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Report of the Secretary of War; being part of the message and documents communicated to the two Houses of Congress at the beginning of the second session of the Fifty-fourth Congress, 1896

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REPORT

OF THE

SECRETARY OF WAR;

BEING PART OF

THE MESSAGE AND DOCUMENTS

COMMUNICATED TO THE

TWO HOUSES OF CONGRESS

AT THE

BEGINNING OF THE SECOND SESSION OF THE FIFTY-FOURTH CONGRESS.

IN THREE VOLUMES.

VOLUME I.

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VOLUME I.—ANNUAL REPORTS.

NOTE.—The annual reports of the Chief of Engineers and Chief of Ordnance are published in Volumes II and III, respectively.

REPORT

OF

THE SECRETARY OF WAR.

WAR DEPARTMENT,

Washington, D. C., November 24, 1896.

To the PRESIDENT:

I have the honor to submit the following report of the operations of this Department for the past year.

The expenditures for the fiscal year ended June 30, 1896, the appropriations for the present year, and the estimates of amounts required for the year beginning July 1, 1897, are shown in the following statement:

Title.	Expenditures for fiscal year ended June 30, 1896.	Appropriations for fiscal year ending June 30, 1897.	Estimates for fiscal year ending June 30, 1898.
Salaries and contingent expenses	$1,436,795.00	$1,485,956.00	$1,464,236.00
Pay, etc., of the Army	13,505,068.09	13,103,512.73	13,522,880.15
Subsistence of the Army	1,488,286.64	1,650,000.00	1,659,837.50
Regular supplies, Quartermaster's Department	1,858,288.09	2,200,000.00	2,200,000.00
Incidental expenses, Quartermaster's Department	555,784.90	600,000.00	600,000.00
Barracks and quarters and hospital construction	820,726.06	932,000.00	832,000.00
Shooting ranges and contingencies of Army	10,978.87	25,000.00	25,000.00
Cavalry and artillery horses	109,773.45	130,000.00	130,000.00
Army transportation	2,321,727.54	2,400,000.00	2,500,000.00
Clothing, etc	1,310,204.46	1,050,000.00	1,100,000.00
Medical Department	142,436.56	155,500.00	155,200.00
Ordnance Department	1,356,884.55	1,089,000.00	1,131,000.00
Military Academy	458,084.19	449,525.61	521,812.83
Fortifications and seacoast defenses	2,867,464.75	7,273,388.00	15,822,043.75
Arsenals, etc	399,845.43	239,645.50	139,796.00
Rivers and harbors	17,844,560.43	15,963,458.96	5,349,000.00
Parks, cemeteries, military posts, etc	808,067.99	1,018,938.00	1,558,380.00
National Soldiers' Homes	3,133,181.42	3,208,478.75	3,443,214.23
Artificial limbs, etc	138,637.72	577,000.00	191,000.00
Buildings and grounds in and around Washington	388,736.54	153,350.65	139,992.75
Miscellaneous items	847,765.94	339,490.00	397,990.00
Total	51,803,298.62	54,044,244.20	52,883,383.21

The aggregate of appropriations for this Department unexpended and turned into the general fund of the Treasury at the end of the last fiscal year was $1,975,033.07. For the year 1895 it was $1,764,467.98, and for 1894 it was $1,387,922.21.

ARMY SERVICE AND STATIONS.

During the past year the only active operations devolved upon the Army consisted of scouting in the mountains of Arizona and in the Mexican territory adjacent to the Arizona line, with the object of the capture of renegade Apaches, who, in December, 1895 and March, 1896, raided into Arizona from their resorts south of the boundary line and committed three murders within our own territory. Detachments of troops were immediately sent in pursuit; two of the Indians were killed and one captured. The remainder of the band of renegades were pursued 150 miles south of the Mexican line where the trail could be no longer followed. The pursuit was continued into Mexican territory under an international agreement between the United States and Mexico, which provided for the reciprocal crossing of the frontiers by the armed detachments of either country when in actual pursuit of hostile Indians. The service performed was very arduous, and involved over 42,000 miles march of various organized detachments.

Under the call of the United States marshal made in August last, troops were called out in the Department of Arizona to protect the American portion of the town of Nogales against a raid of filibusters and Mexican Indians. There were no casualties among the troops, but six Mexicans and eight Indians were killed in the Mexican portion of the town before the arrival of the troops. The object of the raid was the capture and plunder of the custom-house. The timely appearance of the troops probably prevented a serious disturbance and the loss of life and property of American citizens.

In the Department of Dakota troops were sent to the scene of alleged depredations by Indians near the Tongue River Agency in Montana and to protect the citizens.

The band of refugee Cree Indians, a Canadian tribe who have lived in Montana for several years, were, in pursuance of the act of Congress approved May 13, 1896, collected, deported, and delivered by our troops to the officials of the Canadian Government—a delicate duty, which was performed with expedition and discretion.

In response to the request of the Secretary of the Interior, a detachment of troops was ordered to the capital of the Choctaw Nation in the

Indian Territory, to prevent expected trouble at a tribal election and the inauguration of a governor. The trouble was averted and the troops were withdrawn.

The military posts of Fort Stanton in New Mexico, Fort Buford in North Dakota, Fort Hancock in Texas, and Fort Omaha in Nebraska have been discontinued since October last, and the garrisons withdrawn. The new posts of Fort Harrison, Montana, Fort Crook, Nebraska, and Little Rock, Arkansas, have been occupied.

To promote the efficiency of the troops several transfers of regiments and exchanges of stations have been made during the year. The Twenty-fourth Infantry, which has had over thirty years' continuous service in Texas and the Southwestern Territories, was transferred to Fort Douglas near Salt Lake City. The Fifteenth Infantry, after five years' service near Chicago, has taken the place of the Twenty-fourth, and the Fourth Infantry, which has been in Idaho and Washington for ten years, has succeeded the Fifteenth. The Fifth Artillery was brought to posts in New York Harbor after six years' service on the Pacific Coast. Nine regiments in all were changed.

The equivalent of 5 regiments are now stationed in the Pacific States, 15 are east of the Missouri River and the meridian of Kansas City, and 20 regiments are still located in the plains and mountain country, extending westward from the Missouri River to the eastern boundary of the Pacific States. Of the cavalry arm, 1 regiment is on the Pacific, 1½ regiments are east of the meridian of Kansas City, and the rest, 7½ regiments, are serving in the prairie and mountain region, where are the homes of nearly all the Indians who are still capable of making trouble. One regiment of artillery is serving on the Pacific Coast, 1 on the Gulf, and 3 on the Atlantic. Of 10 batteries of field artillery, 2 are in California, 1 in Texas, 3 in Kansas, 1 in Illinois, 1 in Rhode Island, 1 in New York, and 1 in the District of Columbia.

There are seventy-seven military posts in all. Six have garrisons of one company each, seventeen have two companies, nine have three companies; there are nine of four companies, four of five companies, seven of six companies, two of seven companies, and twenty at which eight or more companies are serving.

STRENGTH OF THE ARMY.

The number of enlisted men in the service on October 31 was 25,426, or 284 less than the number authorized by law. Deducting the sick, those absent on furlough, recruits not joined, the men employed in the

staff departments and on detached service, the effective field strength of the Army on that day was 22,382 of all arms. The number of officers of the line is 1,619. Of these, 1,300 are serving with their regiments and 319 are on detached duty. The number of officers on detached service in 1895 was 324, and on the 30th of June, 1893, it was 470. The strength of the Army as fixed by statute or in pursuance thereof is—

Arm.	Officers.		Enlisted men.	
	Line.	Staff.	Companies and regiments.	Staff.
Cavalry	447	.....	6,170	.....
Artillery	288	.....	4,025	.....
Infantry	884	.....	13,125	.....
Engineers	.....	.....	500	.....
Hospital Corps	.....	.....	.....	710
Staff	.....	528	.....	1,180
	1,619	528	23,820	1,890
Total	2,147		25,710	

The distribution of the troops by geographical departments, according to the latest returns, is as follows:

Department.	Officers.	Enlisted men.	Total.
California	118	1,455	1,573
Colorado	250	3,179	3,429
Columbia	124	1,501	1,625
Dakota	194	2 433	2,627
East	522	6,670	7,192
Missouri	334	4,203	4,537
Platte	201	2,517	2,718
Texas	142	1,771	1,913
Total	1,885	23,729	25,614

LINE ORGANIZATION.

The defects of regimental organization that have been pointed out in previous years have not yet been remedied, but measures pending in both Houses of Congress will, if passed, accomplish that result. In respect to the need of reorganization, thirteen years ago General Sherman, in his last report as General in Chief, strongly recommended—

* * * That each regiment of infantry be composed of twelve companies, the same as now with the artillery and cavalry, making three battalions of four companies each in time of peace and eight companies in time of war. * * * The militia and volunteers of the States would soon follow suit, and we should have

throughout the country these small, handy battalions of four companies instead of the large cumbersome regiments of ten companies—a bad tactical unit and in practice always scattered.

Lieutenant-General Sheridan, in 1884, remarked:

I have no scheme to present for reorganization. * * * Were I called upon to recommend any change whatever, it would be simply to make a uniform organization of the three arms of service by adding two companies and the corresponding majors to each regiment of infantry.

In the last report submitted by Lieutenant-General Schofield as Commander of the Army, he remarked:

The reorganization of the infantry of the Army into three-battalion regiments, as long urged by military men, still remains under the consideration of Congress. So, also, the necessary increase of the artillery to provide for the seacoast defense. * * * I beg leave to suggest that this is a favorable time for the dispassionate consideration of this subject with a view to * * * such improvement or organization as will make the Army thoroughly efficient for the purposes for which it is maintained.

Since these recommendations were made there has been no improvement in means of offense or defense that should warrant us in departing from the advice of these distinguished leaders, and I renew my recommendation, contained in previous reports, that the infantry be reorganized upon the general idea of three light and mobile battalions of four companies each to the regiment, instead of the unwieldy ten-company formation that was adopted in 1798 and is still adhered to for the infantry arm.

The completion of several defensive works and installation of their modern armament at points where no troops are stationed, and the approaching completion of other modern batteries, suggest the pressing need of a larger force of artillerists than is now available. The present approved plans of seacoast defense involve the establishment of upward of 100 distinct batteries, grouped in 20 or more harbors. In each must be a garrison of sufficient strength to take care of all the guns and other public property in the harbor, and the maintenance of all in a state of efficient defense. Some addition to the present force of artillery will therefore be indispensably necessary.

The number of line officers serving with their commands is larger comparatively than at any time since the last war.

The number detached for duty at Washington and at department headquarters has been reduced from 55 in 1893 to 30. The change in the method of recruiting has permitted a reduction of officers detached for that service from 106 to 28. The number of officers attached to

service schools has been reduced from 75 in that year to 54, and the number assigned as instructors in military departments of schools and colleges and to the militia of the States has been increased from 96 to 128. Officers detached for miscellaneous duties have been reduced from 85 to 40.

STAFF ORGANIZATION.

In previous reports attention has been called to what are believed to be defects in the organization of the Army staff—a redundancy of staff corps, more officers in some corps than can be usefully employed, and an excessive number of staff officers of high rank.

Notwithstanding the reductions that have been recently made, the public interests have in no manner suffered as a consequence, the work is not in arrears or lacking in thoroughness, and there has been no complaint to the Department that any officer is overworked. On the contrary, it is believed that some further reductions can be made without detriment to the service.

Any temporary deficiency of staff officers can be readily and satisfactorily supplied by details of officers of the line, a course which would meet every possible necessity of the service.

In the three departments that deal with Army pay and supplies 105 staff officers are now allowed by law. A consolidation of these departments, as heretofore recommended, would accord with sound business methods, and would in itself work a large reduction in the number of officers employed.

The work of the Corps of Engineers, always important, has during the past season been unusually heavy. The fortification act carried the largest amount ever appropriated for this object in one act, and the expansion of work necessitated by it, together with the large amounts provided for river and harbor work, has called for the greatest activity on the part of its officers.

The Chief Signal Officer of the Army reports gratifying success in important experiments and tests of inventions pertaining to the functions of that corps, and shows that our Army is fully abreast of the progress of the times in this branch of the service.

DRILL AND INSTRUCTION.

During the year the system of drill as laid down for the field artillery and cavalry has been revised, published, and is now in use. The infantry drill book has also been revised and will be published before the close of the year.

Manuals and handbooks more clearly specifying the duties of several staff departments than are found in the general Army

Regulations have been published during the year. A compilation of the Federal laws relating to the Army, with references to decisions of the courts and accounting officers, has been prepared and will soon be published and distributed to the Army.

The post lyceums have been well sustained and good results secured through lectures, essays, and discussions. Their sessions have been well attended, and the character of the papers submitted and the diversity of subjects treated gives evidence of intelligent zeal and interest in the work and of ambition to keep abreast with the march of improvement, not only in respect of military science, but the other branches of human knowledge that should interest officers of the Army.

The War Department library, under the charge of the Chief Signal Officer, has received many additions during the year, the new books all of a high standard and selected with care and intelligence. It has been very greatly improved in character and usefulness, and may now be classed favorably with the military libraries of the world. In order that it may serve the Army at large, as well as the officers in Washington, books are now supplied to any officer, wherever stationed, on the sole condition that they shall be returned in good condition within a reasonable time.

Field maneuvers and marches for practice, in addition to the usual drills, are carried on at all the posts, with results of conceded benefit.

The department commanders bear testimony that the discipline of the troops within their commands was never better than now. The number of trials by general courts-martial was about 15 per cent less during the past year than during the year previous.

SUBSISTENCE.

The number of purchasing stations of subsistence stores has been reduced by four during the year, but there has been no difficulty in securing all the supplies required, and upon favorable terms as to price. The economy that has resulted from their discontinuance and the reduction in the number of officers amounts to several thousand dollars.

The close proximity of nearly all the garrisoned stations to lines of railroad has facilitated supply and made it unnecessary to accumulate large stocks of provisions at the remote posts, as was required a few years ago. Losses from wastage, damage, and deterioration are much reduced.

The articles of food that should constitute an emergency ration, to be supplied when the full ration can not be transported, have been specified and defined.

The consolidated mess for all the men of a garrison has many features to recommend it, but it has not met with general approval. For two years past all new barracks built or planned provide for company cooking and messing.

THE POST EXCHANGE.

The exchange is a general cooperative store, maintained under strict military supervision, but without expense to the Government, at nearly all military stations, by the enlisted men, in which are kept for sale most of the commodities that are in demand at military posts. The receipts last year from all sources were more than one and a half million dollars, with net profits of about $350,000. These, after deducting a reserve balance of $105,000, were distributed for the following objects: Paid to the various commands as their share of the net profits and applied to better the messes, $225,000; donated to improve the regimental bands, over $8,000; nearly $2,000 to cultivate gardens; over $1,000 for books and periodicals for the reading rooms; nearly $5,000 for gymnasia, and over $3,000 as prizes in athletic sports.

There are now but two garrisoned posts with sutlers, and in these cases exceptional reasons exist for a continuance of the old system.

HEALTH.

In no previous year of the history of the Army has the health of the troops been so satisfactory as during the last fiscal year. Each soldier was sick 12.4 days, as against a record of 15.3 for the preceding ten years. The number of soldiers so disabled as to require their discharge from service was 9.15 per thousand, as compared with 23.77 annually for the preceding ten years. The mortality rate was 5.16 per thousand of mean strength, as compared with 7.85 for the preceding decade. The enlisted men of the colored regiments are apparently less susceptible to most diseases than the whites. The reports show that each white soldier lost 12.6 days on account of sickness, while the men of the colored regiments lost but 9.6 days.

The officers of the Medical Department are usefully employed. There are on duty at posts serving with troops 148, an average of about 2 to each post. The rest, 29 in number, are required for duty as assistants in the Surgeon-General's Office, chief surgeons of Departments, attending surgeons in cities, and for various other special service.

The experience gained in carrying on the Army and Navy Hospital

at Hot Springs, Ark., does not appear to have sustained expectations in regard to its value to the officers and men of the Army and Navy, nor do those expectations appear to be realizable. It would seem that the only way to keep the hospital filled would be to compel the sick of the Army and Navy to go there for treatment.

The present buildings have a capacity for 80 patients—16 officers and 64 enlisted men—but the attendance is seldom more than half the capacity, and frequently not one-fourth. Of the cases admitted, it appears that two-thirds to three-fourths are benefited or cured. Although designed for the treatment of officers and sailors of the Navy, only a few officers have ever availed themselves of its advantages; no sailors have been sent there for many years.

The hospital was erected in pursuance with the act of Congress approved June 30, 1882, and, including furnishing, cost $140,500. Two officers of the Medical Department and one of the line are stationed there, and a detachment of the Hospital Corps. The annual cost of the establishment to army appropriations, including pay, rations, clothing, and all supplies, amounts to a sum that it has been estimated would be ample to pay for first-class hotel accommodations at Hot Springs and for the best professional attendance for all the officers and soldiers who now avail themselves of the privileges of treatment in the hospital or who are sent there for that purpose. It does not seem that the establishment should be maintained by the War Department. I therefore recommend that authority be granted by Congress for its transfer to the Interior Department, and lease for private use, the same as building sites and spring-water privileges on the Government Hot Springs Reservation are now leased. If this is done, a considerable revenue should be derived, and the hospital and army appropriations somewhat relieved.

PAYMENT OF TROOPS.

The Paymaster-General reports that during the year the Army was paid monthly, the first year in which this result has been attained. It has been accomplished with a less number of paymasters than were last year available. The amount disbursed was upward of $14,000,000, or a little more than one-fourth of the entire appropriation for the Military Establishment.

Rules to govern the payment of troops by check and by currency sent by express, as authorized by the act of Congress approved February 27, 1893, were embraced in the new edition of Army Regulations, and

went into effect in November of last year, although payments under the act cited had been made to a limited extent for some years. About one-half the enlisted men now receive their monthly pay in the form of checks sent by mail or in cash sent by express, and long and expensive journeys of paymasters are not now required.

The express charges on the money disbursed is about the same under the new system as it was under the old, for it has for some years been customary to utilize the express facilities for forwarding funds, the paymaster and clerk usually proceeding by the same conveyance that transported the money, and when arrived at the destination the officer receipted for the package that he himself had shipped.

The paymaster's function at the post was confined to a distribution of the money that had been forwarded at public charge. The change in method consists in requiring one of the officers at the post to distribute these remittances, so saving the Government in each case the expense of the journey of two persons and of so utilizing the services of the pay officers that a smaller number may be able to pay the army.

The system was in operation for seven months of the last fiscal year, and under it about three-fourths of the posts and stations were paid. The sum thus disbursed since December, 1895, amounts to $2,720,000, and during that period two cases have been reported of discrepancy between the amount claimed to have been shipped and the amount received at destination. The sum now involved is but $26.92, or one one-hundred thousandth of one per cent of the disbursement.

After a few months' trial of the system as prescribed by the rules first promulgated, it was seen that some slight modification of the requirements and a more precise specification of the duties of the paymasters and of the officer distributing the pay were desirable. If discrepancies should hereafter occur, which is improbable, there will be no difficulty in fixing the responsibility for the error.

The institution of this system of payment results in a considerable economy, and also insures the prompt payment of every soldier at the close of each month. The experience so far gained also indicates that habits of economy on the part of the enlisted men are encouraged, for the soldiers' deposits during the year were more than $100,000 greater than during the year previous. The saving to Army appropriations resulting from the improvement of the pay system arises from a reduced cost for transportation of paymasters and their clerks, and some reduction in other expenses. The aggregate of these items will be more than $25,000 annually.

The total number of paymasters below the grade of brigadier-general is 25, and each of these officers is furnished with a clerk. There is no other duty devolved upon the Pay Department save that of distributing the pay to the Army and the Military Academy and of disbursing the mileage appropriation. When the methods that are customary among business men and corporations of paying their employees shall have been more generally applied in the Army, there is little doubt that the present force of paymasters will be found to be larger than the necessities of the service require.

The amount expended last year from the mileage appropriation was about $106,000, and this included about $50,000 paid to officers as a reimbursement for outlays made by them of full fares paid to railroads over a part of which the Government is entitled to transportation at 50 per cent of regular rates. The accounting officers of the Treasury have raised objections to the reimbursement of officers in amount greater than the railroads are entitled to receive, but the enforcement of such a rule would work an injustice to the officer, who must advance full fare. The only practical remedy that has been suggested is to transfer to the Quartermaster's Department the duty of furnishing transportation orders on all the railroads to officers who are traveling under orders without troops, the same as is done now for all other officers who travel with their commands; but this involves a change in the existing law, which I recommend.

The estimates submitted this year for mileage call for $80,000, against $140,000 appropriated last year. The difference, $60,000, is made up of $10,000 saved in the mileage appropriation and $50,000 that will not be required when all transportation to officers traveling without troops is furnished by the quartermasters, their disbursements being paid from the general appropriation for Army transportation. The Government will thus secure the advantage of half rates over the 50 per cent roads, and the officers will not be obliged to make any advances.

RECRUITING.

The total number of men enlisted last year was 8,498, of whom nearly one-half were secured at garrisoned posts without expense. The remainder, 4,636 in number, were enlisted in the cities, and almost 3,000 of these proceeded directly from places of enlistment to the regiments to which they had been assigned, while the rest were assembled in rendezvous before they were sent to their regiments. There were no guards or escorts for either class, and therefore no expense attended their journeys save the regular railroad fare.

Shortly before the recruiting depôts were discontinued in October 1894, there were upward of 1,500 men detained at those establishments. All recruits now reach their companies a few days after enlistment, and come immediately under instruction by the officers under whom they are to serve. There is no time lost, and they become trained soldiers much sooner than under the old system.

The new practice receives the hearty commendation of all who have observed its practical working. Besides the advantage to the service through higher efficiency, the economies in direct expenditures reach a large sum, while the indirect and consequential economies are also important, one of which was the addition to the available barrack accommodation for regular garrisons of three well-built posts that were very favorably situated for military purposes.

DESERTION.

When the policy was inaugurated of very greatly reducing the reward authorized to be paid for the apprehension of deserters from the Army, and of discontinuing the military prison—which for twenty years had been maintained exclusively for the confinement of violators of the rules of army discipline—apprehensions were expressed by some lest there should ensue a great increase in the number of army deserters, but the result has not justified the forebodings; in fact, it seems to have been proven that the discipline and efficiency of the service were in no way affected by the prison, which was established in 1874 and discontinued on the 30th of June, 1895. Up to 1891 the reward authorized to be paid for deserters was $30 but during that year it was increased to $60, and in 1894 it was reduced to $10. Army desertions numbered 7,157 the year immediately preceding the establishment of the prison. In 1883 there were 3,578 deserters; in 1893, 1,682; and during the fiscal year just closed the number reached 1,365.

The expenditures from specific appropriations made on account of the Leavenworth Prison were about $73,000 annually, while the annual appropriations for the Army were drawn upon for the compensation and allowances of the 7 officers and 130 soldiers who were employed as wardens, turnkeys, guards, etc., and for other incidental expenses connected with the establishment, the total expenditures, direct and indirect, amounting to about $135,000 per annum, without counting the rewards paid for the apprehension of deserters, which yearly reached about $26,000.

While a reward of $60 was paid, 4,139 men deserted, 1,265 were apprehended, at a cost of $75,909, and 594 surrendered themselves. During the last two years, the reward being only $10, there were 2,530 deserters, of whom 361 were apprehended, at a cost of $3,615, and 314 voluntarily gave themselves up. The desertions in the former period of three years numbered 1,380 per year, and in the second period of two years they were 1,265 each year. These figures indicate that desertions were certainly not decreased by fear of punishment as formerly administered at Fort Leavenworth; in fact there is a falling off since the prison was closed of more than 100 desertions yearly.

All expenditures for the prison are now discontinued, and the officers and soldiers who were formerly there are now rendering efficient service with their appropriate commands. All offenders against military law are now confined at the larger permanent posts, where their labor is most useful to the Army. The total number of these men who were under discipline on October 1 was 276, while 11 men, who were guilty of offenses amounting to common-law felonies, are confined in penitentiaries.

THE MILITARY ACADEMY.

The Superintendent of the Military Academy at West Point reports that the state of discipline of the corps of cadets has been generally admirable. The precision of movement of the battalion and the general excellence of drill in all the military exercises in which cadets are instructed have never been greater than during last year.

The health of the cadets for the year was far from satisfactory. An expert investigation into the prevalence of malarial fevers pointed to the use of unfiltered water as a cause. Appropriations are therefore earnestly recommended for filter beds and for other necessary improvements to insure the healthfulness of the water supply of the post.

The number of cadets was 332, the largest number that has ever attended the academy at one time. Nevertheless there were forty vacancies reported in the number assigned by law to the Congressional districts. Full use should be made of the facilities for military instruction which the academy affords, and I renew the recommendation of my former reports that the President be permitted to name ten cadets at large each year. Authority should be somewhere lodged to fill the vacancies in the Congressional district representation where for any reason there is a failure to appoint.

MILITARY INSTRUCTION AT COLLEGES.

Military instruction was imparted by officers of the Army at 106 schools and colleges during the past fiscal year. Reports of officers on duty show that 1,376 students attended artillery drills and 9,760 attended infantry drills. Equipments for signaling have been issued to 42 schools, and interest and instruction have reached that point that 16 schools and colleges held military encampments for longer or shorter periods, during which the students led the daily life of the soldier in the field. This fact, with others noted in the reports of officers in charge of instruction at schools and colleges, shows that the effort of the Government to encourage military discipline and training among the youth of the country is appreciated by those in whose behalf it is put forth, and, on the other hand, that the Government is securing an adequate return for the employment of its officers on this duty. The system has made steady progress since its inception.

SERVICE SCHOOLS.

The four service schools now provide excellent facilities for officers to pursue technical studies in the higher branches of their profession.

A school for officers and men of the artillery arm has been maintained at Fort Monroe since 1867, and has attained a high standard of excellence. Each regiment of artillery is represented at this post by one or more companies, of which there are eight in all. To these organizations are attached, for terms of two years, the subaltern officers of other companies, so that all the officers of artillery have opportunity to receive the benefit of this special training.

At Fort Leavenworth a school for the higher instruction of young officers of infantry and cavalry has been maintained since 1881. It was established by the late General Sherman as a school of application in the three arms, but by degrees its character has undergone some change, in many respects taking the character of a post-graduate school, including practical maneuvers. The instruction given is of great value, and the desire to take the two-years course is now as common as was formerly the objection to it. A full regiment of infantry and a squadron of cavalry constitute the garrison of the post.

The school at Fort Riley, established in 1887, is entirely a practical one, the text-book filling a minor part, and the instruction in field exercises and combined movements of the three arms is of great value to the service. The command consists of eight troops of cavalry and

three batteries of field artillery, the infantry from Fort Leavenworth marches to this post for participation in the exercises.

In 1866 the Chief of Engineers organized an engineering school at Willets Point, and in 1885 it was formally recognized by the War Department. The object of the school is to provide a post-graduate course in engineering for the young officers of the Corps of Engineers, and to give them practical instruction in their duties with engineer troops, in submarine mining, and higher military engineering. Selected officers from other arms of the service are also detailed for instruction at this school in certain practical branches. The garrison consists of three companies of the Engineer Battalion, under its battalion commander, and all is supervised by the Chief of Engineers. The course for engineer officers is three years, and for the officers of other arms one year. The value of the training given here is recognized by all who are familiar with its scope. The participation of young infantry and cavalry officers in its advantages has been most beneficial.

The medical school is in Washington, and conducted under the supervision of the Surgeon-General. It was established for the purpose of instruction of the newly appointed medical officers and such others as might be authorized to attend. The session of the school is of four months' duration for the students, and the curriculum includes the special duties of army medical officers. The faculty consists of officers who are stationed in Washington or vicinity.

STATE TROOPS.

There are now 35 army officers regularly assigned to State headquarters, and in addition to these 31 officers have been detailed on temporary duty during the past year at State encampments. All concur in reporting a steady improvement in the training and efficiency of the militia.

Camps of instruction were held in thirty-one States, and in several instances regular troops were encamped with the militia, serving not only to furnish an object lesson in matters of detail, but also to promote cordial relations between the Regular and State forces.

Within the past year effort has been made to obtain more reliable and complete information than has heretofore been secured concerning the amount of the actually serviceable articles of military supplies in the hands of the State troops, as well as the additions that would be

required if they were to take the field. The returns received indicate so serious a deficiency in almost every item of armament and equipment necessary for field service, that the General Government should no longer withhold the appropriations necessary to place the State forces on a better footing to render efficient aid whenever called into the service of the United States.

The States appropriate nearly $3,000,000 annually for the support of the militia, not counting contributions from private sources and time spent in armory drilling, for which no pay is allowed. The General Government appropriates $400,000, to be drawn in money or equipment, as the State authorities may elect.

When the States furnish the armories and defray all expenses incidental to keeping their forces in training, it is suggested that the United States should provide them with the implements which they will need in active service—arms and field equipment—as the supply on hand is totally inadequate for serious and prolonged field operations.

Recommendations made last year are again submitted for action by Congress which, if approved, will materially benefit the militia without increase of expense.

The first is that the States be allowed to return such unserviceable, worn out, or obsolete stores and weapons as have been advanced to them by the War Department in past years, that they be sold for what they will bring, and the proceeds credited to the allotments to the respective States and Territories for arming and equipping their militia.

The second is that the Secretary of War be authorized to issue Springfield rifles of caliber .45 to each State and Territory in exchange for other rifles now held; and,

The third is, that any State or Territory may, in addition to the stores and supplies issued under the act for equipping the Militia, purchase at regulation prices, such Army stores and supplies as the Secretary of War may approve.

The following table shows the number of officers and men comprising the organized militia of the States and Territories, and allotment to each of the annual appropriation by the General Government, and the appropriations made by each State and Territory.

The artillery arm, comprising 4,716 officers and men, is maintained in thirty-four States, and the cavalry, comprising 4,936 officers and men, is maintained in twenty-six States.

State.	Aggregate strength.	Federal appropriation.	State appropriation.
Alabama	2,552	$9,488.73	$24,000.00
Alaska	None.	None.	None.
Arkansas	961	6,900.90	None.
Arizona	442	2,000.00	300.00
California	3,836	7,763.51	111,800.00
Colorado	890	3,450.45	31,344.50
Connecticut	2,779	5,175.67	140,000.00
Delaware	390	2,587.83	3,000.00
District of Columbia	1,339	8,000.00	27,525.00
Florida	1,088	3,450.45	12,000.00
Georgia	3,193	11,213.96	15,000.00
Idaho	594	2,587.83	255.00
Illinois	6,228	20,702.70	180,000.00
Indiana	2,821	12,939.18	45,000.00
Iowa	2,441	11,213.96	50,200.00
Kansas	1,506	8,626.12	16,500.00
Kentucky	1,597	11,213.96	10,000.00
Louisiana	1,994	6,900.90	24,500.00
Maine	1,367	5,175.67	32,447.83
Maryland	1,732	6,900.90	45,000.00
Massachusetts	5,227	12,939.18	256,900.00
Michigan	2,524	12,076.57	73,286.11
Minnesota	1,935	7,763.51	50,000.00
Mississippi	1,769	7,763.51	4,400.00
Missouri	2,219	14,664.41	10,000.00
Montana	406	2,587.83	22,400.00
Nebraska	1,199	6,900.90	30,000.00
Nevada	400	2,587.83	None.
New Hampshire	1,390	3,450.45	30,000.00
New Jersey	4,063	8,626.12	167,554.27
New Mexico	429	3,000.00	1,600.00
New York	13,242	31,054.05	448,000.00
North Carolina	1,410	9,488.73	6,000.00
North Dakota	530	2,587.83	11,000.00
Ohio	6,229	19,840.09	317,235.24
Oklahoma	550	1,409.48	None.
Oregon	1,540	3,450.45	60,000.00
Pennsylvania	8,250	27,603.60	350,000.00
Rhode Island	1,268	3,450.45	67,074.20
South Carolina	3,530	7,763.51	10,000.00
South Dakota	795	3,450.45	300.00
Tennessee	2,379	10,351.35	8,000.00
Texas	3,000	12,939.18	5,000.00
Utah	974	2,590.60	3,500.00
Vermont	800	3,450.45	18,000.00
Virginia	3,006	10,351.35	11,372.00
Washington	1,051	3,450.45	20,000.00
West Virginia	892	5,175.67	15,000.00
Wisconsin	2,620	10,351.35	110,000.00
Wyoming	510	2,587.83	5,000.00
Total	111,887	400,000.00	2,880,854.15

SEACOAST DEFENSES.

APPROPRIATIONS.

The following table shows the amounts of money appropriated, or authorized for expenditure under contract, for gun and mortar batteries, submarine defenses (including mining casemates), sites, guns, mortars, gun carriages and mortar carriages, since the date of the report of the Board on Fortifications and Other Defenses, appointed pursuant to the act of Congress approved March 3, 1885, for the purpose of carrying out the recommendations of that Board:

Act.	Fortifications.			Armament.			
	Gun and mortar batteries.	Submarine defenses	Sites.	Guns.	Mortars.	Gun carriages.	Mortar carriages.
Sept. 22, 1888	.....	$140,081.08	.....	$1,500,000.00	$250,000.00	.....	.....
Mar. 2, 1889*	.....	500,000.00	.....	35,000.00	.....	.....	$100,000.00
Aug. 18, 1890*	$1,221,000.00	200,000.00	$500,000.00	70,000.00	400,000.00	.....	225,000.00
Feb. 24, 1891	750,000.00	100,000.00	500,000.00	870,000.00	.....	100,000.00	.....
July 23, 1892	500,000.00	.....	500,000.00	925,000.00	100,000.00	300,000.00	200,000.00
Feb. 18, 1893	50,000.00	.....	175,000.00	775,000.00	.....	200,000.00	100,000.00
Aug. 1, 1894	500,000.00	.....	150,000.00	425,000.00	.....	100,000.00	.....
Mar. 2, 1895	500,000.00	40,000.00	.....	425,000.00	.....	100,000.00	.....
June 6, 1896	†4,900,000.00	100,000.00	500,000.00	1,548,206.00 ‡3,580,373.25	810,000.00	1,114,500.00	378,000.00
Total	8,421,000.00	1,080,081.08	2,325,000.00	10,153,579.25	1,560,000.00	1,914,500.00	1,003,000.00

*These acts carried authority for 100 guns to be manufactured under contract.

†Contracts to amount of $2,500,000, but appropriation not yet made.

‡Contract price with Bethlehem Iron Company for 100 guns. Final payment, at the option of the Government, not due till 1903; $2,730,131.25 yet to be appropriated.

Aggregate for permanent defenses (including sites)	$11,826,081.08
Aggregate for armament	14,631,079.25
Grand aggregate	26,457,160.33

Deducting the amount for sites and unappropriated amounts under the act of June 6, 1896, and under the Bethlehem Iron Company's contract, leaves $18,902,029 as the amount actually appropriated for fortifications proper and their armament.

THE ACT OF JUNE 6, 1896.

In considering the above aggregate of $26,457,160.33, it is to be noted that $9,350,000, or between one-third and one-half of the total since 1888, was carried by the act of June 6, 1896. So much of the latter sum as became available for immediate expenditure was allotted or placed under contract as soon as was practicable. The additional amount authorized has either been placed under contract or will be so placed at a very early date on proposals which have been invited. But all of the actual results of this expenditure can not be apparent for some time to come.

The act appropriated $2,400,000 for gun and mortar batteries, to be expended in the manner heretofore usual in this kind of work. Of this sum a small part was reserved to provide for the expense of supervision of the work which the same act authorized to be done by contract. The remainder of the amount actually appropriated was allotted for the construction of the following emplacements:

Six emplacements for 12-inch guns—four on disappearing carriages and two on nondisappearing carriages;
Twenty-eight emplacements for 10-inch guns on disappearing carriages;
Three emplacements for 8-inch guns on disappearing carriages;
Eight emplacements for 5-inch rapid-fire guns;
Four emplacements for 6-pounder rapid-fire guns;*
Forty-four emplacements for 12-inch mortars in four batteries.

The last of these emplacements will be completed, ready for its armament, by July 1, 1897.

The act further authorized the Secretary of War to enter into contracts "for material and work for construction of fortifications, to be paid for as appropriations may from time to time be made by law, to an additional sum in the aggregate not to exceed two million five hundred thousand dollars." Under this authority proposals have been invited for the construction, under contract, of the following emplacements:

Seven emplacements for 12-inch guns—five on disappearing carriages and two on nondisappearing carriages;
Nineteen emplacements for 10-inch guns—eighteen on disappearing carriages and one on a nondisappearing carriage;
Fifteen emplacements for 8-inch guns on disappearing carriages;
Four emplacements for 5-inch rapid-fire guns;
Thirty-two emplacements for 12-inch mortars in three batteries.

The last of these emplacements will be ready for its armament December 1, 1897.

As will appear from the report of the Chief of Engineers, the Department in making these allotments was guided by a desire to protect as many of the seaports as practicable against marauding attacks of isolated cruisers as well as to provide a more efficient defense for the important places. In some cases, for economy both of time and money, locations were selected for expenditure where the Government already

*Two of these partially completed from prior allotments.

controlled the site or had a working plant. Finally, the allotment has been so made as to utilize to the best advantage the guns for which carriages could be most speedily furnished.

Some unavoidable delay has arisen in placing contracts, due in part to protracted legal proceedings in securing the needed sites, in part to certain changes in the style of carriage to be furnished, which required new designs for platforms. The work has been pushed as rapidly as possible, and it is believed that all proposals for contract work will be received early in December, except in two cases, where proposals have not yet been invited, due to nonownership of sites.

The following is a summary of the emplacements provided for by the act of June 6, 1896, including both those built by hired labor and by contract:

12-inch.		10-inch.			8-inch.	Rapid-fire.		Mortar.
F. P. disappearing.*	Nondisappearing.	C. P. disappearing.*	F. P. disappearing.	Nondisappearing.	F. P. disappearing.	5-inch.	6-pounder.	12-inch.
9	4	1	45	1	18	12	2	76

* F. P.=Front pintle; C. P.=Center pintle.

These figures are, of course, subject to slight change as the work progresses. In some cases it is hoped that the numbers may be increased by means of savings made from some of the allotments, thus enabling additional emplacements to be constructed.

The $100,000 appropriated for submarine defenses is being expended in part in the construction of three mining casemates and cable storage tanks and torpedo storehouses at ports where all or part of the necessary mine equipment has been provided. With the remainder there are being procured such portions of submarine mining material as are not subject to rapid deterioration, and which can not be hurriedly procured in an emergency.

The appropriation of $500,000 for the purchase of sites is now practically all pledged. Negotiations have been in progress during the year for the purchase of sites at Portland, Me., Narragansett Bay, Baltimore, and Charleston. In all cases the sites selected for purchase were such—due regard being had to the requirements of the defense—as to make the total cost of batteries and sites a minimum.

Under authority conveyed by the act, a contract has been made with the Bethlehem Iron Company for twenty-one sets of 10-inch

and one set of 16-inch steel gun forgings, while a second contract was made with the Midvale Steel Company for twenty-one sets of 12-inch forgings. The total cost of these forgings is $1,186,821.01, leaving from the appropriation a balance of $19,216.99 to be applied in inspection and incidental expenses.

The price per pound paid for these forgings is 24 cents for the 16-inch forgings, 23.65 cents for the 12-inch forgings, and 23.60 cents for the 10-inch forgings. Under the first contract made by the Department for steel gun forgings the highest price per pound for 12-inch and 10-inch forgings was 30.5 cents and for 8-inch forgings 27.5 cents. Previous to that contract the lowest average prices paid for American forgings for guns of these calibers were those paid by the Navy Department under a contract in 1887, viz, 33, 32, and 29.5 cents, respectively.

For finishing and assembling 8, 10, and 12 inch guns at the Army Gun Factory the sum of $343,168 was appropriated. This is being expended for the purpose authorized as rapidly as the capacity of the factory will permit.

A contract was made with the Bethlehem Iron Company for twenty-two sets of 12-inch mortar forgings, and with the Midvale Steel Company for fourteen sets. For finishing and assembling twenty of these sets a contract has been made with the Builder's Iron Foundry, while the remaining fourteen sets will be finished and assembled at the Army Gun Factory. In addition, a contract has been made with the Bethlehem Iron Company for thirty completed mortars. The prices paid for forgings are 23.5 and 23.9 cents per pound; for completed mortars the contract price is $12,000 per mortar. Thus, for the appropriation of $810,000 the Government obtains sixty-six completed mortars, with a small balance to be applied to inspection and incidental expenses.

Contracts have been made with the Bethlehem Iron Company, the Southwark Foundry and Machine Company, and the Niles Tool Works Company, respectively, for twelve, ten, and eight 10-inch disappearing gun carriages, the latest delivery to be within nineteen months from the date of contract, August 17, 1896. The prices paid are, respectively, $16,400, $12,000, and $15,975. This division of the work was necessary in order to have deliveries completed within a reasonable time. It is hoped that final delivery will be made at an earlier date than that specified in the contract.

In addition, orders have been placed at the Government carriage

factory at Watertown Arsenal for the manufacture of five 8-inch, five 10-inch, four 12-inch disappearing carriages, and five 12-inch nondisappearing barbette carriages.

Enough funds are available from the appropriation to procure twelve 8-inch front-pintle disappearing carriages on proposals now advertised for, one 8-inch, one 10-inch, and one 12-inch carriage, all centre-pintle, and nine 12-inch front-pintle carriages, leaving a sufficient balance for inspection and incidental expenses.

A contract has been made with the Robert Poole & Sons Company for fifty-seven 12-inch mortar carriages, and a contract for ten with the Southwark Foundry and Machine Company. The prices paid are, respectively, $5,396 and $6,000 per carriage. The latest delivery is to be within eighteen months of the date of contract, August 17, 1896. The total cost is $367,572, leaving from the appropriation of $378,000 a balance of $10,428 to be applied to inspection and incidental expenses.

In all cases where different prices have been paid for the same article, it has been necessary in order to secure final delivery within a reasonable time.

The following summary shows the number of gun and mortar carriages provided for by this appropriation:

12-inch.	10-inch.	8-inch.	12-inch mortar.
19	36	18	67

TOTAL NUMBER OF EMPLACEMENTS PROVIDED SINCE FIRST APPROPRIATION, AUGUST 18, 1890.

The total number of emplacements provided by the aggregate of $8,421,000 is 128 gun and 156 mortar emplacements. The following summary shows the proportions of these emplacements as regards the guns and types of carriages to be mounted in them:

12-inch.			10-inch.			8-inch.	Rapid-fire.		Mortar.
Lift.	F. P. disappearing.	Nondisappearing.	C. P. disappearing.	F. P. disappearing.	Nondisappearing.	F. P. disappearing.	5-inch.	6-pounder.	12-inch.
2	9	10	1	64	1	25	12	4	156

The number provided by the act of June 6, 1896, is shown on page 22. Prior to this act, provision had been made for 36 gun and 80 mortar

emplacements. For the construction of 30 gun and 64 mortar emplacements funds had been allotted from the appropriations of 1890, 1891, and 1892. Most of these, however, were completed for the reception of their armament with funds provided by subsequent appropriations. Thus, of the 128 gun and 156 mortar emplacements, 98 and 92, respectively, have been entirely provided for since June 30, 1893.

The above summary shows a very large proportion of emplacements intended to receive guns mounted on disappearing carriages. In fact, of the 481 high-power guns to be emplaced, it is proposed to mount only about 48 on the nondisappearing principle. The intensity of fire delivered from the main and secondary batteries of a battle ship is such as to make adequate cover for the gunners in shore batteries an absolute necessity. This condition, rigidly imposed by the Board o Engineers and various special boards, involved the solution of a most difficult problem. Reference will be made to this in connection with the subject of gun carriages. It is here mentioned only in explanation of the slowness with which emplacements for 12-inch guns have proceeded. Until recently the only practicable method, it was believed, for mounting these guns on the disappearing principle was in a gun-lift battery. In such a battery the gun and carriage are mounted upon a platform which, by hydraulic mechanism, can be lowered in a few seconds to the loading position out of sight of the enemy, and with equal rapidity be returned to the firing position.

In some cases, where the site made it preferable or necessary, it was proposed to mount these guns in casemates protected by armor plates. The combined cost of these two methods was estimated at $39,050,000 for emplacement alone. The device of a satisfactory disappearing carriage would, if it could be used on all sites planned for gun lifts and armored casemates, reduce this cost by more than $20,000,000.

In the hope that the officers charged with this duty would solve the problem, the Department has proceeded very slowly in the matter of emplacements for the 12-inch gun. Only one gun-lift battery has been built. Nearly one-half of the 12-inch emplacements thus far provided are on sites where nondisappearing carriages are a suitable mount. In the belief that the problem has been solved the appropriations committees were informed at the previous session of the present Congress that this Department proposed to spend no more money for gun-lift batteries. While stating this to be the general policy of the Department, it is, of course, without prejudice to the right and duty

of the Secretary of War to recommend whatever method seems at the time to be most judicious.

The emplacements enumerated are distributed among the ports of Portland, Me., Portsmouth, N. H., Boston, Narragansett Bay, eastern entrance to Long Island Sound, eastern and southern entrances to New York, Philadelphia, Baltimore, Washington, Hampton Roads, Wilmington, Charleston, Savannah, Key West, Pensacola, Mobile, New Orleans, Galveston, San Diego, San Francisco, the mouth of the Columbia River, and Puget Sound. I have stated the reasons which have guided the Department in allotting the current appropriation. In addition, it may be said that all of the emplacements have been located with a view to carrying out the project of the Board on Fortifications organized under the act of Congress of March 3, 1885, revised by the permanent Board of Engineers. This project requires:

(*a*) Four hundred and eighty-one high-power guns (excluding the 16-inch gun), so located as to throw, wherever practicable, the exterior line of defense at a minimum of 8 to 10 miles from the place to be, defended;

(*b*) In each locality it requires that the guns shall be so placed that, while themselves having the greatest practicable dispersion, they can concentrate upon any position of an enemy's vessel a fire equal and, if possible, superior to the heaviest that can be brought to bear from the most powerful hostile fleet which can attack this position;

(*c*) To hold these vessels under the fire of the guns and to prevent them from running the batteries, the project requires a complete system of submarine mines so planted as to close all navigable channels to an enemy while offering no obstruction to friendly commerce. This system calls for upwards of 6,000 mines with the appliances necessary for their operation;

(*d*) To protect the mine fields and prevent their destruction by counter-mining or other means, the project requires 361 rapid-fire guns able to give a good account of small, lightly armored vessels used for that purpose;

(*e*) To cover the entire system and prevent an enemy's fleet from occupying an advantageous position from which to attack the batteries, 12-inch mortars are so placed, usually in groups of four combined in a 16-gun battery, so as to make it impossible for a hostile vessel to anchor or remain long in one position within a radius of 5 or 6 miles of the defensive position. For this purpose 1,048 mortars are needed.

To accomplish these objects a few of the high-power guns, where the nature of the site affords sufficient protection from hostile fire, are to be mounted in barbette batteries on nondisappearing carriages. The great majority, however, will be in barbette batteries on disappearing carriages, which, by the force of recoil, are lowered after each shot from the view of the enemy, and by the energy thus stored are easily returned after loading to the firing position. The 12-inch mortars are placed in sunken pits or behind massive parapets in such a way as to be entirely and always screened from view.

The batteries—gun and mortar—thus formed, are made up of the emplacements frequently mentioned in the preceding paragraphs. It will, therefore, be understood that this term does not mean merely the masonry platform upon which a gun with its carriage is mounted, but all that part of a fortification which is necessary for the installation, protection, and service of the gun. In any battery, one emplacement means not only the platform, but all that part of the parapets, traverses, magazines, bombproofs, etc., which is made necessary by reason of that platform and the gun and carriage mounted upon it.

TOTAL NUMBER OF GUNS PROVIDED SINCE FIRST APPROPRIATION, SEPTEMBER 22, 1888.

The following summary shows the total number of guns and mortars completed by July 1, 1896:

Year and place.	8-inch gun.	10-inch gun.	12-inch gun.	12-inch mortar.
Army Gun Factory:				
1890	*1	*1	.....	.....
1891	.....	.....	*1	7
1892	12	.....	.....	18
1893	.....	18	5	48
1894	12	5	3	4
1895	5	8	3	3
1896	10	9	9	.....
West Point Foundry (finishing and assembling):				
1893, 1894, and 1895	11	.....	.....	.....
The Bethlehem Iron Company (under its contract for 100 completed guns):				
Up to June 30, 1896	10	15	.....	.....
Total	61	56	21	80

* Type gun.

Ten rapid-fire guns with their mounts have been contracted for, to be delivered in February, 1897, and eight more will be procured with funds available.

In addition the following guns and mortars, including those for which forgings are under contract, are now in process of construction:

Place.	8-inch gun.	10-inch gun.	12-inch gun.	16-inch gun.	12-inch mortar.
Army Gun Factory	12	45	46	*1	16
Builders' Iron Foundry					20
Bethlehem Iron Company	15	35	25		30
Total	27	80	71	1	66

* Type gun.

It is estimated that there can be completed at the Army Gun Factory a total of fifty-two 8-inch, sixty-three 10-inch, and forty-three 12-inch guns by June 30, 1897, and a total of fifty-two 8-inch, eighty 10-inch, and fifty-four 12-inch guns by June 30, 1898. Under current appropriation the Bethlehem Iron Company should deliver during the fiscal year ending June 30, 1897, nine 8-inch, nine 10-inch, four 12-inch guns. If the contract rate be not exceeded the Bethlehem Iron Company should deliver during the fiscal year ending June 30, 1898, three 8-inch, four 10-inch, and two 12-inch guns. Under the contracts the last completed mortar should be delivered by June 1, 1898.

Thus, without further appropriations, except to meet authorized contracts, and a comparatively small amount for finishing and assembling forgings at Watervliet, and at the normal rates of delivery, there should be completed by June 30, 1897, the following guns and mortars:

8-inch guns 72
10-inch guns 87
12-inch guns 47
12-inch mortars 88

And the following by June 30, 1898:

8-inch guns 75
10-inch guns 108
12-inch guns 60
12-inch mortars 146

Leaving, at the latter date, still in process of construction, the following:

8-inch guns 3
10-inch guns 28
12-inch guns 32

TOTAL NUMBER OF CARRIAGES PROVIDED SINCE FIRST APPROPRIATION, FEBRUARY 24, 1891.

There has been no difficulty in designing nondisappearing barbette carriages for the comparatively few 8, 10, and 12 inch guns which are

to be placed on sites permitting this form of mount. To provide a satisfactory disappearing carriage has been a far more serious problem, the difficulty rapidly increasing with the caliber of the gun.

After careful tests and experiments, extended over a long time, with many designs, both American and foreign, the Board of Ordnance and Fortification recommended the adoption of the Buffington-Crozier disappearing carriage as a type for the 8 and 10 inch breech-loading steel guns. The first carriages were completed in time to have their official tests begun in November, 1893, and July, 1894, respectively. The Ordnance Board, in its report on the test of the 10 inch carriage, stated that "the advantages of this system of disappearing carriage, as set forth in the report of the Board on the 8-inch carriage, are confirmed and emphasized by the trial of a carriage adapted for a gun of much greater caliber and power, and it is the opinion of the Board that the exhaustive test to which this system has now been subjected demonstrates that on account of the simplicity of its construction, involving no valves, pumps, or other complicated appliances, and the fact that by methods easily understood by the average artillery soldier the operations of loading and maneuvering are effected with remarkable ease, certainty, and rapidity, it is worthy of adoption for use in the service on all sites except those where an all-around traverse is absolutely necessary."

The construction of these carriages in as large numbers as the appropriations would permit was immediately undertaken both at the Government carriage factory at the Watertown Arsenal and under contract. This type was a front-pintle carriage permitting traverse through an arc of about 120°. Improvements in the design have increased the traverse to about 170°, and the carriages recently contracted for, known as the model 1896, are of this improved type.

These carriages, however, do not meet the requirements in all cases. There are some sites on which an all-around fire is necessary. A carriage which will permit this will enable one gun to do the work of two, or perhaps more, thus saving the cost of extra guns and carriages, sites, and fortifications. A still more difficult problem was the designing of a disappearing carriage for the 12-inch breech-loading rifle. How difficult a problem it was will appear when it is noted that such a carriage must endure, without breaking or straining any of its parts, the tremendous shock due to the ballistic force necessary to propel a 1,000-pound projectile at a velocity of 2,100 feet per second, lowering its 52-ton gun for a distance of nearly 8 feet to a secure position for loading

and returning it to its firing position, and that it must do this rapidly, certainly, and easily, and by mechanism not liable to get out of order and easy to be operated by the average soldier. The technical difficulties involved may, perhaps, be better appreciated when it is considered that a similar case would be that of a 50-ton locomotive and tender, running at a speed of 20 miles per hour, which is required to be brought to a full stop from this speed within a distance of 16 feet, or one-third of its length, yet so easily and gently that at the end of the motion there shall not be the slightest jar.

Both these problems, also, it is believed, have been satisfactorily solved. One 12-inch all-around traverse disappearing carriage is now under construction, and 8 and 10-inch carriages of similar design are about to be commenced.

During the years 1892–1894 there were manufactured seventy-nine 12-inch mortar carriages under contract with the Builders' Iron Foundry of Providence, Rhode Island, Robert Poole & Sons Company, of Baltimore, and the West Point Foundry, of Cold Spring, New York. Since that time seven have been completed at the Watertown Arsenal, making a total of eighty-six, enough for the number of mortars on hand.

The following summary shows the number of gun and mortar carriages completed and building on October 31, 1896:

	12-inch.					10-inch.		8-inch.		Mortar.
	C. P. disappearing.	F. P. disappearing.	Nondisappearing.	Gun lift.	Casemate.	F. P. disappearing.	Nondisappearing.	F. P. disappearing.	Nondisappearing.	12-inch.
Completed	.....	.....	6	2	1	13	.....	5	8	86
Building	1	5	5	.....	.....	46	5	5	.....	67
Total	1	5	11	2	1	64	5	10	8	153

As stated above, there are available sufficient funds to procure ten 12-inch disappearing carriages, one 10-inch disappearing carriage, and thirteen 8-inch carriages in addition to the above.

Of the carriages building, the last of the 12-inch disappearing, if completed on schedule time, will be delivered by August, 1897, and the last of the 12-inch nondisappearing carriages by June, 1897. Of the 10-inch carriages building, from two to three per month, beginning with January next, should be delivered during 1897, the last one being due in January, 1898. Five 8-inch carriages are due between February

and June next. It is expected that all the carriages will be completed within the fiscal year ending June 30, 1898.

PRESENT AND PROSPECTIVE CONDITION OF THE COAST DEFENSES.

In the report of the Secretary of War for 1895 it was estimated that by about July, 1896, the condition of the completed components of our new defenses would be as follows:

Guns.			Carriages.			Emplacements.			Mortars.	Carriages.	Emplacements.
12-inch.	10-inch.	8-inch.	12-inch.	10-inch.	8-inch.	12-inch.	10-inch.	8-inch.	12-inch.	12-inch.	12-inch.
29	45	63	10	31	14	3	16	5	80	86	64

The actual condition at that time was as follows:

Guns.			Carriages.			Emplacements.			Mortars.	Carriages.	Emplacements.
12-inch.	10-inch.	8-inch.	12-inch.	10-inch.	8-inch.	12-inch.	10-inch.	8-inch.	12-inch.	12-inch.	12-inch.
21	56	61	7	20	13	8	12	5	80	86	64

But a considerable number of these elements was approaching completion.

As to the 12-inch guns there have been some delays, but the 10 and 8 inch contract guns are being completed more rapidly than originally contemplated. Of the sixty-six forgings required for the remaining twenty-one 12-inch guns, all but three tubes, three jackets, and three hoops are forged and accepted as to physical qualities, and twenty-nine of them are machined ready for assembling.

The carriages ready at the beginning of this fiscal year were less in number than was anticipated, due to the failure of contractors in some cases to make deliveries at the stipulated times.

The total number of emplacements was one in excess of that estimated.

In anticipating the condition of things at any given date a rate of progress must be assumed which depends upon contract stipulations. A failure from whatever cause to comply with these stipulations may materially change the figures representing the work done at the given date. Assuming the contract conditions as to time to be complied

with, the following emplacements will be completed before the end of December, 1896:

12-inch gun.	10-inch gun.	8-inch gun.	Rapid-fire gun.	12-inch mortar.
11	42	8	6	112

By July, 1897, there should be:

12-inch gun.	10-inch gun.	8-inch gun.	Rapid-fire gun.	12-inch mortar.
14	46	10	12	112

And by December, 1897, there should be:

12-inch gun.	10-inch gun.	8-inch gun.	Rapid-fire gun.	12-inch mortar.
21	66	25	16	156

To fill these emplacements, there should be completed by January 1, 1897, including those now on hand, 27 gun carriages and 95 mortar carriages. Those that are ready to be placed in position have been shipped and mounted, or are being mounted as rapidly as practicable. Thus, at the end of the calendar year the emplacements will be considerably ahead of the carriages. But it could not be otherwise. The current appropriation has been available for only four and one-half months. During that time the engineering work of construction can make rapid progress. But the work on carriages is slow and can not be hastened beyond the facilities of the shops. As the work continues, however, the two branches tend to equalize.

By July, 1897, there should be ready 70 gun carriages and 123 mortar carriages.

By December, 1897, there should be 113 gun carriages and 153 mortar carriages.

By June 30, 1898, there should be 131 gun carriages for the 128 emplacements that will be then ready, and 153 mortar carriages for the 156 emplacements.

The completion of the several component parts—the emplacement, carriage, and gun—means the substantial completion of the finished modern fortification, the work of assembling requiring but little time.

DYNAMITE GUNS.

During the year a battery of three 15-inch dynamite guns at San Francisco was satisfactorily tested and accepted. This makes six of

these guns—five of 15-inch and one of 8-inch caliber—now in position for the defense of two of our principal ports. The cost of these batteries is as follows: One group of one 8-inch and two 15-inch guns, $155,935; one group of three 15-inch guns, $176,000. This is exclusive of the cost of fortification. The cost of projectiles varies from $200 to $500 per shell, exclusive of the explosive charge.

The contract required an extreme range for the 8-inch gun of 3,200 yards and of 5,500 yards for the 15-inch gun of 40 calibers length of bore; the explosive charge diminishing with the range from 100 pounds to 50 pounds for the 8-inch gun, and from 500 pounds to 50 pounds for the 15-inch gun.

Assuming a horizontal target 360 by 90 feet, it was required that in the test for accuracy the 15-inch guns should show 87 per cent of hits at 1,000 yards, 74 per cent at 2,000 yards, 61 per cent at 3,000 yards, 47 per cent at 4,000 yards, and 35 per cent at 5,000 yards. Within the limit of its range the same accuracy was required of the 8-inch guns.

The rate of firing was required to be at least once in three minutes for each gun using a projectile charged with 500 pounds of explosive gelatin, or an equivalent bulk of other high explosive, and twice that rate of speed for a projectile charged with 100 pounds of the explosive.

THE ESTIMATES.

The estimates for the fiscal year ending June 30, 1898, for permanent defenses and their armament, amounts to $10,482,268.*

This sum is distributed as follows:

ENGINEERING WORK.

For gun and mortar batteries	$5,000,000
For submarine defenses	150,000
For sites	500,000

ORDNANCE WORK.

For steel gun forgings	$1,117,326
For finishing and assembling forgings	306,142
For mortars	1,728,000
For gun carriages	908,000
For mortar carriages	772,800

Of emplacements, the estimates will provide 51 for high-power guns, 113 for rapid-fire guns, and 144 for 12-inch mortars.

*This does not include $2,500,000 required to meet the contracts authorized by the fortifications act of June 6, 1896.

Of forgings they will provide 42 sets for 10-inch and 12-inch guns. They will also provide 79 rapid-fire guns with their mounts and from 100 to 200 rounds of ammunition per gun, and 144 completed mortars.

Of carriages they will provide 49 disappearing gun carriages and 138 12-inch mortar carriages.

Thus, including all the contract guns and all those for which forgings will have been procured, provision will have been made for—

One hundred and sixty-three high-power gun emplacements;
One hundred and twenty-nine rapid-fire gun emplacements;
Three hundred 12-inch mortar emplacements;
Three hundred and fifty-eight high-power steel guns;
Ninety-seven rapid-fire guns;
Two hundred and ninety 12-inch mortars;
One hundred and eighty 8, 10, and 12 inch gun carriages;
Two hundred and ninety 12-inch mortar carriages.

The construction of the modern ordnance required by the approved plan of national defenses has been in progress for eight years, and that of emplacements for six years, while a widespread popular impression dates this work at the beginning of a still more remote period of experimentation. During most of this time the visible results of expenditure, in some important respects, were small. The foundations for further progress were not yet completely laid. This slow, laborious work of preparation does not appeal to the popular eye, which sees only accomplished facts.

For this reason there have been occasional evidences of dissatisfaction at what seemed unnecessary tardiness in the execution of the project. But more rapid progress could have been made only by the adoption of a plan involving a very much greater expense. Now that the disappearing gun carriage is perfected, it would seem the part of wisdom to provide for the rapid supply of all that are required for the guns on hand. After that is done, much smaller amounts will provide the number needed for the annual complement of completed guns.

My predecessors in office at the head of the War Department had, during many years, the difficult task of arousing the public mind to a realization of the national deficiencies in the matter of coast defense. As the interest which has been awakened has grown deeper, successive Congresses have made more liberal provision for the accomplishment of the adopted scheme.

Therefore, in submitting the estimates for another year, I feel that it

is no longer necessary to repeat the arguments and earnest appeals that have been reiterated so many times. While earnestly inviting attention to the great work that yet remains to be done, it is also my fortune to have the more grateful duty of exhibiting the important results that have been actually accomplished as well as the splendid progress which is now being made toward the early completion of the work.

ORDNANCE ESTABLISHMENTS.

At the Rock Island Arsenal fifty 3.2-inch field-gun carriages with their limbers, twenty 5-inch siege-gun carriages, and twelve 7-inch siege-howitzer carriages were completed during the year.

The appropriation available for finishing and assembling guns at the Watervliet Arsenal gun factory was sufficient to keep the shop running at only about one-half of its full capacity. The output during the year was ten 8-inch, nine 10-inch, and nine 12-inch guns completely assembled. These, together with a number of guns more or less advanced toward completion, make a total equivalent of about thirteen and a half 8-inch, thirteen and one-third 10-inch, and ten and three-quarters 12-inch guns. There were also completed ten 5-inch siege guns, ten 7-inch siege howitzers, and ten 3.6-inch field mortars.

At the Watertown Arsenal gun-carriage factory the output during the year has been nineteen carriages completed, while considerable progress is reported upon twenty-two additional gun and mortar carriages.

During the year the manufacture of new arms at the Springfield Armory comprised 10,535 magazine rifles, 7,111 magazine carbines, and 404 cadet rifles, all of caliber .30.

The armament of troops in the regular service with the new magazine arms was completed in May last, when the final issue of carbines was made to the cavalry. All of the carbines issued, and all the rifles and carbines now being manufactured, are of an improved model known as "model 1896," in which the few minor defects developed by use in the earlier models have been corrected.

The daily capacity of the armory, with present machines and tools, is now 125 magazine rifles or carbines.

The field gun of 3.2-inch caliber is supplied to all the light batteries, which are fully equipped with four guns each.

The resources of the small-arms cartridge factory and shops for the manufacture of field and siege artillery ammunition at Frankford

Arsenal were fully employed during the year in the manufacture of the usual products. The output of .30-caliber ammunition is scarcely more than enough for the current needs of the service, but it is hoped that a small reserve supply can be accumulated during the present year.

At all of the above-mentioned establishments improvements have been made to the extent permitted by the appropriations. The Chief of Ordnance is urgent in his recommendations that a still further enlargement of the manufacturing plants be provided. That their present capacity is insufficient to assure such a reserve supply of material as we should provide to meet emergencies is apparent. But whether the accumulation of this reserve supply should be effected by an increase of Government plants or by encouraging private facilities now existing or which can be created, is a matter deserving the careful consideration of Congress, involving, as it does, an important question of governmental policy.

POWDERS.

Smokeless powder of American manufacture is used in the .30-caliber rifle and carbine service ammunition. Severe tests, which will be continued, have been made to determine the stability of this powder. Cartridges containing the several varieties of powders used in service have been exposed to the weather through winter and summer for periods of from nine to fourteen months, and then tested in comparison with others of the same date of manufacture which had been stored with great care. Other lots were stored for from six to twelve months in the dry climate of Arizona and then tested along with similar ones which had been stored in a damp climate. In no case did the powder subjected to these tests show any loss of stability.

The new seacoast armament has practiced during the year with charcoal powders. The manufacture of these powders has been thoroughly systematized, and the standard variety for obtaining the best ballistic results with each gun has been carefully determined. They have all been manufactured, the molds and presses are on hand, and the details of the processes are recorded for their reproduction of standard grade. Thus, while it is believed that smokeless powders will soon be adopted for most of these guns, there will be no difficulty in obtaining charcoal powders rapidly and in large quantities whenever desired.

During the year experiments have been conducted with smokeless powders, on which the Chief of Ordnance has submitted reports.

BARRACKS AND QUARTERS.

The construction of new barracks, and the enlargement of old ones, has continued as far as the appropriations permitted, the desire being to provide in the old buildings the requisite air and floor space, and proper ventilation. It is a simple matter to accomplish this in new structures, and the policy has been to plan the new barracks so that they will each accommodate 100 men, if necessary; but at the old posts many of the buildings were constructed when from 38 to 42 men constituted a company, and now that the organizations have been increased to 60 and 65 men the barracks are badly crowded. To cure this, additions are being made as funds are available.

Under the head of "Barracks and quarters," the army bill last year carried an appropriation of $750,000, of which $100,000 was required to be expended at Columbus Barracks. Of this appropriation there was expended for repairs to buildings, $254,967; for new buildings, $273,991; rent at recruiting stations, $23,219; other rents, labor, etc., $92,992; leaving a small balance unexpended.

For military posts, in the sundry civil bill, $225,000 was appropriated. This was expended for new buildings at Forts Crook, $9,916; Ethan Allen, $23,887; Hamilton, $2,504; Harrison, $21,373; Logan, $16,620; Monroe, $11,998; Myer, $35,344; Plattsburg Barracks, $20,906; Presidio, $53,137, and Thomas, $28,001, leaving a small balance unexpended.

The existing accommodations for troops at Portland Harbor, Boston, Narraganset Bay, Delaware Bay, the Potomac below Washington, Charleston, Pensacola, and Mobile harbors, the Mississippi below New Orleans, and the mouth of the Columbia River are inadequate and should be enlarged or reconstructed. Work has been commenced upon the new barracks to accommodate the necessary garrison at Fort Hancock, Sandy Hook.

The sundry civil bill approved June 11, 1896, carried an appropriation of $40,000 for the commencement of a new post at Bismarck, North Dakota, but a suitable site, satisfactory in all respects, at or near that city has not yet been accepted as fulfilling all the conditions required by the act of Congress approved March 2, 1895. A tract of land has recently been tendered that examination may show to be suitable.

By the act of Congress approved March 2, 1895, authority was given to accept the site for a post on Puget Sound, if tendered as a donation and found suitable. Such a site was offered near the city of Seattle

and the donor informed that it would be accepted and utilized if a good title to the whole tract were conveyed to the United States, but several months have passed and the title papers have not been submitted for examination.

A site for a new post near Spokane, Wash., was accepted under the authority contained in the act of Congress approved June 11, 1896, and the work of construction of quarters at this locality will soon begin.

The present need is for barracks for the artillerists required to man the new coast defenses, and it is again urged that the moneys appropriated for barracks and quarters should be distributed in accord with the Department's judgment of the general requirements of a systematic plan rather than as the ambitions of individuals or localities may undertake to control them.

ARMY RECORDS.

In the Record and Pension Office the records of the Revolutionary war and the war of 1812 have been largely augmented during the year by loans from several of the States and by transfer from another department of the Government. The work of reproducing these records by the index-record card system is approaching completion. The loan to the Department of other State records and those belonging to historical societies is expected. Inquiries relative to personal service in the early wars are constantly increasing, and still further increase may be expected when it becomes generally known that the records of those wars have been indexed and arranged for use.

All calls for information from the Pension Bureau and from the accounting officers of the Treasury, numbering 175,000, have been promptly answered. The index-record cards prepared during the year numbered 1,387,362, and those added to the number previously reported make a total of 45,207,770 cards prepared up to June 30, 1896. There was a reduction of 300 in the clerical force of the office in 1894 and a further reduction of 50 in the year 1896. The estimates submitted contemplate a still further reduction of 25 clerks the coming fiscal year, making an aggregate reduction of 375 clerks in three years and an economy of $425,000 annually.

The Board of Publication of the Records of the Rebellion report that the Official Records of the Union and Confederate armies respecting all the battles and campaigns of the civil war are completed, and all are published save four volumes, which are in type; but

since the publication of this first series was begun there has been a large accumulation of official papers not previously accessible to the War Department, and four supplemental volumes will be required for this matter. The atlas of maps is entirely completed, 178 plates in all, and an index.

The records for the second, third, and fourth series are nearly all ready for compilation and publication. Five of these volumes are already in type.

The total number of volumes of War Records that have been distributed is 1,347,995. The number on hand undistributed is 50,242. The number sold is 51,194, and the proceeds of sale, $30,154.30, have been covered into the Treasury.

The appropriation made for the work since commencement of the compilation in 1875 is $2,334,338.50.

The number of books published last year was six, containing 8,529 pages. The near completion of the copying of records will make it possible to dispense with a part of the clerical force next year, and the estimates submitted call for an appropriation $20,000 less than was allowed for the current year.

INDIAN PRISONERS.

The Indians now in confinement number 310, all members of the Apache tribe, who were captured in Arizona in the years 1887–88. While in captivity there have been 117 births and 295 deaths.

They are now established on the military reservation at Fort Sill, Oklahoma, and are living in comfortable dwellings that have been constructed by their own labor. The climate in this region is arid and not well adapted to farming, but these Indians last year raised upward of 3,000 bushels of an African corn, 400 tons of hay, 300 tons of corn fodder, 2,500 bushels of potatoes, and 40,000 melons. They have a herd of 1,157 head of cattle, including 286 calf increase during the year.

The special appropriations made by Congress for their benefit aggregate the sum of $32,500, of which nearly $16,000 was expended for cattle—for these Indians must become a pastoral people—and $8,500 for building materials, tools, seeds, etc. Their rations, clothing, medicines and incidentals supplied by the Quartermaster, Subsistence and Medical departments since their arrival at Fort Sill have cost the additional sum of $44,000. They have now made such progress

toward a basis of self-sustenance that no further special appropriation by Congress is needed.

The title to the lands comprised in the military reservation of Fort Sill is in the Kiowa and Comanche Indians, and when the military shall have no further use for this post the reservation will revert to these Indians. The Apaches will then be trespassers on these lands, unless meanwhile the title to the area occupied by them shall be acquired. I recommend that this be done, and that the status of these Apaches as prisoners be then terminated. The area required for their maintenance is about 36,000 acres. Their homes before capture were in Arizona, but it is not practicable for them to return there. If settled permanently where they now are they will become entirely self-sustaining in a very few years. If dispossessed from their lands they must be sent elsewhere, and all work done in their present location will be lost to them.

RIVERS AND HARBORS.

The condition of the various river and harbor improvements ordered by Congress is given in detail in the report of the Chief of Engineers transmitted herewith. The total expenditures for these purposes during the year ending June 30, 1896, including those of the Mississippi and Missouri River Commissions, was $17,039,731.51. Including the amounts appropriated by the act of June 3, 1896, there was available for expenditure on rivers and harbors July 1, $26,020,974.79.

The act mentioned, in addition to the direct appropriations, also authorized the Secretary of War to enter into contract for the completion of a comparatively large number of specified works, payments for the same being contingent on future appropriations. At the time the Department estimates were by law required to be transmitted to the Treasury this discretion had been exercised in but few cases. Since that time bids have been invited for some additional works, where the conditions seemed to warrant such preliminary action, but with what result can not at this date be determined.

In several instances the money provided was so disproportionate to the amount required to make a beginning this year that nothing could be gained by pledging the Department in contract at this time.

The local engineers have prepared statements showing the amounts that can be profitably expended during the next fiscal year on the

various rivers and harbors for which projects of improvement have been approved by Congress, and for which appropriations have heretofore been made in river and harbor appropriation acts. Such amounts are given in the various appendices to the report of the Chief of Engineers, but the estimates submitted to Congress only include the amounts for which the Government is obligated by existing contracts. It is understood that the appropriations for other works made by the act of 1896 were to cover the operations of two years, and that no further appropriations will be made for such works by the present Congress.

The last river and harbor act provides for continuing the improvement of the stretch of the Mississippi River from the Head of the Passes to the mouth of the Ohio, under the direction of the Secretary of War, in accordance with plans, specifications, and recommendations of the Mississippi River Commission, as approved by the Chief of Engineers, for the general improvement of the river, for the building and repair of levees, and for surveys. This act appropriated $625,000 outright for the work, and additional expenditures were authorized amounting to $8,375,000 during the next four years.

By a majority vote the Commission on January 11, 1896, adopted resolutions to the effect that the plan of general and permanent improvement of the Mississippi River by means of bank protection and contraction work should be discontinued, and that the practical results of deepening the channel and prevention of floods, contemplated by the act under which the Commission was appointed, can be attained with greater economy, more probability of success and in less time by the dredging of channels through shoal places during low-water seasons and the maintenance, in cooperation with the State and local authorities, of an effective levee system.

It is the opinion of a minority of the Commission that, in consideration of this conclusion, the purposes for which the Mississippi River Commission was formed have now been accomplished, and that if the future work for the improvement of the Mississippi River from Cairo to its mouth is confined, as proposed, to the building of levees and annual dredging, with some other minor work, the task is reduced to an administrative one, which can best be cared for by the direct control of the Secretary of War.

In the last annual report of the Department the question was presented whether the very costly improvements on the Missouri River were justified by the interests of the commerce involved. The river

and harbor act of June 3, 1896, appropriates $300,000 for continuing this improvement and provides for an additional expenditure of $300,000 per year for three years from July 1, 1897. Congress having determined that this work should continue, it is desirable that the appropriations should be applied to systematic work in accordance with the plans of the Commission. Arbitrary allotments from the appropriations for work in special localities result in little if any benefit at such places, but interfere with systematic channel improvement, increase its cost, and postpone the time when navigation can receive substantial improvement.

THE GREAT LAKES.

The new lock at the falls of the St. Marys River, though not fully completed, was thrown open to commerce August 3, 1896. This lock, which is 800 feet in length and 100 feet in width, with a depth of 21 feet on the miter sills and a single lift approximating 18 feet, is an essential link in the chain of improvements which are to give a ship channel with depth of 20 feet connecting the waters of the Great Lakes between Chicago, Duluth, and Buffalo. This work, now nearly completed, is one of great magnitude, and its importance to the interests of navigation may be judged by the fact that its total cost from its inception to completion, while amounting to several millions, will be but about 5 per cent of the value of the commerce passing through the Detroit River during the season of 1895.

During the last fiscal year 16,290 vessels passed through the canal at St. Marys Falls, aggregating 15,648,025 registered tonnage and carrying 14,399,332 tons of freight, exceeding the net tonnage through the Suez Canal during the year 1895 by nearly 6,000,000 tons. The traffic through this canal in the year 1895 was the largest in its history.

The total amount of freight carried to and from Lake Superior in 1895 exceeds that of 1894 by 14 per cent, an increase largely due to the improvement in Hay Lake Channel, St. Marys River, which shortens the route 11 miles and provides safe navigation by night.

The commerce passing through the Detroit River during the year amounted to about 25,850,000 tons, with estimated value of $275,000,000, an increase of 7 per cent over the commerce of the preceding year. This tonnage is in excess of the combined net tonnage of London and Liverpool for the year 1894 as reported.

But little change has occurred in the water levels of the Great Lakes during the past year from corresponding levels of 1894, and

as no water has yet been drawn for use in the Chicago Drainage Canal no further facts can be given as to the probable effect of abstracting 10,000 cubic feet of water per second from Lake Michigan. The importance of inaugurating a series of observations and gaugings which will provide reliable data concerning the lake levels and the probable effect of the Chicago Drainage Canal and the deepening of connecting channels was stated in my last annual report, but no action in the matter has yet been taken by Congress.

The law now provides that a notice of thirty days shall be given to the owner of a sunken or wrecked vessel in any river and harbor of the United States before the Secretary of War may direct the removal of such obstruction to navigation. This interval of notice is altogether too long to be consistent with safety to navigation, and is the cause of frequent and well-founded complaint by those interested in shipping. But little time is required for the preparations necessary to begin such removal of obstructions to navigation, and a change in the law to permit the more prompt exercise of the powers of this Department, when individuals are tardy or negligent, is earnestly recommended.

BATTLEFIELD PARKS.

The date of the organic acts, the areas included within the statutory limits of the several national battlefield parks, the areas already acquired, the whole cost of the same, and the price paid per acre are as follows:

Name.	Date of act authorizing establishment.	Approximate area within limits described in the act.	Total area already acquired by the United States.	Total cost.	Cost per acre.
		Acres.	*Acres.*		
Gettysburg	Feb. 11, 1895	3,874	*845.32	$13,922.42	$44.40
Chickamauga	Aug. 19, 1890	8,000	5,568.25	209,033.00	37.54
Shiloh	Dec. 27, 1894	5,800	†266.70	†6,851.00	25.69
Antietam	Aug. 30, 1890	(‡)	22	2,534.48	115.20

*Of the whole area owned 521.77 acres were donated to the United States by the Gettysburg Battlefield Association under authority of the act of Congress approved November 2, 1895, and 313.65 acres have been purchased.

†Purchase of 180.90 acres, costing $6,000, included: but as voucher is not yet returned it is omitted from the succeeding table of cash expenditures.

‡Not defined.

The following table shows the distribution of all outlays by the Government at each battlefield from 1867 to October 31, 1896, but not

including expenditures upon the national cemeteries nor those made by States, associations, and individuals:

Name.	Salaries of commissioners and experts.	Office expenses.	Traveling expenses.	Land and legal expenses.	Services, labor, materials, and tools under contract or otherwise.	Towers, monuments, and markers.
Gettysburg	$27,001.13	$5,560.36	$3,060.98	$9,779.00	$98,657.60	$24,382.17
Chickamauga	67,010.00	14,390.88	12,879.02	233,004.73	351,642.53	62,613.70
Shiloh	19,733.33	3,890.75	1,512.87	851.80	14,070.73	40.91
Antietam	24,523.33	927.95	141.70	3,311.78	25,831.79	6,268.28

Name.	Miscellaneous.	Total expenditures under commission.	Expended in marking the battlefield, maps, etc., before commission was authorized.	Total of all expenditures.	Unexpended balance on hand.
Gettysburg	$1,151.31	$169,592.55	*$81,626.91	$251,219.46	$30,708.16
Chickamauga	10,035.43	751,576.29	7,300.00	758,876.29	56,468.03
Shiloh	.....	40,100.39	.....	41,100.39	34,899.61
Antietam	1,709.03	62,713.86	.....	62,713.86	10,317.14

*Includes $5,419.90 paid for land.

The total expenditures have been $1,113,910.

The more important works carried on during the year in establishing the parks and in marking the fields were:

At Chattanooga, in erecting monuments that have been furnished by the States, the procuring and setting of historical and descriptive tablets, and in placing field guns on cast-iron carriages. The clearing of undergrowth and grubbing of the park are reported as completed. The map of the park, containing minute topographic details and positions of the contending armies, it is reported, will be completed before the close of the calendar year. The expenditures since the last report amounted to $49,585.13.

At Gettysburg work upon macadamized roads has been continued, and 7½ miles are finished; condemnation proceedings are in progress for securing right of way for the further extension of roads traversing other parts of the field. A large number of field guns on cast-iron carriages have been placed; suitable fences constructed where required, and old stone fences and field defensive works have been restored. A large number of trees have been planted on areas that have been deforested since the battle. The four towers that were begun last year have been completed and a fifth added. The work of mapping the field on a large scale has also progressed satisfactorily. The expenditures since the last report aggregate the sum of $100,027.68.

At Shiloh the drawing of a topographical map has been completed and good progress made in marking upon it the positions of troops and camps. Owing to complications respecting land titles and outstanding optional agreements to purchase most of the land within the park limits—which the holders refused to surrender unless they were paid a large sum—it was not possible to make any progress in marking the field and improving the roads until this difficulty should be overcome. The optional agreements referred to expired by their own terms on March 4, 1896, and immediately thereafter steps were taken to secure such tracts of land as were essential. Condemnation proceedings were instituted for acquiring title to the farm embracing Pittsburg Landing, and a decree has been issued vesting title to this property in the United States. Another farm has been bought, and negotiations are in progress for the purchase of other tracts. It is intended by the Commission to commence the work of road making and marking positions at an early date. The expenditures since the last report amount to $25,426.89.

At Antietam the work completed consists of about 5 miles of macadam road, fenced on both sides; the erection of historical, location, and descriptive tablets; the marking of the more important artillery positions with field guns in place; the near completion of a masonry observation tower that overlooks the whole field, and the collection of data for the map of the field that shall exhibit the positions of troops in the more important phases of this action. The expenditures since the last report reach the sum of $6,683.07.

THE YELLOWSTONE PARK.

The troops stationed within the Yellowstone Park are employed as guards to prevent poaching, forest fires, and injury to the natural beauties of that wonderfully interesting region. Their duty has been efficiently performed, and large game is reported to be rapidly increasing.

There has been an uncertainty as to the limits described in the Executive order setting aside these public lands. In order to resolve the doubt, it was determined to establish the boundaries. This has been begun, points have been fixed and monuments erected, and in another season the lines will be completed. When the boundaries are plainly marked there will be less difficulty in enforcing the laws for game protection.

The suggestion has been made that an extensive forest region in Wyoming, adjacent to the park on the south, be added to this game

and forest reserve. The country referred to was the theater of a recent controversy between the Bannock Indians and the game wardens of the State of Wyoming which involved the calling out of troops. This suggestion I deem worthy of attentive consideration as a means of adding to the attractiveness and resources of the park, and at the same time providing a way to avoid further irritation of the Indians of that vicinity.

The general scheme for roads to connect the points of greatest interest and natural beauty contemplates a carriage way from the Cañon of the Yellowstone over Mount Washburn to Mammoth Hot Springs, a distance of 40 miles. This is essential to complete the circuit and to open and make accessible points of great interest. The cost of this road will be about $2,500 per mile or about $100,000 in all.

The expenditures last year were $40,000 and sufficed to provide practicable wagon roads entering the park from the west and south, and to very greatly improve several stretches of incomplete and difficult roadways. The expense for clerical work, superintendence, and other contingencies pertaining to this work was less than 3 per cent of the whole outlay. This and the results attained in the way of improvements show the efficient and economical management of the present superintendent.

THE WASHINGTON WATER SUPPLY.

The pressing need of the District of Columbia which calls for the immediate attention of Congress is early provision for an adequate water supply. While the city of Washington has been exempt from disaster or serious distress in this matter the danger has long been apparent to the officers of this Department. A commission appointed by the Chief of Engineers, and composed of experts distinguished for their experience and success, examined the question thoroughly last year and recommended the completion of the unfinished tunnel and its connecting reservoir as the practical and economical way to promptly meet the emergency.

The work of raising the dam at the Great Falls of the Potomac River, the source of supply, to an elevation of 150 feet 6 inches above mean tide, so that at its lowest stage the river would fill the mouth of the 9-foot conduit, will be entirely finished within a few weeks. An increase of 50 per cent in the supply of water for the reservoirs will thus be assured, and, with the tunnel and its reservoir finished, the city of Washington will have one of the most ample and reliable water supplies in the country.

EQUESTRIAN STATUES IN WASHINGTON.

The equestrian statue of General Hancock was completed early in the present year and dedicated with appropriate exercises, presided over by the President of the United States.

The statue of General Logan will be erected in Iowa Circle during 1897, and it is expected that the statue of General Sheridan will be erected in the park at the intersection of Pennsylvania avenue and Thirteenth street near the end of that year.

The committee of the Society of the Army of the Tennessee having accepted the design for the statue of General Sherman submitted by Carl Rohl-Smith, the Commission named by law has selected a part of the park south of the Treasury Department and adjacent to Pennsylvania avenue as a site, and the contract for the work has been executed.

I renew my recommendation that Congress make early provision for an appropriate memorial at the national capital worthy to perpetuate the memory of General Grant.

Each year demonstrates the desirability of the appointment by the President of a permanent commission of men best qualified to pass on questions of art, to whom shall be intrusted the selection of designs and sites for the future monuments of the capital. The memorials at Washington ought to represent the growing artistic sense of the American people, but it is evident that in numerous instances this has not been realized. Compliance with the highest standard of excellence, established by experienced and capable judges, should be exacted.

ARLINGTON MEMORIAL BRIDGE.

The favorable consideration which Congress at its late session gave to the project for an Arlington memorial bridge, which has been repeatedly urged by this department, encourages the hope that this necessary structure will be authorized at the coming session. The bridge is an undisputed commercial and military necessity as a means of communication between the banks of the Potomac at Washington, but its memorial character ought not to be overlooked. The natural site and national associations with it afford the opportunity for a monumental structure unequaled in beauty and significance. The Aqueduct Bridge is inadequate and unsightly, if not absolutely unsafe.

HALL OF RECORDS.

The rapid expansion of the business of the Government renders urgent the need of a hall of records. Fifteen years ago the State, War, and Navy building was deemed adequate for years to come for all the purposes for which it was designed. It is already necessary to rent buildings outside the Department for the storage of files and records, and the records and papers which are accumulating in the building crowd more each year upon the space required for increasing office work. I renew the recommendation for the construction of a fireproof building especially designed for the preservation of such records of the Departments as are not required for frequent use. Such a building should be centrally located between the Executive Mansion and the Capitol, preferably on the south side of Pennsylvania avenue.

The plan of Washington permits a systematic arrangement of public buildings hereafter built, not only convenient but impressive beyond comparison with the irregular distribution of the public buildings of foreign capitals. The construction of the needed hall of records on the site suggested, following the construction of the city post-office on that site, may, as hereafter the need for other public buildings arises, lead to the development of Pennsylvania avenue from the Capitol to the Executive Mansion into the stateliest thoroughfare in the world, and at the same time the one best adapted to the transaction of official business and best representative of our national characteristics.

In closing this my last annual report as Secretary of War, I have satisfaction in placing on record my high appreciation of the character, ability, and zeal of the officers of our Army and the general spirit of loyalty and patriotic inspiration which pervade its ranks.

To these officers and men and to the heads of departments in the War Office, all of whom have given faithful support to the administration of this Department, I make the acknowledgment which is their due.

DANIEL S. LAMONT,
Secretary of War.

APPENDIX.

1896.

Statement of appropriations under direction of the War Department for the fiscal year ending June 30, 1896, showing the amount appropriated under each title of appropriation, the amount drawn by requisition upon the Treasury, and the balances subject to requisition July 1, 1896.

Title of appropriation.	Balances July 1, 1895.	Appropriated July 1, 1895, to June 30, 1896.	Repayments July 1, 1895, to June 30, 1896.	Aggregate available.	Payments July 1, 1895, to June 30, 1896.	Carried to surplus fund June 30, 1896.	Balance June 30, 1896.
SALARIES, CONTINGENCIES, AND CIVIL APPROPRIATIONS.							
Salaries, Office of—							
Secretary of War	$15,385.37	$92,900.00		$108,285.37	$89,005.24	$8,204.00	$11,076.13
Adjutant-General	6,102.70	159,280.00		165,382.70	157,665.38	1,018.94	6,698.38
Inspector-General	516.06	13,160.00		13,676.06	13,160.00	365.24	150.82
Judge-Advocate-General	149.69	13,660.00		13,809.69	13,108.13	29.36	672.20
Quartermaster-General	5,696.25	152,340.00		158,036.25	151,339.35	2,878.31	3,818.59
Commissary-General	1,269.52	42,760.00		44,029.52	42,645.85	1,094.52	289.15
Surgeon-General	3,017.79	151,266.00		154,283.79	150,617.64	319.81	3,346.34
Paymaster-General	667.50	34,560.00		35,227.50	34,081.65	289.42	856.43
Chief of Ordnance	392.81	41,660.00		42,052.81	41,659.95	24.97	367.89
Chief of Engineers	576.11	23,240.00		23,816.11	23,205.16	42.90	568.05
Publication of Records of the Rebellion	1,890.24	15,380.00		17,270.24	15,306.28	635.24	1,328.72
Record and Pension Office, War Department	106,690.05	616,430.00		723,120.05	601,199.43	76,856.21	45,064.41
Signal Office		5,700.00		5,700.00	5,700.00		
Of employees, public buildings and grounds, under chief engineer	78.98	47,060.00		47,138.98	46,997.44	78.98	62.56
Contingent expenses, public buildings and grounds, under chief engineer	2.02	500.00		502.02	493.46	2.02	6.54
Contingent expenses, War Department	19,693.33	54,058.15		73,751.48	19,693.33	2,621.95	36,828.21
Postage to Postal Union countries, War Department		500.00		500.00	500.00		
Stationery, War Department	11,953.15	30,033.07		41,986.22	11,208.72	5,258.38	25,519.12
Rent of buildings, War Department	900.00	4,600.00		5,500.00	4,600.00		900.00
Total salaries, contingencies, etc	174,981.57	1,499,087.22		1,674,068.79	1,436,795.00	99,720.25	137,553.54
ERECTION OF MONUMENTS.							
Battle lines and sites for tablets at Antietam	7,921.00	300.00		8,221.00	8,221.00		
Monuments or tablets at Gettysburg	25,748.62			25,748.62	22,994.31	2,754.31	
Pedestal for statue of Gen. Philip H. Sheridan	50,000.00			50,000.00			50,000.00
Pedestal for statue of Gen. John A. Logan	47,999.21			47,999.21			47,999.21
Pedestal for statue of Gen. Winfield Scott Hancock	47,000.00			47,000.00	47,000.00		
Pedestal and statue of Gen. William T. Sherman	50,000.00	30,000.00		80,000.00			80,000.00
Pedestal for statue of Samuel D. Gross		1,500.00		1,500.00	1,500.00		
Lincoln tablet, Gettysburg National Park		5,000.00		5,000.00	100.00		4,900.00
Total erection of monuments	228,668.83	36,800.00		265,468.83	79,815.31	2,754.31	182,899.21
BUILDINGS AND GROUNDS IN AND AROUND WASHINGTON, ETC.							
Improvement and care of public grounds	784.35	49,500.00		50,284.35	48,810.23	284.35	1,189.77

Repairs, fuel, etc., Executive Mansion	5,583.67	34,000.00		39,583.67	28,061.14	1,083.67	10,438.86
Lighting, etc., Executive Mansion, etc	252.71	14,766.50		15,019.21	14,256.89	252.71	509.61
Repairs to water pipes and fire plugs	6.37	12,500.00		12,506.37	12,460.05	6.37	39.95
Telegraph to connect the Capitol with the Departments, etc		1,250.00		1,250.00	1,249.30		.70
Care and maintenance of Washington Monument	30.95	11,520.00		11,550.95	11,364.92	30.95	155.08
Steam tug, harbor of New York	4,800.00	45,000.00		49,800.00	44,914.42		4,885.58
Prevention of deposits, harbor of New York	14,286.26	39,000.00		53,286.26	48,688.32	504.88	4,093.06
Transportation of reports and maps to foreign countries	186.65	100.00		286.65	100.00	86.65	100.00
Support and medical treatment of destitute patients	1,583.41	19,000.00		20,583.41	18,999.96	.04	1,583.41
National Encampment, Grand Army of the Republic	1,786.88			1,786.88			1,786.88
Increasing the water supply of Washington, D. C	401,006.38			401,006.38	99,460.60		301,545.78
Maintenance of Garfield Hospital		19,000.00		19,000.00	19,000.00		
Improving the receiving reservoir, District of Columbia	17,500.00			17,500.00	17,500.00		
Estimate for bridge across the Eastern Branch of the Potomac River		3,500.00		3,500.00	3,500.00		
Repairs to Aqueduct Bridge, District of Columbia	22,570.00	65,000.00		87,570.00	17,879.70		69,690.30
Ford's Theater building: Repairs	9.39			9.39			9.39
Investigations pertaining to water rights and titles to land at Great Falls	4,000.00			4,000.00			4,000.00
Erection of fish ways at Great Falls			8.99	8.99			8.99
Portrait of Benjamin Harrison, ex-President of the United States	2,500.00			2,500.00	2,500.00		
Total buildings and grounds in and around Washington, etc	476,887.02	314,136.50	8.99	791,032.51	388,745.53	2,249.62	400,037.36
Repayments in excess of payments					8.99		
Actual expenditures					388,736.54		
MILITARY ESTABLISHMENT.							
Expenses of Commanding General's Office		1,750.00		1,750.00	1,750.00		
Expenses of recruiting	78,532.97	651.12	1,919.41	81,103.50		38,962.95	42,140.55
Contingencies, Military Information Division, Adjutant-General's Office	40.00	3,640.00		3,680.00	3,581.06		98.94
Contingencies, headquarters of military departments	919.11	3,000.00		3,919.11	2,594.46	426.61	898.04
Contingencies of the Army	20,452.41	15,000.57		35,452.98	2,354.29	9,502.75	23,595.94
Signal Service of the Army	2,809.69	18,192.38		21,002.07	16,118.19	292.52	4,591.36
Mileage to officers traveling without troops	2,033.09	140,000.00		142,033.09	113,110.12		28,922.97
Pay, etc., of the Army	482,386.89	13,390,993.40		13,873,380.29	13,391,957.97	454,023.05	27,399.27
Subsistence of the Army	49,875.62	1,650,665.33		1,700,540.95	1,488,286.64	36,055.77	176,198.54
Regular supplies, Quartermaster's Department	670,097.44	2,300,108.72		2,970,206.16	1,858,288.09	273,317.55	838,600.52
Incidental expenses, Quartermaster's Department	53,917.41	601,128.44		655,045.85	555,784.90	20,514.58	78,746.37
Barracks and quarters	795,289.31	40,772.84		836,062.15	759,378.94	3,168.15	73,515.06
Transportation of the Army and its supplies	884,997.08	2,546,267.43		3,431,264.51	2,321,727.54	388,669.12	720,867.85
Transportation of the Army and its supplies, Pacific railroads		178,937.79		178,937.79	178,937.79		
Horses for cavalry and artillery	56,911.49	129,941.85		186,853.34	109,773.45	23,013.70	54,066.19
Construction and repair of hospitals	10,263.92	45,000.00		55,263.92	54,441.02	394.90	428.00
Quarters for hospital stewards	85.93	7,000.00		7,085.93	6,906.10	47.81	132.02
Shooting galleries and ranges	349.13	10,000.00		10,349.13	3,624.58	338.70	1,385.85
Purchase of land for target ranges, Fort McPherson, Ga	16,500.00			16,500.00	16,500.00		
Bellevue rifle range, Omaha, Nebr		600.00		600.00			600.00
Land for rifle range near Madison Barracks, N. Y			13.00	13.00			13.00
Clothing and camp and garrison equipage	570,898.46	1,100,000.00		1,670,898.46	1,310,204.46	57,028.70	303,665.30
Hospital, Fort Meade, S. Dak	25,000.00			25,000.00	24,632.91		367.09

Statement of appropriations under direction of the War Department for the fiscal year ending June 30, 1896, etc.—Continued.

Title of appropriation.	Balances July 1, 1895.	Appropriated July 1, 1895, to June 30, 1896.	Repayments July 1, 1895, to June 30, 1896.	Aggregate available.	Payments July 1, 1895, to June 30, 1896.	Carried to surplus fund June 30, 1896.	Balance June 30, 1896.
MILITARY ESTABLISHMENT—continued.							
Army and Navy Hospital, Hot Springs, Ark	$18.07			$18.07			$18.07
Medical and Hospital Department	90,607.20	$160,570.80		251,178.00	$104,810.71	$30,573.41	115,793.88
Army Medical Museum	.47	5,000.00		5,000.47	5,000.04	.43	
Library, Surgeon-General's Office		8,000.00		8,000.00	7,988.90		11.10
Engineer depot at Willets Point, N. Y	5,322.18	6,500.00		11,822.18	8,367.58	421.59	3,033.01
Ordnance stores, etc	41,465.78	500,027.30		541,493.08	536,756.82	3,854.46	881.80
Ordnance service	120.94	100,000.00		100,120.94	99,328.95		791.99
Ordnance material—proceeds of sales	219,159.88	8,705.69		227,865.57	73,826.00		154,039.57
Manufacture of arms	250,474.67	400,000.00		650,474.67	620,377.67	1,80	30,095.20
Pay of Military Academy	16,146.87	282,832.99		298,979.86	266,911.03	9,923.09	22,145.74
Current and ordinary expenses, Military Academy	49.25	79,867.10		79,916.35	71,607.47	6,202.21	2,106.67
Miscellaneous items and incidental expenses, Military Academy		29,310.00		29,310.00	28,268.95	190.83	850.22
Total military establishment	4,344,725.26	23,764,463.75	$1,932.41	28,111,121.42	24,048,196.63	1,356,924.68	2,706,000.11
Repayments in excess of payments					1,932.41		
Actual expenditures					24,046,264.22		
PUBLIC WORKS.							
Buildings and grounds, Military Academy.							
Buildings and grounds, Military Academy		58,451.25		58,451.25	56,296.74	2,154.51	
New academic building, Military Academy	.07			.07		.07	
New gymnasium, Military Academy	11.37			11.37			11.37
Memorial hall, West Point, N. Y	241,096.23			241,096.23	35,000.00		206,096.23
Total buildings and grounds, Military Academy	241,107.67	58,451.25		299,558.92	91,296.74	2,154.58	206,107.60
Arsenals.							
Rock Island bridge, Rock Island, Ill	7,529.92	12,250.00		19,779.92	12,250.00	7,529.92	
Reconstructing Rock Island bridge, Rock Island, Ill		196,000.00		196,000.00	175,000.00		21,000.00
Rock Island Arsenal, Rock Island, Ill		57,500.00		57,500.00	40,000.00		17,500.00
Columbia Arsenal, Columbia, Tenn		8,000.00		8,000.00	7,832.50		167.50
Frankford Arsenal, Philadelphia, Pa		5,000.00		5,000.00	5,000.00		
Indianapolis Arsenal, Indianapolis, Ind	8,500.00	4,323.15		12,823.15	6,000.00		6,823.15
Springfield Arsenal, Springfield, Mass	1,146.92	13,000.00		14,146.92	13,000.00		1,146.92
Watervliet Arsenal, West Troy, N. Y	14,370.00	12,605.00		26,975.00	17,000.00		9,975.00
Watertown Arsenal, Watertown, Mass	5,979.84	73,500.00		79,479.84	31,979.84		47,500.00
Repairs of arsenals	65.51	45,000.00		45,065.51	44,913.09	.37	152.05

Powder depot, Dover, N. J.	19,299.92			19,299.92			19,299.92
Proving ground, Sandy Hook, N. J.	10,587.39	77,500.00		88,087.39	36,870.00		51,217.39
Testing machine		10,000.00		10,000.00	10,000.00		
Benicia Arsenal, Benicia, Cal.		4,500.00		4,500.00			4,500.00
Total arsenals	67,479.50	519,178.15		586,657.65	399,845.43	7,530.29	179,281.93
Fortifications.							
Artesian well, Fortress Monroe, Va.	6,000.00			6,000.00	100.00		5,900.00
Armament of fortifications	1,756,518.53	4,991,598.00		6,748,116.53	1,782,365.54		4,965,750.99
Preservation and repair of fortifications	7,655.42	95,000.00		102,655.42	44,632.14		58,023.28
Construction of a counterpoise battery	37,400.00			37,400.00			37,400.00
Board of Ordnance and Fortification	241,988.84	250,000.00		491,988.84	77,707.38		414,281.46
Board on Fortifications or Other Defenses	28,470.77			28,470.77			28,470.77
Board on Pacific Coast Gun Factory	2,500.00			2,500.00			2,500.00
Plans for fortifications	900.00	10,000.00		10,900.00	5,900.00		5,000.00
Torpedoes for harbor defense	66,535.76	140,000.00		206,535.76	47,229.11		159,306.65
Howell counterpoise carriage		50,000.00		50,000.00			50,000.00
Machine guns	15,000.00			15,000.00	14,300.00		700.00
Ammunition for morning and evening gun	.21	20,600.00		20,600.21	20,595.11	.21	4.89
Torpedo howitzers	15,000.00			15,000.00			15,000.00
Artillery targets		6,000.00		6,000.00	6,000.00		
Pneumatic dynamite guns	421,496.45			421,496.45	188,178.65		233,317.80
Ten-inch pneumatic disappearing gun carriage	40,000.00			40,000.00	17,197.20		22,802.80
Sea walls and embankments		17,975.00	.07	17,975.07			17,975.07
Sea wall, Governors Island, New York Harbor	297.94			297.94			297.94
Sites for fortifications and seacoast defenses	149,993.64	500,000.00		649,993.64	83,150.50		566,843.14
Gun and mortar batteries	511,082.07	3,000,000.00		3,511,082.07	577,204.23		2,933,877.84
Purchase of sites for seacoast defenses	100.28			100.28			100.28
Powder and projectiles, proceeds of sales	5,877.22			5,877.22	4,200.00		1,677.22
Gatling 8-inch gun		40,000.00		40,000.00			40,000.00
Emery loading apparatus		10,000.00		10,000.00			10,000.00
Total fortifications	3,306,817.13	9,131,173.00	.07	12,437,990.13	2,868,759.79	.21	9,569,230.13
Repayments in excess of payments					.07		
Actual expenditures					2,868,759.72		
Military posts.							
Wharf at Fortress Monroe, Va.	28,336.61			28,336.61			28,336.61
Sewerage system, Fortress Monroe, Va.	37,300.00	9,860.00		47,160.00	25,300.00		21,860.00
Bridge over Mill Creek, Fortress Monroe, Va.	115.78			115.78			115.78
Reconstructing bridge, Niobrara River, Nebr.	57.84			57.84		57.84	
Water supply, Fort D. A. Russell, Wyo.	2,808.65			2,808.65		2,808.65	
Military posts	133,280.12	225,000.00		358,280.12	328,871.35	557.12	28,851.65
Fort Wayne Military Reservation		20,000.00		20,000.00	20,000.00		
Purchase of buildings at military posts	9,977.48			9,977.48			9,977.48
Military storehouse, Omaha, Nebr.	11,219.13			11,219.13	200.00		11,019.13
Additional lands, Fort Ethan Allen Military Reservation	7,000.00			7,000.00			7,000.00
Transfer of school site, Fort McClary Military Reservation, Me.	150.35			150.35			150.35

Statement of appropriations under direction of the War Department for the fiscal year ending June 30, 1896, etc.—Continued.

Title of appropriation.	Balances July 1, 1895.	Appropriated July 1, 1895, to June 30, 1896.	Repayments July 1, 1895, to June 30, 1896.	Aggregate available.	Payments July 1, 1895, to June 30, 1896.	Carried to surplus fund June 30, 1896.	Balance June 30, 1896.
PUBLIC WORKS—continued.							
Military posts—Continued.							
Shiloh National Military Park	$67,500.00			$67,500.00	$25,411.11		$42,088.89
Improvement of Yellowstone National Park		$35,000.00		35,000.00	35,000.00		
Chickamauga and Chattanooga National Park	82,469.35	5,773.13		88,242.48	88,242.48		
Gettysburg National Park	75,000.00			75,000.00	62,086.53		12,913.47
Payment to Gettysburg Battlefield Memorial Association		2,000.00		2,000.00			2,000.00
Total military posts	455,215.31	297,633.13		752,848.44	585,111.47	$3,423.61	164,313.36
Harbors and rivers.							
Improving harbor at—							
Belfast, Me	5,000.00			5,000.00	5,000.00		
Rockland, Me	20,000.00			20,000.00	20,000.00		
Camden, Me	12,000.00			12,000.00	12,000.00		
Improving channel in Back Cove, Portland, Me	12,000.00			12,000.00	12,000.00		
Breakwater from Mount Desert to Porcupine Island, Me	7,000.00			7,000.00	7,000.00		
Improving harbor at Portsmouth, N. H	4,432.39			4,432.39			4,432.39
Harbor of refuge at Little Harbor, N. H	10,000.00			10,000.00	10,000.00		
Improving harbor at—							
Burlington, Vt	25,000.00			25,000.00	15,000.00		10,000.00
Swanton, Vt	326.93			326.93			326.93
Harbor of refuge at—							
Woods Holl, Mass			$400.08	400.08			400.08
Sandy Bay, Cape Ann, Mass	152,000.00			152,000.00	52,000.00		100,000.00
Improving harbor at—							
Boston, Mass	240,500.00			240,500.00	80,000.90		160,500.00
Chatham, Mass			597.85	597.85			597.85
Hyannis, Mass	2,500.00			2,500.00	2,000.00		500.00
Gloucester, Mass	37,000.00			37,000.00	27,000.00		10,000.00
Lynn, Mass	7,500.00			7,500.00	7,500.00		
Manchester, Mass			646.96	646.96			646.96
Nantucket, Mass	22,400.00			22,400.00	19,000.00		3,400.00
Newburyport, Mass	20,000.00			20,000.00	20,000.00		
New Bedford, Mass	6,500.00			6,500.00	6,500.00		
Plymouth, Mass	3,000.00			3,000.00			3,000.00
Provincetown, Mass	5,000.00			5,000.00	1,000.00		4,000.00
Scituate, Mass	5,000.00			5,000.00	5,000.00		
Salem, Mass			631.34	631.34			631.34
Vineyard Haven, Mass	7,500.00			7,500.00	500.00		7,000.00
Wareham, Mass			238.70	238.70			238.70
Wellfleet, Mass	4,000.00		634.43	4,634.43			4,634.43

Marthas Vineyard, Mass	1,500.00			1,500.00	500.00		1,000.00
Kingston, Mass			1,059.91	1,059.91			1,059.91
Improving Canapitsit Channel, Mass	4,500.00			4,500.00	2,500.00		2,000.00
Harbor of refuge at Point Judith, R. I	280,000.00			280,000.00	266,000.00		14,000.00
Improving Cove Coasters Harbor Island, R. I	.50			.50			.50
Improving harbor at—							
Block Island, R. I	1,500.00			1,500.00	300.00		1,200.00
Newport, R. I	8,000.00			8,000.00	5,200.00		2,800.00
Improving entrance to Point Judith Pond, R. I	9,847.38			9,847.38	400.00		9,447.38
Breakwater at New Haven, Conn	85,000.00			85,000.00	82,500.00		2,500.00
Harbor of refuge, Duck Island Harbor, Conn	30,000.00			30,000.00	30,000.00		
Improving harbor at—							
Bridgeport, Conn	3,000.00			3,000.00	3,000.00		
Five Mile River, Conn	2,500.00			2,500.00	2,500.00		
New Haven, Conn	10,000.00			10,000.00	9,500.00		500.00
Norwalk, Conn	13,500.00			13,500.00			13,500.00
Stonington, Conn	4,800.00			4,800.00	4,300.00		500.00
Stamford, Conn	10,000.00			10,000.00	10,000.00		
Wilsons Point, Conn	500.00		3.10	503.10			503.10
Cos Cob and Miamus River, Conn	4,000.00			4,000.00	4,000.00		
Improving—							
Buttermilk Channel, N. Y	45,000.00			45,000.00	45,000.00		
Arthur Kill, between Staten Island and New Jersey, N. Y. and N. J	976.14		116.63	1,092.77			1,092.77
Breakwater at Rouses Point, Lake Champlain, N. Y			32.45	32.45			32.45
Improving—							
Canarsie Bay, N. Y	2,000.00			2,000.00	500.00		1,500.00
Channel in Gowanus Bay, N. Y	110,000.00			110,000.00	109,000.00		1,000.00
Improving harbor at—							
Buffalo, N. Y	4,000.00			4,000.00	4,000.00		
Charlotte, N. Y	134,621.95			134,621.95	8,625.95		125,996.00
Dunkirk, N. Y	9,000.00			9,000.00	7,250.00		1,750.00
Improving Flushing Bay, N. Y	2,298.41			2,298.41	300.00		1,998.41
Improving harbor at—							
Great Sodus Bay, N. Y	9,000.00			9,000.00	5,950.00		3,050.00
Greenport, N. Y	1,277.85		6.17	1,284.02			1,284.02
Huntington, N. Y	2,000.00			2,000.00	2,000.00		
Larchmont, N. Y	120.95			120.95			120.95
Little Sodus Bay, N. Y	4,000.00			4,000.00	2,550.00		1,450.00
Oak Orchard, N. Y			259.84	259.84			259.84
Ogdensburg, N. Y	12,500.00			12,500.00	12,500.00		
Olcott, N. Y	4,000.00		465.35	4,465.35			4,465.35
Oswego, N. Y	18,000.00			18,000.00	8,050.00		9,950.00
Port Chester, N. Y	4,000.00			4,000.00	4,000.00		
Port Jefferson, N. Y	7,000.00			7,000.00	7,000.00		
Plattsburg, N. Y			239.25	239.25			239.25
Pultneyville, N. Y	1,000.00			1,000.00	1,000.00		
Rondout, N. Y	4,500.00			4,500.00	2,500.00		2,000.00
Saugerties, N. Y	5,000.00			5,000.00	4,000.00		1,000.00
Improving—							
Tonawanda Harbor and Niagara River, N. Y	46,000.00			46,000.00	42,000.00		4,000.00
New York Harbor, N. Y	65,000.00			65,000.00	16,000.00		49,000.00

Statement of appropriations under direction of the War Department for the fiscal year ending June 30, 1896, etc.—Continued.

Title of appropriation.	Balances July 1, 1895.	Appropriated July 1, 1895, to June 30, 1896.	Repayments July 1, 1895, to June 30, 1896.	Aggregate available.	Payments July 1, 1895, to June 30, 1896.	Carried to surplus fund June 30, 1896.	Balance June 30, 1896.
PUBLIC WORKS—continued.							
Harbors and rivers—Continued.							
Improving harbor at—							
Sacketts Harbor, N. Y	$5,000.00			$5,000.00	$650.00		$4,350.00
Mamaroneck, N. Y	220.55			220.55			220.55
Wilson, N. Y			$21.49	21.49			21.49
Keyport, N. J	5,000.00			5,000.00	5,000.00		
Improving Raritan Bay, N. J	14,000.00			14,000.00	14,000.00		
Improving harbor between Philadelphia, Pa., and Camden, N. J	721,000.00			721,000.00	510,000.00		211,000.00
Improving harbor at Erie, Pa	51,786.62			51,786.62	4,484.23		47,302.39
Ice harbor at—							
Marcus Hook, Pa	2,947.39			2,947.39	531.67		2,415.72
Newcastle, Del			40.05	40.05			40.05
Reedy Island, Del	16,236.93			16,236.93			16,236.93
Improving harbor at—							
Delaware Breakwater, Del	50,000.00			50,000.00	25,000.00		25,000.00
Wilmington, Del	20,250.00			20,250.00	10,000.00		10,250.00
Board to determine route of Chesapeake and Delaware Canal	2,436.29			2,436.29			2,436.29
Removing obstructions from the harbor at Delaware Breakwater	734.08			734.08			734.08
Improving harbor at—							
Baltimore, Md	10,000.00			10,000.00	10,000.00		
Annapolis, Md	1,524.58			1,524.58			1,524.58
Cambridge, Md	6,737.00			6,737.00	6,737.00		
Cape Charles City, Va	10,000.00			10,000.00	10,000.00		
Norfolk, Va	67,000.00			67,000.00	67,000.00		
Beaufort, N. C	3,000.00			3,000.00	1,000.00		2,000.00
Improving Edenton Bay, N. C	2,447.41			2,447.41			2,447.41
Improving waterway between—							
Newbern and Beaufort, N. C	6,790.00			6,790.00			6,790.00
Beaufort Harbor and New River, N. C	8,500.00			8,500.00	4,500.00		4,000.00
Improving harbor at—							
Charleston, S. C	415,000.00			415,000.00	200,000.00		215,000.00
Georgetown, S. C			1,519.29	1,519.29			1,519.29
Improving—							
Winyaw Bay, S. C	62,000.00			62,000.00	54,000.00		8,000.00
Outer bar at Brunswick, Ga	237,125.00			237,125.00	3,402.26		233,722.74
Improving harbor at Savannah, Ga	496,250.00			496,250.00	462,000.00		34,250.00
Improving—							
Apalachicola Bay, Fla	14,500.00			14,500.00	14,500.00		
Channel, Charlotte Harbor and Pease Creek, Fla	15,000.00			15,000.00	15,000.00		
Tampa Bay, Fla	.96			.96			.96

Jupiter Inlet, Fla		$500.00		500.00		500.00
Improving harbor at—						
Pensacola, Fla	97,000.00			97,000.00	43,000.00	54,000.00
St. Augustine, Fla	6,000.10			6,000.10		6,000.10
St. Louis, Mo	31,000.00			31,000.00		31,000.00
Mobile, Ala	331,300.00			331,300.00	331,300.00	
Improving—						
Biloxi Bay, Miss			617.73	617.73		617.73
Channel in West Galveston Bay, Tex	2,000.00			2,000.00	2,000.00	
Ship channel in Galveston Bay, Tex	24,500.00			24,500.00	24,500.00	
Improving harbor at—						
Brazos Santiago, Tex	56,855.00		621.00	57,476.00		57,476.00
Galveston, Tex	1,135,000.00	300,000.00		1,435,000.00	1,400,000.00	35,000.00
Ashtabula, Ohio	65,000.00			65,000.00	29,200.00	35,800.00
Black River, Ohio	8,200.00			8,200.00	8,200.00	
Cleveland, Ohio	43,800.00			43,800.00	8,800.00	35,000.00
Fairport, Ohio	20,000.00			20,000.00	9,800.00	10,200.00
Huron, Ohio	10,000.00			10,000.00	8,000.00	2,000.00
Port Clinton, Ohio	6,000.00			6,000.00		6,000.00
Sandusky City, Ohio	14,500.00			14,500.00	11,500.00	3,000.00
Toledo, Ohio	77,000.00			77,000.00	76,800.00	200.00
Vermilion, Ohio	2,000.00			2,000.00		2,000.00
Conneaut, Ohio	27,500.00			27,500.00	27,500.00	
Michigan City, Ind	31,000.00			31,000.00	11,000.00	20,000.00
Calumet, Ill	15,000.00			15,000.00	15,000.00	
Chicago, Ill	90,000.00			90,000.00	60,000.00	30,000.00
Waukegan, Ill	23,000.00			23,000.00	14,000.00	9,000.00
Alpena, Mich	4,000.00			4,000.00		4,000.00
Harbor of refuge at—						
Grand Marais, Mich	19,450.00			19,450.00	13,468.99	5,981.01
Portage Lake, Mich	25,000.00			25,000.00	20,000.00	5,000.00
Sand Beach, Mich	105,000.00			105,000.00	7,500.00	97,500.00
Improving harbor at—						
Black Lake, Mich	13,000.00			13,000.00	13,000.00	
Charlevoix, Mich	10,000.00			10,000.00	7,500.00	2,500.00
Frankfort, Mich	51,500.00			51,500.00	41,500.00	10,000.00
Grand Haven, Mich	25,000.00			25,000.00	7,500.00	17,500.00
Manistee, Mich	12,000.00			12,000.00	12,000.00	
Cheboygan, Mich	15,000.00			15,000.00	15,000.00	
Ludington, Mich	6,000.00			6,000.00	6,000.00	
Manistique, Mich	2,000.00		44.95	2,044.95		2,044.95
Marquette, Mich	13,523.81			13,523.81	12,672.24	851.57
Monroe, Mich	1,500.00			1,500.00	1,500.00	
Muskegon, Mich	25,000.00			25,000.00	10,000.00	15,000.00
Ontonagon, Mich	10,246.91			10,246.91	10,218.91	28.00
Pentwater, Mich	8,500.00			8,500.00	3,500.00	5,000.00
Petoskey, Mich	43,000.00			43,000.00	43,000.00	
St. Joseph, Mich	22,047.20			22,047.20	22,000.00	47.20
South Haven, Mich	18,000.00			18,000.00	8,000.00	10,000.00
White River, Mich	9,000.00			9,000.00	4,000.00	5,000.00
Saugatuck, Mich	7,000.00			7,000.00	4,500.00	2,500.00
Ausable, Mich	196.50			196.50		196.50

Statement of appropriations under direction of the War Department for the fiscal year ending June 30, 1896, etc.—Continued.

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PUBLIC WORKS—continued.							
Harbors and rivers—Continued.							
Improving—							
Eagle Harbor, Mich	$1,103.75			$1,103.75	$96.52		$1,007.23
Mouth and harbor of Cedar River, Mich	1,500.00		$36.03	1,536.03			1,536.03
Improving harbor at—							
Ahnapee, Wis	4,000.00			4,000.00	2,000.00		2,000.00
Ashland, Wis	9,500.00			9,500.00	9,500.00		
Green Bay, Wis	21,000.00			21,000.00	21,000.00		
Kenosha, Wis	14,000.00			14,000.00	13,000.00		1,000.00
Kewaunee, Wis	19,000.00			19,000.00	17,000.00		2,000.00
Manitowoc, Wis	36,000.00			36,000.00	33,000.00		3,000.00
Milwaukee, Wis	1,000.00			1,000.00	1,000.00		
Oconto, Wis	3,500.00			3,500.00	3,000.00		500.00
Pensaukee, Wis	500.00			500.00	500.00		
Port Washington, Wis	5,031.75			5,031.75	5,000.00		31.75
Racine, Wis	16,000.00			16,000.00	16,000.00		
Superior Bay and St. Louis Bay, Wis	43,400.00			43,400.00	42,500.00		900.00
Sheboygan, Wis	19,000.00			19,000.00	19,000.00		
Harbor of refuge—							
Milwaukee Bay, Wis	45,000.00			45,000.00	44,000.00		1,000.00
At entrance of Sturgeon Bay Canal, Wis	5,000.00			5,000.00	4,500.00		500.00
Improving Minnesota Point at Superior, Wis	45.92			45.92			45.92
Ice harbor at Dubuque, Iowa	4,503.99			4,503.99			4,503.99
Improving harbor at—							
Memphis, Tenn	10,000.00			10,000.00	10,000.00		
Agate Bay, Minn	5,000.00			5,000.00			5,000.00
Grand Marais, Minn	3,000.00			3,000.00	3,000.00		
Duluth, Minn	58,317.64			58,317.64	51,352.25		6,965.39
Breakwater and harbor of refuge between Straits of Fuca and San Francisco, Cal	140,858.52			140,858.52			140,858.52
Improving Humboldt Harbor and Bay, Cal	392,000.00			392,000.00	262,000.00		130,000.00
Improving harbor at—							
Oakland, Cal	57,449.74			57,449.74	46,000.00		11,449.74
San Luis Obispo, Cal	35,000.00			35,000.00	20,000.00		15,000.00
San Diego, Cal	34,977.30			34,977.30	34,977.30		
Survey of San Francisco Harbor, San Pablo and Suisun bays, Straits of Carquinez and mouths of San Joaquin and Sacramento rivers, Cal	1,000.00			1,000.00			1,000.00
Survey of Pacific coast between Points Duma and Capistrane, Cal	3,349.22			3,349.22			3,349.22
Examination for deep-water harbor at San Pedro or Santa Monica bays, Cal	6,574.96			6,574.96			6,574.96

Improving—						
Entrance to Coos Bay and Harbor, Oreg	17,500.00			17,500.00	5,000.03	12,499.97
Tillamook Bay and Bar, Oreg	8,000.00			8,000.00	7,000.00	1,000.00
Nehalem Bay, Oreg	9,584.92			9,584.92		9,584.92
Yaquina Bay, Oreg	14,000.00			14,000.00	14,000.00	
Gray's Harbor and Chehalis River, Wash	7,000.00			7,000.00	6,711.17	288.83
Improving harbor at—						
Olympia, Wash	500.00			500.00	500.00	
Greenville, Miss	5,000.00			5,000.00	5,000.00	
Vicksburg, Miss	35,000.00			35,000.00		35,000.00
Natchez and Vidalia, Miss	80,000.00			80,000.00	15,000.00	65,000.00
New Orleans, La	10,000.00			10,000.00	1,000.00	9,000.00
Ship channel connecting waters of the Great Lakes between Chicago, Duluth, and Buffalo	500,000.00			500,000.00	461,412.57	38,587.43
Committee on water communications between the Great Lakes and the Atlantic Ocean	10,000.00			10,000.00	10,000.00	
Improving—						
Lubec Channel, Me	5,000.00			5,000.00	5,000.00	
Moosabec Bar at Jonesport, Me	6,000.00			6,000.00	6,000.00	
Harrisseckit River, Me	10,000.00			10,000.00	9,963.62	36.38
Kennebunk River, Me	1,507.50			1,507.50		1,507.50
Kennebec River, Me	64,000.00			64,000.00	44,000.00	20,000.00
Penobscot River, Me	10,000.00			10,000.00	.59	9,999.41
Narragaugus River, Me	11,500.00			11,500.00	11,500.00	
Saco River, Me	10,000.00			10,000.00	10,000.00	
St. Croix River, Me	35,000.00			35,000.00	25,000.00	10,000.00
Bellamy River, N. H	15,000.00			15,000.00	13,000.00	2,000.00
Cocheco River, N. H	15,000.00			15,000.00	10,000.00	5,000.00
Otter Creek, Vt	5,043.40			5,043.40		5,043.40
Ipswich River, Mass	1,800.00		82.09	1,882.09		1,882.09
Merrimac River, Mass	1,400.00			1,400.00	1,400.00	
Powow River, Mass	26,700.00			26,700.00	5,700.00	21,000.00
Taunton River, Mass	3,500.00			3,500.00	3,500.00	
Weymouth River, Mass	10,000.00			10,000.00	7,500.00	2,500.00
Mystic and Malden rivers, Mass	19,900.00			19,900.00	19,900.00	
Essex River, Mass	7,500.00			7,500.00	7,500.00	
Removing Green Jacket Shoal, Providence River, R. I	7,500.00			7,500.00	7,500.00	
Improving—						
Providence River and Narragansett Bay, R. I	15,100.00			15,100.00	10,991.52	4,108.48
Pawcatuck River, R. I	6,000.00			6,000.00	5,100.01	899.99
Pawtucket River, R. I	24,000.00			24,000.00	22,000.00	2,000.00
Connecticut River, between Hartford and Holyoke	8,940.30			8,940.30		8,940.30
Connecticut River, Conn	20,000.00			20,000.00	11,000.00	9,000.00
Housatonic River, Conn	19,000.00			19,000.00	13,500.00	5,500.00
Thames River, Conn	15,418.00			15,418.00	8,418.00	7,000.00
Saugatuck River, Conn	3,000.00			3,000.00	3,000.00	
Removing obstructions in East River and Hell Gate, N. Y	55,000.00			55,000.00	50,000.00	5,000.00
Improving—						
Browns Creek, N. Y	4,000.00			4,000.00	4,000.00	
East Chester Creek, N. Y	3,000.00			3,000.00	3,000.00	
Great Chazy River, N. Y	3,000.00			3,000.00	2,931.02	68.98
Patchogue River, N. Y	4,000.00			4,000.00	4,000.00	

Statement of appropriations under direction of the War Department for the fiscal year ending June 30, 1896, etc.—Continued.

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PUBLIC WORKS—continued.							
Harbors and rivers—Continued.							
Improving—							
St. Lawrence River, N. Y	$10,150.00			$10,150.00	$8,150.00		$2,000.00
Harlem River, N. Y	132,285.83			132,285.83	127,285.83		5,000.00
Hudson River, N. Y	640,000.00			640,000.00	515,000.00		125,000.00
Niagara River, N. Y	21,500.00			21,500.00	18,400.00		3,100.00
Goshen Creek, N. J	3,000.00			3,000.00			3,000.00
Mattawan Creek, N. J	3,000.00			3,000.00	3,000.00		
Elizabeth River, N. J	3,000.00			3,000.00	3,000.00		
Passaic River, N. J	13,000.00			13,000.00	11,000.00		2,000.00
Shrewsbury River, N. J	1,500.00			1,500.00	1,500.00		
Raccoon River, N. J	2,242.77			2,242.77			2,242.77
Squan River, N. J	2,000.00			2,000.00			2,000.00
Rancocas River, N. J			$399.70	399.70			399.70
Raritan River, N. J	20,000.00			20,000.00	20,000.00		
Frankford Creek, Pa	2,000.00			2,000.00			2,000.00
Dam at Herrs Island, Allegheny River, near Pittsburg, Pa	65,000.00			65,000.00	60,000.00		5,000.00
Purchase of upper lock and dam, Monongahela River, between Pittsburg, Pa., and Morgantown, W. Va	323,333.13			323,333.13			323,333.13
Cost of condemnation of upper lock and dam, Monongahela River, between Pittsburg, Pa., and Morgantown, W. Va	5,098.64			5,098.64			5,098.64
Improving—							
Allegheny River, Pa	16,000.00			16,000.00	10,000.00		6,000.00
Delaware River, Pa. and N. J	196,000.00			196,000.00	51,989.40		144,010.60
Schuylkill River, Pa	26,450.00			26,450.00	22,450.00		4,000.00
Survey of Delaware River between Philadelphia, Pa., and Camden, N. J	4,465.28			4,465.28			4,465.28
Improving—							
Murderkill River, Del	6,500.00			6,500.00	6,500.00		
Mispillion Creek, Del	10,150.00			10,150.00	5,800.00		4,350.00
Appoquinnimink River, Del	5,000.00			5,000.00	1,000.00		4,000.00
Smyrna River, Del	5,000.00			5,000.00	3,000.00		2,000.00
Broad Creek, Del	5,000.00			5,000.00	5,000.00		
Choptank River, Md	2,000.00			2,000.00	2,000.00		
Chester River, Md	4,458.54			4,458.54	1,500.00		2,958.54
Manokin River, Md	4,000.00			4,000.00	4,000.00		
Patuxent River, Md	382.70			382.70			382.70
Susquehanna River near Havre de Grace, Md	10,000.00			10,000.00			10,000.00
Wicomico River, Md	3,000.00			3,000.00	3,000.00		
Patapsco River, Md	12,000.00			12,000.00			12,000.00
Potomac River	91,000.00			91,000.00	35,536.94		55,463.06
Warwick River, Md	2,000.00			2,000.00	2,000.00		

Latrappe River, Md	4,750.00			4,750.00	4,750.00	
Waterway from Chincoteague Bay to Indian River Bay, Md., Va., and Del	16,500.00			16,500.00	16,500.00	
Aquia Creek, Va	3,000.00			3,000.00	3,000.00	
Occoquan Creek, Va	2,500.00			2,500.00	2,500.00	
Nomini Creek, Va	5,000.00			5,000.00	4,000.00	1,000.00
Urbana Creek, Va	3,000.00			3,000.00	3,000.00	
Appomattox River, Va	4,400.00			4,400.00	4,280.00	120.00
James River, Va	110,000.00			110,000.00	110,000.00	
Mattaponi River, Va	4,500.00			4,500.00	3,000.00	1,500.00
Pamunkey River, Va	1,500.00			1,500.00		1,500.00
Rappahannock River, Va	12,500.00			12,500.00	9,500.00	3,000.00
Staunton River, Va	8,084.77			8,084.77		8,084.77
York River, Va	16,500.00			16,500.00	14,000.00	2,500.00
North Landing River, Va. and N. C	1,300.00			1,300.00	1,000.00	300.00
New River, Va. and W. Va	2,308.94			2,308.94		2,308.94
Dan River, Va. and N. C	39.63			39.63		39.63
Lower Machodoc Creek, Va	3,000.00			3,000.00	3,000.00	
Big Sandy River, W. Va. and Ky	20,000.00			20,000.00	12,000.00	8,000.00
Elk River, W. Va	1,500.00			1,500.00		1,500.00
Cheat River, W. Va			3.16	3.16		3.16
Gauley River, W. Va	500.00			500.00		500.00
Guyandotte River, W. Va	1,000.00			1,000.00	1,000.00	
Great Kanawha River, W. Va	770,633.00			770,633.00	305,000.00	465,633.00
Monongahela River, W. Va	38,500.00			38,500.00		38,500.00
Shenandoah River, W. Va	16,020.49			16,020.49		16,020.49
Waterway from Norfolk Harbor, Va., to Albemarle Sound, N. C	3,000.00			3,000.00	2,200.00	800.00
Ocracoke Inlet, N. C	77,500.00			77,500.00	25,000.00	52,500.00
Waterway between New River and Swansboro, N. C	4,200.00		176.27	4,376.27		4,376.27
Contentnia Creek, N. C	6,500.00			6,500.00	3,000.00	3,500.00
Fishing Creek, N. C	15,000.00			15,000.00	37.03	14,962.97
Mackeys Creek, N. C			356.12	356.12		356.12
Cape Fear River, N. C	132,000.00			132,000.00	61,000.00	71,000.00
Pasquotank River, N. C	1,500.00			1,500.00		1,500.00
New River, N. C	4,500.00			4,500.00	1,000.00	3,500.00
Neuse River, N. C	11,003.00			11,003.00	8,000.00	3,003.00
Lockwoods Folly River, N. C	7,000.00			7,000.00	7,000.00	
Lumber River, N. C	3,000.00			3,000.00	2,500.00	500.00
Pamlico and Tar rivers, N. C	8,500.00			8,500.00	3,500.00	5,000.00
Roanoke River, N. C	53,006.76			53,006.76	20,000.00	33,006.76
Trent River, N. C	2,513.50			2,513.50	2,500.00	13.50
Yadkin River, N. C	4,497.12			4,497.12		4,497.12
Waccamaw River, N. C	4,000.00			4,000.00	3,500.00	500.00
Black River, N. C	2,000.00			2,000.00	2,000.00	
Survey of waterways connecting Dismal Swamp Canal, Va., with sounds of North Carolina	4,500.00			4,500.00	4,100.00	400.00
mproving—						
Mingo Creek, S. C	3,000.00			3,000.00	2,500.00	500.00
Wappoo Cut, S. C	1,520.29			1,520.29	6.00	1,514.29
Beaufort River, S. C	4,500.00			4,500.00	4,500.00	
Congaree River, S. C	3,000.00			3,000.00	1,500.00	1,500.00
Great Pedee River, S. C	4,500.00			4,500.00	4,000.00	500.00

Statement of appropriations under direction of the War Department for the fiscal year ending June 30, 1896, etc.—Continued.

Title of appropriation.	Balances July 1, 1895.	Appropriated July 1, 1895, to June 30, 1896.	Repayments July 1, 1895, to June 30, 1896.	Aggregate available.	Payments July 1, 1895, to June 30, 1896.	Carried to surplus fund June 30, 1896.	Balance June 30, 1896.
PUBLIC WORKS—continued.							
Harbors and rivers—Continued.							
Improving—							
Little Pedee River, S. C	$3,500.00			$3,500.00	$3,000.00		$500.00
Salkahatchie River, S. C	1,762.24		$397.03	2,159.27			2,159.27
Santee River, S. C	29,500.00			29,500.00	24,500.00		5,000.00
Wateree River, S. C	1,000.00			1,000.00	1,000.00		
Chattahoochee River, Ga. and Ala	14,000.00			14,000.00	7,000.00		7,000.00
Flint River, Ga	3,000.00			3,000.00	2,500.00		500.00
Ocmulgee River, Ga	3,000.00			3,000.00	3,000.00		
Oconee River, Ga	4,500.00			4,500.00	4,500.00		
Oostenaula and Coosawattee rivers, Ga	499.39			499.39			499.39
Coosa River, Ga. and Ala	130,018.27			130,018.27	115,000.00		15,018.27
Surveys of Biscayne Bay and Palm Beach, Fla		$1,500.00		1,500.00	1,500.00		
Improving—							
La Grange Bayou, Fla	4,839.20			4,839.20			4,839.20
Volusia Bar, Fla	1,000.00			1,000.00			1,000.00
Ocklawaha River, Fla	1,000.00			1,000.00	1,000.00		
Choctawhatchee River, Fla. and Ala	4,000.00			4,000.00	4,000.00		
Escambia and Conecuh rivers, Fla. and Ala	3,000.00			3,000.00	3,000.00		
Manatee River, Fla	3,000.00			3,000.00	3,000.00		
Suwanee River, Fla	2,000.00			2,000.00	2,000.00		
Withlacoochee River, Fla	800.05			800.05	14.93		785.12
Indian River, Fla	20,000.00			20,000.00	15,000.00		5,000.00
Alabama River, Ala	32,000.00			32,000.00	32,000.00		
Black Warrior River, Ala	37,500.00			37,500.00	22,500.00		15,000.00
Tallapoosa River, Ala	28.08			28.08			28.08
Warrior and Tombigbee rivers, Ala. and Miss	240,000.00			240,000.00	102,000.00		138,000.00
Yazoo River, Miss	263,000.00			263,000.00	73,900.00		189,100.00
Tchula Lake, Miss	2,000.00			2,000.00	2,000.00		
Steeles Bayou, Miss	2,443.26			2,443.26	2,443.26		
Big Sunflower River, Miss	5,000.00			5,000.00	5,000.00		
Chickasahay River, Miss	5,000.00			5,000.00	5,000.00		
Leaf River, Miss	2,500.00			2,500.00			2,500.00
Pascagoula River, Miss	10,000.00			10,000.00	5,000.00		5,000.00
Pearl River, Miss	5,409.40			5,409.40	5,409.40		
Tallahatchee River, Miss	3,000.00			3,000.00	3,000.00		
Mississippi River, Miss	3,172,400.14			3,172,400.14	2,276,680.00		895,720.14
Survey for canal connecting Lake Superior and Mississippi River	4,000.00			4,000.00	4,000.00		
Improving Mississippi River—							
From Minneapolis to Des Moines Rapids, Minn., Iowa, Mo., Ill., and Wis	3,000.00			3,000.00			3,000.00

From mouth of the Ohio River to Minneapolis, Minn	2,454.341.34			2,454,341.34	1,829,083.04		625,258.30
Between mouths of Ohio and Illinois rivers, Ill. and Mo	35,100.00			35,100.00	4,000 00		31,100.00
Gauging the waters of Lower Mississippi and its tributaries		6,000 00		6,000.00	6.000.00		
Reservoirs at head waters of Mississippi River	10,618.82			10,618.82	9,278.56		1,340.26
Operating snag and dredge boats on Upper Mississippi River		25,000.00		25,000.00	25,000.00		
Constructing jetties and other works at South Pass, Mississippi River		100,000.00		100,000.00	100,000.00		
Examination and surveys at South Pass, Mississippi River		11,500 00		11,500.00	11,500.00		
Removing obstructions in Mississippi River		123,000.00		123,000.00	108,000.00		15,000.00
Mississippi River Commission	50.40			50.40			50.40
Improving—							
Bayou Vermillion, La	5,000.00			5,000.00	5,000.00		
Bogue Chitto, La	2,500.00			2,500.00	2,500.00		
Bayou Bœuf, La	6,400.00			6 400.00	4,400.00		2,000.00
Bayou Bartholomew, La	4,500.00			4,500.00	2,500.00		2,000.00
Bayou Courtableau, La	5 000.00			5,000.00	5,000.00		
Bayou Black, La	319.31			319 31			319.31
Bayou D'Arbonne, La	3,700.00			3.700.00	3,700.00		
Bayou Plaquemine, La	149,407.77			149,407.77	62,400.00		87,007.77
Bayou Terrebonne, La			158.90	158.90			158.90
Bayou Lafourche, La	77,900.00			77,900.00	26,900.00		51,000.00
Connecting Bayou Teche with Grand Lake at Charenton, La	22,100.05			22,100.05			22,100.05
Improving—							
Amite River, La	2.50			2.50			2.50
Calcasieu River and Pass, La	62,864.00			62,864.00	41,000.00		21,864.00
Red River La. and Ark	125,200.00			125,200.00	89,730.89		35,469.11
Mermentau River, La	5,000.00			5,000.00			5,000.00
Atchafalaya and Red rivers, La	67,500.00			67.500.00	15,000.00		52,500.00
Sabine Pass, Tex	260,000.00			260.000.00	226,300.60		33,700.00
Aransas Pass and Bay, Tex	40,667.35			40,667.35			40,667.35
Mouth of Brazos River, Tex	16,651.57			16,651.57			16,651.57
Paso Cavallo, Tex	35,368.78			35,368.78			35,368.78
Buffalo Bayou, Tex	9,500.00			9.500.00	9,500.00		
Cypress Bayou, Tex. and La	10,000.00			10 000.00			10,000.00
Trinity River, Tex	3,000.00			3,000.00	300.00		2,700.00
Neches River, Tex	4,157.84			4,157.84	4,157.84		
Sabine River, Tex	5,000.00			5,000.00	5,000.00		
Ouachita River, Ark. and La	29,500.00			29,500.00	22,023.12		7,476.88
Removing obstructions in Arkansas River, Ark. and Kans	4,500.00			4,500.00	4,500.00		
Improving—							
Black River, Ark. and Mo	7,000.00			7,000.00	4,000.00		3,000.00
Fourche Le Fevre River, Ark	892.75			892.75			892.75
St. Francis River, Ark	5,100.28			5,100.28	4,800.55		299.73
Red River above Fulton, Ark	1,000.00			1,000.00	1,000.00		
Arkansas River, Ark	160,562 99			160,562.99	104,967.49		55,595.50
White River, Ark	46,550.00			46,550.00	35,000.00		11,550.00
Current River, Ark. and Mo	3,600.00			3,600.00	2,300.00		1,300.00
Caney Fork River, Tenn			20.00	20.00			20.00
Clinch River, Tenn	4,500.00			4,500.00	500.00		4,000.00
French Broad River, Tenn	6,900.00			6,900.00	6,900.00		
Cumberland River below Nashville, Tenn	40,000.00			40,000.00	16,000.00		24,000.00
Cumberland River above Nashville, Tenn	224,000.00			224,000.00	109,000.00		115.000.00
Tennessee River above Chattanooga, Tenn	43,400.00			43,400.00	18,900.00		24,500.00

Statement of appropriations under direction of the War Department for the fiscal year ending June 30, 1896, etc.—Continued.

Title of appropriation.	Balances July 1, 1895.	Appropriated July 1, 1895, to June 30, 1896.	Repayments July 1, 1895, to June 30, 1896.	Aggregate available.	Payments July 1, 1895, to June 30, 1896.	Carried to surplus fund June 30, 1896.	Balance June 30, 1896.
PUBLIC WORKS—continued.							
Harbors and rivers—Continued.							
Improving—							
Tennessee River below Chattanooga, Tenn., Ala., and Ky	$681,848.71			$681,848.71	$272,834.35		$409,014.36
Obeys River, Tenn	17.86			17.86			17.86
Obion River, Tenn	3,500.00			3,500.00	3,000.00		500.00
South Fork Cumberland River, Ky	32.98			32.98			32.98
Kentucky River, Ky	200,870.86			200,870.86	123,000.00		77,870.86
Rough River, Ky	30,500.00			30,500.00	30,500.00		
Tradewater River, Ky	485.00			485.00			485.00
Green River, Ky	150,288.12			150,288.12	72,500.00		77,788.12
Survey of canal connecting Lake Erie with Ohio River, Ohio	6,000.00			6,000.00	6,000.00		
Survey of the Ohio River below Pittsburg, Pa	9,565.92			9,565.92			9,565.92
Improving—							
Ohio River below Pittsburg, Pa	225,000.00			225,000.00	73,000.00		152,000.00
Ohio River	316,419.92			316,419.92	184,802.31		131,617.61
Muskingum River, Ohio	12,000.00			12,000.00	7,000.00		5,000.00
Operating snag boats on Ohio River		$25,000.00		25,000.00	24,907.69		92.31
Examination of Portage Lake and Lake Superior ship canals	2,310.92			2,310.92			2,310.92
Improving—							
Detroit River, Mich	50,000.00			50,000.00	20,000.00		30,000.00
Hay Lake Channel, Sault Ste. Marie River, Mich	275,000.00			275,000.00	10,000.00		265,000.00
St. Clair Flats Canal, Mich	134.17		$4,586.54	4,720.71			4,720.71
Black River, Mich	7,500.00			7,500.00	1,000.00		6,500.00
Clinton River, Mich	5,000.00			5,000.00	1,000.00		4,000.00
Menomonee River, Mich. and Wis	2,000.00			2,000.00	2,000.00		
Saginaw River, Mich	50,000.00			50,000.00	50,000.00		
Rouge River, Mich	5,000.00			5,000.00			5,000.00
St. Joseph River, Mich	500.00			500.00	500.00		
St. Marys River, Mich	1,788,865.00			1,788,865.00	417,803.92		1,371,061.08
St. Marys River and St. Marys Falls Canal, Mich	182.31			182.31			182.31
Thunder Bay River, Mich	2,000.00			2,000.00			2,000.00
Turning Basin, Rouge River, Mich	2,000.00			2,000.00			2,000.00
Improving waterway from Kewaunee Bay to Lake Superior, Mich	90,000.00			90,000.00	87,000.92		2,999.08
Sturgeon Bay and Lake Michigan Ship Canal	11,000.00			11,000.00	10,000.00		1,000.00
Improving—							
Chippewa River, Wis	2,998.97			2,998.97	2,998.97		
St. Croix River, Wis. and Minn	1,000.00			1,000.00	1,000.00		
Fox River, Wis	19,004.76			19,004.76	18,000.00		1,004.76
Damages by improvement of Fox and Wisconsin rivers, Wis		400.00		400.00			400.00

Improving—							
Red River of the North, Minn. and Dak	3,992.39			3,992.39	3,913.95		78.44
White River, Ind	4,000.00			4,000.00	4,000.00		
Wabash River, Ind. and Ill	8,000.00			8,000.00	8,000.00		
Illinois and Mississippi Canal	370,000.50			370,000.50	370,000.00		.50
Improving—							
Calumet River, Ill. and Ind	16,500.00			16,500.00	10,000.00		6,500.00
Kaskaskia River, Ill			39.20	39.20			39.20
Illinois River, Ill	15,000.00			15,000.00	15,000.00		
Missouri River, from mouth to Sioux City, Iowa	914,537.88			914,537.88	868,880.53		45,657.35
Gasconade River, Mo	2,500.00			2,500.00	2,500.00		
Osage River, Mo. and Kans	124,800.00			124,800.00	69,300.00		55,500.00
St. Francis River, Mo	5,770.53			5,770.53	3,700.00		2,070.53
Missouri River, Mo	21,139.33			21,139.33	20,111.88		1,027.45
Missouri River, from Stubbs Ferry, Mont., to Sioux City, Iowa	54,994.01			54,994.01	49,411.51		5,582.50
Examination of Missouri River from Three Forks to Canyon Ferry, Mont	754.01			754.01			754.01
Improving—							
Yellowstone River, Mont. and Dak	11,720.00		.41	11,720.41			11,720.41
Napa River, Cal	4,000.00			4,000.00	4,000.00		
Petaluma Creek, Cal	15,000.00			15,000.00	15,000.00		
Sacramento and Feather rivers, Cal	143,230.56			143,230.56	30,009.14		113,221.42
San Joaquin River, Cal	30,017.06			30,017.06	16,028.67		13,988.39
Mokelumne River, Cal	5,000.00			5,000.00	5,000.00		
Mouth of Columbia River, Oreg. and Wash	194,180.00			194,180.00	127,000.00		67,180.00
Columbia River at Cascades, Oreg	539,653.00			539,653.00	427,001.28		112,651.72
Examination and survey of Columbia River, Oreg	3,169.49			3,169.49			3,169.49
Gauging waters of Columbia River, Oreg	500.00			500.00	500.00		
Improving—							
Columbia and Lower Willamette rivers below Portland, Oreg	19,000.00			19,000.00	16,500.00		2,500.00
Coquille River, Oreg	11,000.00			11,000.00	8,300.00		2,700.00
Siuslaw River, Oreg	18,000.00			18,000.00	17,500.00		500.00
Upper Columbia and Snake rivers, Oreg. and Wash	4,200.00			4,200.00	2,000.00		2,200.00
Willamette River above Portland, Oreg	9,500.00			9,500.00	9,000.00		500.00
Examination of obstructions in Columbia River	520.51			520.51			520.51
Improving—							
Columbia River at Three Mile Rapids, Oreg. and Wash	96,300.00			96,300.00	3,000.00		93,300.00
Willapa River and Harbor, Wash	4,950.00			4,950.00	2,300.00		2,650.00
Columbia River from Rock Island Rapids to Priest Rapids, Wash			2.00	2.00			2.00
Snohomish River, Wash	6,500.00			6,500.00	6,500.00		
Cowlitz River, Wash	1,000.00			1,000.00	1,000.00		
Puget Sound, Wash	8,000.00			8,000.00	2,998.20		5,001.80
Swinomish Slough, Wash	4,000.00			4,000.00			4,000.00
Waterway connecting Puget Sound with Lakes Union and Washington	21,000.00			21,000.00	1,000.00		20,000.00
Surveys for deep-water harbor, Gulf of Mexico	766.96			766.96			766.96
Improving—							
Colorado River at Yuma, Ariz			218.25	218.25			218.25
Upper Snake River, Idaho	11,000.00			11,000.00	6,500.00		4,500.00
Operating and care of canals and other works of navigation		707,704.81		707,704.81	707,704.81		
Removing sunken vessels or craft obstructing or endangering navigation		37,503.03		37,503.03	37,503.03		

Statement of appropriations under direction of the War Department for the fiscal year ending June 30, 1896, etc.—Continued.

Title of appropriation.	Balances July 1, 1895.	Appropriated July 1, 1895, to June 30, 1896.	Repayments July 1, 1895, to June 30, 1896.	Aggregate available.	Payments July 1, 1895, to June 30, 1896.	Carried to surplus fund June 30, 1896.	Balance June 30, 1896.
PUBLIC WORKS—continued.							
Harbors and rivers—Continued.							
Examinations, surveys, and contingencies of rivers and harbors	$135,064.07			$135,064.07	$63,501.41		$71,562.66
Total harbors and rivers	26,382,351.71	$1,338,107.84	$14,672.27	27,735,131.82	17,859,232.70		9,875,899.12
Repayments in excess of payments					14,672.27		
Actual expenditures					17,844,560.43		
MISCELLANEOUS OBJECTS.							
Signal Service.							
Road to the signal station on Pikes Peak, Colo	10,000.00			10,000.00			10,000.00
Military telegraph line from Fort Ringgold, Tex., to Fort McIntosh, Tex	965.00			965.00	798.34		166.66
Military telegraph line from El Paso, Tex., and New Fort Bliss, Tex	140.00			140.00	72.37		67.63
Military telegraph lines		25.58		25.58	25.58		
Signal Service transportation		2.24		2.24	2.24		
Total Signal Service	11,105.00	27.82		11,132.82	898.53		10,234.29
National cemeteries.							
National cemeteries	15,592.92	100,000.00		115,592.92	110,943.31		4,649.61
Pay of superintendents of national cemeteries	1,849.17	61,880.00		63,729.17	61,724.51	$1,068.66	936.00
Repairing roads to national cemeteries	6,559.30	8,000.00		14,559.30	9,964.51	2,987.58	1,607.21
Road to the national cemetery, Presidio of San Francisco, Cal	9,995.00	10,000.00		19,995.00	19,995.00		
Road to the national cemetery at Hampton, Va	2,000.00			2,000.00			2,000.00
Road from national cemetery near Mound City to Mounds Junction, Ill	25.90			25.90		25.90	
Headstones for graves of soldiers	32,541.79	25,000.00		57,541.79	44,126.62		13,415.17
Burial of indigent soldiers	2,002.57	3,700.00		5,702.57	1,502.57		4,200.00
Road to the national cemetery, Illinois		15,000.00		15,000.00			15,000.00
Total national cemeteries	70,566.65	223,580.00		294,146.65	248,256.52	4,082.14	41,807.99
Artificial limbs and appliances.							
Artificial limbs	51,808.80	130,030.00		181,838.80	132,037.72	47,844.89	1,956.19
Trusses for disabled soldiers		5,000.00		5,000.00	5,000.00		
Appliances for disabled soldiers	1,274.13	2,000.00		3,274.13	1,600.00	434.13	1,240.00
Total artificial limbs and appliances	53,082.93	137,030.00		190,112.93	138,637.72		3,196.19

Civil surveys.							
Survey of road from Aqueduct Bridge to Mount Vernon	2,112.71			2,112.71			2,112.71
Survey of northern and northwestern lakes	11,343.25	27,000.00		38,343.25	33,906.70	40.15	4,396.40
Total civil surveys	13,455.96	27,000.00		40,455.96	33,906.70	40.15	6,509.11
Miscellaneous.							
Arming and equipping the militia	303,333.48	400,000.00		703,333.48	182,990.04		520,343.44
Seacoast batteries for instruction of militia		5,905.00		5,905.00	5,905.00		
Infantry and Cavalry School, Fort Leavenworth, Kans		1,500.00		1,500.00	1,500.00		
Artillery School, Fort Monroe, Va		5,000.00		5,000.00	5,000.00		
Support of military prison, Fort Leavenworth, Kans	7,234.31			7,234.31	17.36	106.01	7,110.94
Publication of Official Records of War of the Rebellion	22,000.34	145,000.00		167,000.34	152,472.73	.34	14,527.27
Expenses of military convicts	3,331.75	3,000.00		6,331.75	796.00	1,462.50	4,073.25
State or Territorial homes for disabled soldiers and sailors	142,500.00	793,799.74		936,299.74	767,300.47		168,999.27
Support of National Home for Disabled Volunteer Soldiers	150,489.04	1,481.50	22,621.79	174,592.33		173,283.23	1,309.10
National Home for Disabled Volunteer Soldiers	793,812.12	1,920,946.00		2,714,758.12	2,365,880.95		348,877.17
Support of Soldiers' Home	2,700,330.86	339,654.64		3,039,985.50	321,552.98		2,718,432.52
Arms and quartermaster stores for State of Wyoming	5,666.64			5,666.64			5,666.64
Military stores for Montana militia	11,792.29			11,792.29			11,792.29
Expenses of California Débris Commission, etc	7,766.01			7,766.01	4,000.00		3,766.01
Establishment of Apache prisoners upon military reservations		10,000.00		10,000.00	10,000.00		
Total miscellaneous	4,148,256.84	3,626,286.88	22,621.79	7,797,165.51	3,817,415.53	174,852.08	3,804,897.90
Repayments in excess of payments					22,621.79		
Actual expenditures					3,794,793.74		
War claims of States.							
Refunding to States expenses incurred in raising volunteers		5,567.48		5,567.48	5,567.48		
Examination of claims of States and Territories under act of June 27, 1882	5,689.75			5,689.75			5,689.75
Refunding to California expenses incurred in suppressing Indian hostilities	925.65			925.65	925.65		
Reimbursing State and citizens of California for expenses in suppressing Modoc Indian hostilities	224.25			224.25			224.25
Total war claims of States	6,839.65	5,567.48		12,407.13	6,493.13		5,914.00
War claims of volunteers.							
Bounty to volunteers, their widows and legal heirs	91,429.95	209,224.25		300,654.20	240,183.18	3,683.21	56,787.81
Bounty to Fifteenth and Sixteenth Missouri Cavalry Volunteers		166.66		166.66	166.66		
Bounty under act of July 28, 1866	15,609.95	27,266.66		42,876.61	26,375.45	14,403.71	2,097.45
Pay of two and three year volunteers	237,154.16	331,920.36		569,074.52	324,814.52	234,576.53	9,683.47
Services and supplies of Montana volunteers in Nez Perce Indian war	657.00			657.00			657.00
Three months' pay proper		150.00		150.00	150.00		
Preventing and suppressing Indian hostilities	22.82			22.82	22.82		
Horses and other property lost in the military service	4,305.32	107,225.34		111,530.66	73,580.06		37,950.60

Statement of appropriations under direction of the War Department for the fiscal year ending June 30, 1896, etc.—Continued.

Title of appropriation.	Balances July 1, 1895.	Appropriated July 1, 1895, to June 30, 1896.	Repayments July 1, 1895, to June 30, 1896.	Aggregate available.	Payments July 1, 1895, to June 30, 1896.	Carried to surplus fund June 30, 1896.	Balance June 30, 1896.
MISCELLANEOUS OBJECTS—continued.							
War claims of volunteers—Continued.							
Commutation of rations to prisoners of war in rebel States and to soldiers on furlough	$32,963.09	$10,059.00		$43,022.09	$3,657.80	$20,358.68	$19,005.61
Traveling expenses, California and Nevada volunteers	187.21	220.97		408.18	220.97		187.21
Pay of volunteers, Mexican war		160.34		160.34	160.34		
Extra pay to officers and men who served in the Mexican war		243.00		243.00	243.00		
Capture of Jefferson Davis	1,503.38			1,503.38	1,503.38		1,503.38
Pay, transportation, services, and supplies of Oregon and Washington volunteers in 1855-56		198.38		198.38	198.38		
Total war claims of volunteers	383,832.88	686,834.96		1,070,667.84	669,773.18	273,022.13	127,872.53
Relief acts.							
Claims of officers and men of the Army for destruction of private property		1,838.84		1,838.84	1,838.84		
Claims of loyal citizens for supplies furnished during the rebellion	6,939.00			6,939.00			6,939.00
Claims for quartermaster stores and commissary supplies, act July 4, 1864	1,048.74			1,048.74			1,048.74
Awards for quartermaster stores and commissary supplies taken by Army in Tennessee	130.00			130.00			130.00
Stores and supplies taken by the Army (Bowman act) March 3, 1891		6,124.00		6,124.00	6,124.00		
Reimbursement to Col. F. C. Ainsworth			$96.37	96.37			96.37
Relief on account of the Ford's Theater disaster	14,479.17	131,850.00		146,329.17	131,889.17		14,440.00
Relief of trustees of Presbyterian church, Bethel Springs, Tenn		400.00		400.00	400.00		
Relief of widow and legal representatives of Orsemus B. Boyd		1,776.06		1,776.06	1,776.06		
Relief of estate of John R. Bigelow		284.66		284.66	284.66		
Relief of owners and crew of schooner Henry R. Tilton		80.74		80.74	80.74		
Relief of A. T. Hensley		432.00		432.00	432.00		
Relief of J. J. Links		1,289.33		1,289.33	1,289.33		
Relief of John Finn		6,363.95		6,363.95			6,363.95
Relief of John J. Shipman		17,811.96		17,811.96	17,811.96		
Total relief acts	22,596.91	168,251.54	96.37	190,944.82	161,926.76		29,018.06
Repayments in excess of payments					96.37		
Actual expenditures					161,830.39		

RECAPITULATION.

Salaries, contingencies, etc	$880,537.42	$1,850,023.72	$8.99	$2,730,570.13	$1,905,355.84	$104,724.18	$720,490.11
Military Establishment, Army, and Military Academy	4,344,725.26	23,764,463.75	1,932.41	28,111,121.42	24,048,196.63	1,356,924.68	2,706,000.11
Public works	30,452,971.32	11,344,543.37	14,672.34	41,812,187.03	21,804,246.20	13,108.69	19,994,832.14
Miscellaneous objects	4,709,736.82	4,874,578.68	22,718.16	9,607,033.66	5,077,308.07	500,275.52	4,029,450.07
Total	40,387,970.82	41,833,609.52	39,331.90	82,260,912.24	52,835,106.74	1,975,033.07	27,450,772.43
Repayments in excess of payments					39,331.90		
Actual expenditures					52,795,774.84		

REPORT

OF THE

MAJOR-GENERAL COMMANDING THE ARMY.

ANNUAL REPORT

OF THE

MAJOR-GENERAL COMMANDING THE ARMY.

HEADQUARTERS OF THE ARMY,
Washington, D. C., November 10, 1896.

SIR: I have the honor to transmit herewith the reports of Major-General Ruger, commanding the Department of the East; Major-General Merritt, commanding Department of the Missouri; Brigadier-General Brooke, commanding Department of Dakota; Brigadier-General Wheaton, commanding Department of the Colorado; Brigadier-General Otis, commanding Department of the Columbia; Brigadier-General Forsyth, commanding Department of California; Brigadier-General Bliss, commanding Department of Texas; and Brigadier-General Coppinger, commanding Department of the Platte; the reports of the Adjutant-General (Ruggles) and the Inspector-General (Breckenridge) of the Army; also the reports of the commanding officers of the United States Artillery School at Fort Monroe, Cavalry and Light Artillery School at Fort Riley, and the Infantry and Cavalry School at Fort Leavenworth.

These reports give a full history of the military affairs in the different departments, the movement of troops, the important military changes that have occurred during the year, the administration and discipline, the result of inspections, instruction, and progress made at the various military schools of practice; also the reports of field operations, practice marches, target practice, etc. I concur in the recommendation contained in the report of Major General Ruger concerning field exercises; also in the recommendation of Brigadier-General Coppinger regarding the Bannock Indians.

Fortunately, during the year the Army has been called on only to a limited extent to act either against hostile Indians or against bodies of men who are engaged in violating the United States law or international treaty obligations. There have been several lawless bands that have to some extent disturbed the peace along the Rio Grande and the border line between Mexico and the southern border of Arizona and New Mexico. The troops of the Mexican Republic, as well as our own, have been engaged in suppressing such acts of lawlessness as have in a small degree interfered with the peace of the communities on both

sides of the border, and arrangements have been made through the Government of Mexico to secure cooperation of the forces of that Republic and our own to this end.

The troops in the Department of the Colorado have been actively engaged, in small detachments, in protecting the settlements against the depredations of a few Indian outlaws. The zeal and judicious disposition and action of the troops have contributed largely to maintaining a condition of peace and security among the sparsely settled districts of that frontier.

The personnel of the Army was never in better condition. The percentage of violations of military discipline has been exceedingly small during the year, and in the main both officers and men have fulfilled all the requirements that could be expected of a patriotic, intelligent, and efficient army.

The standard of enlisted men is constantly improving. The requirements for entering the service are now so exacting that during the last year out of 49,240 applicants only 7,465 were accepted as qualified for service in the Army, showing the care taken in enlistments and the rising standard of requirements. The soldiers are now very largely American born and taken from every section of our country, and very many of the most respected families are represented among them. This condition of affairs has made to a very large degree the elementary schools established for enlisted men under section 1231, Revised Statutes, unnecessary, and now calls for a different class of instruction, more strictly professional. It also emphasizes the need of a different grade of special text-books, and post libraries should be supplied, with suitable books, for those who would use them. Very many of our soldiers, through their Army training to a faithful performance of duty with promptness and accuracy, and the instruction they have received during their service, are engaged in business for themselves or have secured excellent positions in civil life after their discharge, and are among the most valued citizens in the community where they reside. A good post library at every military post is also needed for the use of the officers in the post lyceum work. Through this work a valuable incentive to study and improvement has been provided for the service. It is recommended that post libraries meeting both these needs be provided.

A great improvement has been made in the architecture, durability, and stability of the public buildings that are now occupied by the Army, which contributes largely to the health and comfort of the occupants and is in the end economical. Yet the necessity for changing from the old temporary and rapidly decaying buildings that have heretofore been constructed, many of them on what was formerly known as the Indian frontier, to the more durable and sanitary buildings that are now being constructed requires a large increase of the construction fund, and this, added to the fact that in many cases new posts have to be constructed for the accommodation of batteries of artillery, renders

it necessary that large appropriations be made, and I therefore recommend that a liberal appropriation be furnished for the construction and repair of public buildings for the Army. These buildings, once constructed, will serve their purpose indefinitely with ordinary repairs.

During the last year the country has fortunately been free from any serious outbreak of Indians, and all the different tribes have been in the main peaceable, well disposed, and constantly making some progress toward civilization. I attribute this to three causes. The first, the presence of, and knowledge on the part of the Indians of the strength and efficiency of, the military forces that are within reach of all the tribes. The presence of the troops has a wholesome effect in restraining any turbulent element or spirit of disaffection or dissension that may occur among the tribes. The second is the fact that the Indians are receiving more benefits from the General Government and a just, intelligent, and judicious administration of their affairs. The third is that many of the most turbulent and heretofore hostile Indian tribes have been under the care and control of experienced, judicious, and conscientious officers of the Army, who have had years of experience with these people, have administered their affairs with intelligence and fidelity, and command the respect and confidence of the Indians. I recommend that the same policy be continued in regard to the management of the Indians.

Most of the infantry, cavalry, and light artillery have engaged in practice marches and field maneuvers during the year, which have been highly beneficial to the service and instructive to both officers and men. Wherever it has been practicable, especially at Fort Riley, Kans., the forces have been concentrated and practical field maneuvers and problems in minor tactics executed with marked intelligence and efficiency.

Very great attention has been paid to the physical improvement of the commands by thorough athletic training through calisthenic and gymnastic exercises, with highly beneficial results in improving the physical condition of the different commands. At all military posts where shelter is needed in winter a suitable gymnasium building—and for cavalry a riding hall—is absolutely essential to the efficiency of the men and the development of their physical condition.

The requirements of the service render it necessary that troops should be stationed in the important fortifications along our 8,000 miles of seacoast and at certain points along the 7,000 miles of our national boundary, to give security to our national interests against a foreign foe and protection to our border from Indians, etc., on both sides of the national boundary; second, that they should be located within available reach of large bodies of Indians who, while apparently peaceful and harmless, require the presence of strong military forces to keep the hostile element subdued and in a condition of safety; third, the location of troops at strategic points in different parts of the country where they can be economically supplied with all the materials required for the necessities of the service, and be on lines of communication where they can be

easily concentrated and made available wherever their presence may be required. While it is important that these positions should be judiciously selected, especially for strategic purposes, there will necessarily be influences used to have the troops stationed where they are not required, but are for the benefit of local communities or for some purpose other than national requirements. I therefore most earnestly recommend that no consideration for the location of military posts be entertained except where they are called for by the military authorities and deemed absolutely essential for the national requirements.

COAST DEFENSES.

The question of coast defenses is one of the most important in military affairs, not only as it concerns the military forces, but also as it affects the interests and welfare of the nation. The history of all civilized nations makes it apparent that this important question can not be disregarded without serious danger to the Government and disaster to the welfare of its people, as a large portion of the wealth of the nation, estimated at upward of six billions of property, and a large percentage of the population are concentrated and congregated in the commercial ports of the nation, and as the safety and existence of our entire foreign commerce depend upon well-protected harbors and commercial ports, I again call attention to this subject and renew the recommendations that I have heretofore made.

The modern appliances of war are now so entirely different from those of thirty years ago that it has become an imperative necessity to change not only the character and position of the fortifications but the armament as well. Apparently we have nearly reached the limit in the present type of high-power guns, having a power of throwing large armor-piercing projectiles fully 12 miles, and it is believed by the best military authorities that very great improvement in that respect is a question of extreme doubt. The fact that other nations are armed with these most destructive equipments renders it imperative that our ports should be protected by at least an equally efficient class of modern weapons of war. I therefore call attention to my report of last year, and earnestly renew my recommendations on the subject therein contained.

During the years between 1888 and 1895 the appropriations for both guns and fortifications were so limited as to practically paralyze the work for the construction of high-power guns and fortifications for the protection of our coast. It is exceedingly gratifying to acknowledge the fact that the last Congress made more liberal appropriations for both guns and fortifications than it has heretofore done, and the work of manufacturing high-power guns and mortars, as well as the emplacements for such armament, is progressing satisfactorily, and it is of the highest importance that this work should be continued and that liberal and ample appropriations should be made for that purpose during the coming fiscal year.

The change in the appliances of war has been so great that it necessitates the placing of the high-power guns at much farther distances from the great centers of wealth, communication, and commerce, rendering it necessary to build barracks and quarters for the accommodation of the garrisons to man the works, when completed, by the Ordnance and Engineers Corps. I therefore recommend that liberal appropriations be made by the coming Congress for the manufacture of high-power guns and mortars, the construction of emplacements, platforms, and fortifications for the same, and the construction of barracks and quarters for the accommodation of the artillery garrisons that are to man them, and I urge that a sufficient appropriation be made available during the coming fiscal year, as follows:

For the work of the Ordnance, Engineer, and Quartermaster's Departments: For the defenses of Portland, Me., $1,134,850; for the defenses of the port of Portsmouth, N. H., $393,925; for the defenses of the port of Boston, Mass., $1,078,350; for the defenses of Narragansett Bay, Rhode Island, $642,825; for the defenses of Long Island Sound, eastern entrance, $896,925; for the defenses of New York, eastern entrance, $913,600; for the defenses of New York, southern entrance, $1,299,600; for the defenses of Philadelphia, Pa., $625,025; for the defenses of Baltimore, Md., $671,450; for the defenses of Washington, D. C., $577,925; for the defenses of Hampton Roads, Virginia, $619,325; for the defenses of Wilmington, N. C., $125,525; for the defenses of Charleston, S. C., $350,925; for the defenses of Savannah, Ga., $393,925; for the defenses of Key West, Fla., $32,400; for the defenses of Pensacola, Fla., $150,400; for the defenses of Mobile, Ala., $150,400; for the defenses of New Orleans, La., $489,400; for the defenses of Galveston, Tex., $157,925; for the defenses of San Diego, Cal., $600,925; for the defenses of San Francisco, Cal., $910,850; for the defenses of the mouth of Columbia River, Oregon, $566,325; for the defenses of Puget Sound, Washington, $764,050. The above sums are imperatively required for the present year. The amounts for the construction of barracks and quarters, included in the above estimates, will be all that will be required for these localities for many years, and probably complete the work needed for that department.

An unwise argument has been made against the construction of modern high-power guns, mortars, and the modern appliances of war that it is a danger and a menace to the laboring classes, and in some instances marked protests have been made against such a national policy. The arguments seem scarcely worthy of consideration; yet it is deemed proper to call attention to the fact that these national safeguards are in no sense a menace to any class of our citizens, not even to the humblest individual, but, on the other hand, they are a protection to the life, property, and welfare of all classes, from the highest to the lowest. They protect not only the commercial ports, with their accumulation of public buildings and private dwellings, the commerce, the shipyards, the factory, the foundry, the workshop, but also the

savings banks and the cottage. In fact, the destruction of our great commercial and manufacturing cities would be a national disaster far more serious and appalling to the great masses of the laboring population than it would be to any other class of our people.

I also call attention to my report of last year, under the head of "General condition of the Army," in which I refer to the fact that at a time when we had 30,000,000 less population, and proportionately less wealth in public and private interests, the Army was double the strength that it is to-day. The Army was reorganized in 1866, with the available strength of 51,605; in 1869 it was reduced to 35,036, and in 1870 to 32,788. During the great panic following 1873 it was reduced in 1874 to 25,000. There is no significance in that number any more than in any other number that might by chance be selected. Unfortunately, during the long period of serious depression, when the Government was laboring under a great debt and a protracted panic, a theory became crystallized that this number was suitable for this great nation of nearly 80,000,000 population and its constantly increasing wealth and numbers. Hence the Army, which is one of the pillars of the Government, the safeguard of the life, property, and liberty of the people, has remained stagnant and crystallized, in the same condition that it was twenty years ago. I again renew my recommendation that a standard be fixed according to the population and wealth of the nation, which, in my judgment, would be judicious, patriotic, and eminently wise, not only for the welfare of the people of the present day, but for all time during the existence of the Republic. I therefore suggest that the enlisted strength of the Army be fixed at one soldier to every 2,000 of population, as the minimum, and the maximum strength not to exceed one soldier to every 1,000 population, the strength to be determined within these limits by the President of the United States according to the necessities and requirements of the nation.

There are now before Congress bills to "reorganize the Army" (Senate No. 2202, H. R. No. 5835), introduced by Senator Hawley, chairman of the Senate Committee on Military Affairs, and Representative Hull, chairman of the House Committee on Military Affairs. These bills are identical in provisions, and meet some of the most immediately pressing wants of the service, especially that of the increase of the artillery. The three-battalion organization for the infantry has been repeatedly recommended; yet there is still a question whether the cumbersome battalions adopted in some of the large armies of Europe, and the extended-order system, copied from the American open-order formation, for individual fighting, have not been rendered fatally defective in their modification for service in our country, especially where our country is broken by hill and dale, open fields and dense forests, requiring quick maneuvers, rapid marches, night fighting, etc. The light ten-company regiments and skirmish formation were found most effective during our great war, and should Congress not deem it advisable to adopt the three-battalion organization for the infantry, I recommend that the

increase herein suggested be made according to the present authorized formations for regiments of infantry.

I desire also to commend to your favorable consideration the bill (S. 2420) introduced by Senator Sewell, now before the Senate, to regulate the pay of noncommissioned officers in the Army, and to request that its passage be urged as a much-needed measure, to encourage enlisted men to aspire to and fit themselves for the grade of noncommissioned officers. Upon the efficiency and intelligence of this class depends in a large degree the value of modern heavy guns and their appliances, machine guns, and magazine small arms.

Attention is invited to the recommendations of the Adjutant-General of the Army in his report to the Secretary of War, under the head of "Clerical duty in the Army," for the relief of a most deserving class of army clerks. I entirely concur in his recommendation, which is sustained by those of Maj. Gen. Wesley Merritt, Brig. Gen. Elwell S. Otis, Brig. Gen. Frank Wheaton, and Brig. Gen. Z. R. Bliss on the same subject in their reports herewith.

I also renew my recommendation of last year concerning the cavalry and light artillery, and the importance of having at least two stations east of the Rocky Mountains and one west, suitable for the accommodation of one regiment of cavalry; also the recommendations made concerning the use of bicycles and motor wagons; and also renew my recommendation concerning the promotion of enlisted men who shall be found competent after thorough examination to the grade of second lieutenant after five years of service.

Official communications upon military subjects form so important a branch of the duties of the officers of the Army, both in garrison and field, and particularly in the supreme hour of battle, that I deemed it advisable to ascertain the attention paid to this subject, especially by the officers who have joined the service since the last great war. Therefore, on the 15th of June last I addressed a circular letter to the officers of the Army, calling for a report direct to me on nine questions therein propounded. The object of this circular was twofold: First, to ascertain the attention given to this subject by officers; and, second, to obtain their unbiased and uninfluenced views on the questions contained in the circular. The replies received have shown that the officers of the Army as a body are most attentive to their duties and have given much thought to their profession. The reports have, in the main, been quite satisfactory, aggregating some 10,000 pages. It will require time to classify and maturely consider them, and I will refer to this subject in a subsequent communication.

Very respectfully, your obedient servant,

NELSON A. MILES,
Major-General Commanding.

The SECRETARY OF WAR.

REPORTS

TO THE

MAJOR-GENERAL COMMANDING THE ARMY.

REPORT OF THE ADJUTANT-GENERAL.

HEADQUARTERS OF THE ARMY,
ADJUTANT-GENERAL'S OFFICE,
Washington, October 10, 1896.

SIR: I have the honor to submit the annual returns and reports of the Army:

A.—Showing the actual strength of the Army June 30, 1896.

B.—Showing position and distribution of the troops, by departments, taken from the latest return on file in the Adjutant-General's Office.

C.—Geographical departments and posts, with distribution of troops, post-offices, telegraph stations, and nearest railroad stations and boat landings.

D.—Statement showing gain and loss in the enlisted strength of the Army during the fiscal year ended June 30, 1896.

The number of enlisted men in service June 30, 1896, receiving increased pay under the acts of Congress of August 4, 1854, and May 15, 1872, was as follows:

Five years' continuous service ($2 per month)	3,451
Ten years' continuous service ($3 per month)	2,137
Fifteen years' continuous service ($4 per month)	1,023
Twenty years' continuous service ($5 per month)	625
Twenty-five years' continuous service ($6 per month)	395
Thirty years' continuous service ($7 per month)	13
Thirty-five years' continuous service ($8 per month)	6
Forty years' continuous service ($9 per month)	1
Reenlisted pay	638
Total	8,289

THE LINE OF THE ARMY.

The necessity for an increase of the artillery force and for the reorganization of the infantry has been fully explained to Congress, and the matter is now pending before it. It is to be hoped that speedy action may be taken to accomplish the end desired.

The number of officers detailed on detached service in April, 1894, was 407; in September, 1895, it was 324, and at the present date it has been reduced to 321. This reduction has been effected without material injury to the various interests which have required the details.

The number of discharges for fraudulent enlistment has steadily decreased since the passage of the law in 1892, viz: In 1893, 301; in 1894, 253; in 1895, 147, and in 1896, 84.

Discharges by favor were 338 in number during the fiscal year ended June 30, 1895, and 235 during the past year—a decrease of slightly over 30 per cent.

DESERTIONS.

The number of desertions from the Army during the year was 1,365, an increase of 200 over the number reported for last year. It represents 5.46 per cent of the enlisted strength.

Sixty per cent of the whole number deserted during their first year of service. These men may generally be classed as restless, perhaps congenitally so, unable to withstand the monotony of a regular life and mildest discipline. In cases of older soldiers who desert, the incentive is likely to be found in some local entanglement.

The cause of desertion is therefore not altogether in the service; it is part of human nature. Its absolute eradication can not be hoped for.

POST EXCHANGES.

To-day an exchange doing its full work embraces the following sections: (*a*) A well-stocked general store in which such goods are kept as are usually required at military posts, and as extensive in number and variety as conditions will justify; (*b*) a well-kept lunch counter supplied with as great a variety of food as circumstances permit, such as tea, coffee, cocoa, nonalcoholic drinks, soup, fish, cooked and canned meats, sandwiches, pastries, etc.; (*c*) a canteen at which, under certain conditions, beer and light wines by the drink and tobaccos may be sold; (*d*) reading and recreation rooms, supplied with books, periodicals, and other reading matter, billiard and pool tables, bowling alley, and facilities for other proper indoor games, as well as apparatus for outdoor sports and exercises, such as cricket, football, baseball, tennis, etc.; (*e*) a well-equipped gymnasium possessing also the requisite paraphernalia for outdoor athletics. Fully two-thirds of the exchanges are now operating all of these sections. Receipts from the sale of beer have gradually decreased until now they are over 40 per cent less than in the early days of the exchange.

The aggregate receipts during the past year were $1,513,829.52, the expenses $1,164,675.24, and the net profits $349,151.28. There has been a slight decrease in the volume of business as compared with the preceding year, but an increase of about 4 per cent in profits, due, no doubt, to improved management. Of the profits, $8,249.32 have been donated to the funds of the various regimental bands; $1,886.70 to laying out, preparing, and cultivating gardens and supplying seeds, roots, and plants; $1,026 to the purchase of books and periodicals for post libraries; $4,792.02 to the fitting up of gymnasiums and the purchase of gymnastic appliances, and $3,296.54 as prizes for the encouragement of athletic sports. Of the remainder, after setting aside a sufficient amount to meet anticipated expenses for at least one month in advance, as required by regulations, $224,979.90 were returned to the various commands as dividends on their investment. The net value of the 73 exchanges now in operation in the Army was, on June 30, 1896, $192,795.97.

The exchanges are now largely manned by civilians. On June 30, 1896, there were 153 civilians employed as stewards, bookkeepers, and attendants, at a monthly compensation of $5,308. At some frontier

posts it is impracticable to find competent civilians for these positions, and at small posts the amount of business will not justify the expense of hiring them, so that there is necessarily a small number of enlisted men still employed, varying from time to time according to actual requirements. The revised regulations for the exchange which went into operation in July, 1895, seem to have met fully the expectations of the department in simplifying its administration. All reports indicate that these institutions are giving satisfaction.

POST-GRADUATE SCHOOLS.

The reports from the Infantry and Cavalry School at Fort Leavenworth, Kans., the Cavalry and Light-Artillery School at Fort Riley, Kans., and the Artillery School at Fort Monroe, Va., attest the excellence and thoroughness of the methods of instruction as well as of the general industry, zeal, and proficiency of the student officers.

LYCEUMS.

Department commanders report good results from systematic readings from advanced text-books, from recitations, from essay readings, and from discussions at post lyceums during the year. The professional papers prepared covered a wider range of subjects than heretofore and have given evidence of reading, intelligent thought, and industry. The system furnishes an incentive for study and research, and it assists in keeping officers abreast of the development of military science and of the ever-increasing demands of their profession.

GYMNASIUMS.

The value of gymnastics in military training has been fully demonstrated. Notwithstanding meager facilities at posts for gymnastic training, much has been accomplished as the result of the great interest manifested by the men as fostered by their officers. Still better results will be obtained when a thorough course of instruction shall have been formulated.

A properly equipped gymnasium should be provided at each permanent post, and its establishment should not be dependent, as now, upon an allotment of the profits of the post exchange or voluntary subscriptions from officers and men.

POST SCHOOLS.

The operations of these schools during the past year have been generally satisfactory. The legal requirement that no person shall be enlisted who can not speak, read, and write the English language has lessened the necessity for them. Instruction in typewriting and in the making of company, regimental, and other military papers and reports may now be advantageously imparted in them.

LAUNDRIES.

In consideration of the improved conditions of the service, involving increased expenditures of the enlisted man to keep his clothing and bed furniture in proper condition, as required for inspection, I renew the recommendation heretofore made by me that post laundries be established, under proper supervision, at all permanent posts.

CONSOLIDATED MESSES.

The consolidated mess is yielding to the troop, the battery, or the company mess. This is necessarily so where the company rather than the regiment is the unit for service. However, for some considerable time yet the consolidated mess houses, wherever they have been erected, must be utilized for the purposes for which they were intended.

Respectfully submitted.

GEO. D. RUGGLES,
Adjutant-General.

Maj. Gen. NELSON A. MILES,
Commanding the Army.

A.—General Return or Exhibit of the Actual Strength of the Army of the United States June 30, 1896.

Commissioned officers.

	General.	Major-generals.	Brigadier-generals.	Colonels.	Lieutenant-colonels.	Majors.	Aids-de-camp.	Captains.	Adjutants (extra lieutenants).	Regimental quartermasters (extra lieutenants).	Battalion adjutant.	Battalion quartermaster.	First lieutenants.	Second lieutenants.	Additional second lieutenants.	Chaplains.	Military storekeepers.	Ordnance storekeepers.	Medical storekeepers.	Total.
General officers		3	6																	9
Aids-de-camp to general officers							a 16													
Adjutant-General's Department			1	4	6	4														15
Inspector-General's Department			1	2	2	2														7
Judge-Advocate-General's Department			1	1	3	3														8
Quartermaster's Department			1	4	8	14		30									1			58
Subsistence Department			1	2	3	8		6												20
Medical Department			1	6	10	50		72					34							173
Pay Department			1	2	3	20														26
Corps of Engineers			1	6	12	24		30	b 1	b 1			26	10	3					112
Ordnance Department			1	3	4	10		23					13					3		57
Signal Corps			1			1		5					3							10
Post chaplains																30				30
Chief of Record and Pension Office				1																1
First Regiment of Cavalry				1	1	3		12	1	1			12	12	2					45
Second Regiment of Cavalry				1	1	3		12	1	1			12	12	2					45
Third Regiment of Cavalry				1	1	3		12	1	1			12	12	2					45
Fourth Regiment of Cavalry				1	1	3		12	1	1			12	12	2					45
Fifth Regiment of Cavalry				1	1	3		12	1	1			12	12	3					46
Sixth Regiment of Cavalry				1	1	3		12	1	1			12	12	2					45
Seventh Regiment of Cavalry				1	1	3		12	1	1			12	12	3					46
Eighth Regiment of Cavalry				1	1	3		12	1	1			12	12	2					45
Ninth Regiment of Cavalry				1	1	3		12	1	1			12	12	2	1				46
Tenth Regiment of Cavalry				1	1	3		12	1	1			12	12	2	1				46
Aggregate of Cavalry				10	10	30		120	10	10			120	120	22	2				454
First Regiment of Artillery				1	1	3		12	1	1			24	13	2					58
Second Regiment of Artillery				1	1	3		12	1	1			24	13	2					58
Third Regiment of Artillery				1	1	3		12	1	1			24	13	3					59
Fourth Regiment of Artillery				1	1	3		12	1	1			24	13	2					58
Fifth Regiment of Artillery				1	1	3		12	1	1			24	13	3					59
Aggregate of Artillery				5	5	15		60	5	5			120	65	12					292
First Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Second Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Third Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Fourth Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Fifth Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Sixth Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Seventh Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Eighth Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Ninth Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Tenth Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Eleventh Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Twelfth Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Thirteenth Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Fourteenth Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Fifteenth Regiment of Infantry				1	1	1		10	1	1			10	10						35
Sixteenth Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Seventeenth Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Eighteenth Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Nineteenth Regiment of Infantry				1	1	1		10	1	1			10	10						35
Twentieth Regiment of Infantry				1	1	1		10	1	1			10	10						35
Twenty-first Regiment of Infantry				1	1	1		10	1	1			10	10						35
Twenty-second Regiment of Infantry				1	1	1		10	1	1			10	10						35
Twenty-third Regiment of Infantry				1	1	1		10	1	1			10	10	1					36
Twenty-fourth Regiment of Infantry				1	1	1		10	1	1			10	10		1				36
Twenty-fifth Regiment of Infantry				1	1	1		10	1	1			10	10	2	1				38
Aggregate of Infantry				25	25	25		250	25	25			250	250	20	2				897
West Point detachment																				
Recruits at rendezvous, stations, and en route																				
Indian scouts																				
Grand aggregate		3	16	71	91	206		596	40	40			566	445	57	34	1	3		2,169
Military Academy																				
Retired	1	4	28	101	30	82		269					90	19		17				641

Enlisted men.

	Sergeant-majors.	Quartermaster-sergeants.	Chief musicians.	Principal musicians.	Saddler sergeants.	Chief trumpeters.	Ordnance sergeants.	Commissary sergeants.	Post quartermaster-sergeants.	Hospital stewards.	Acting hospital stewards.	Battalion sergeant-major.	Battalion quartermaster-sergeant.
General officers													
Aids-de-camp to general officers													
Adjutant-General's Department													
Inspector-General's Department													
Judge-Advocate-General's Department													
Quartermaster's Department									80				
Subsistence Department								90					
Medical Department										106	94		
Pay Department													
Corps of Engineers												1	1
Ordnance Department							99						
Signal Corps													
Post chaplains													
Chief of Record and Pension Office													
First Regiment of Cavalry	1	1	1		1	1							
Second Regiment of Cavalry	1	1	1		1	1							
Third Regiment of Cavalry	1	1	1		1	1							
Fourth Regiment of Cavalry	1	1	1		1	1							
Fifth Regiment of Cavalry	1	1	1		1	1							
Sixth Regiment of Cavalry	1	1	1		1	1							
Seventh Regiment of Cavalry	1	1	1		1	1							
Eighth Regiment of Cavalry	1	1	1		1	1							
Ninth Regiment of Cavalry	1	1	1		1	1							
Tenth Regiment of Cavalry	1	1	1		1	1							
Aggregate of Cavalry	10	10	10		10	10							
First Regiment of Artillery	1	1	1	2									
Second Regiment of Artillery	1	1	1	2									
Third Regiment of Artillery	1	1	1	2									
Fourth Regiment of Artillery	1	1	1	2									
Fifth Regiment of Artillery	1	1	1	2									
Aggregate of Artillery	5	5	5	10									
First Regiment of Infantry	1	1	1	2									
Second Regiment of Infantry	1	1	1	2									
Third Regiment of Infantry	1	1	1	2									
Fourth Regiment of Infantry	1	1	1	2									
Fifth Regiment of Infantry	1	1	1	2									
Sixth Regiment of Infantry	1	1	1	2									
Seventh Regiment of Infantry	1	1	1	2									
Eighth Regiment of Infantry	1	1	1	2									
Ninth Regiment of Infantry	1	1	1	2									
Tenth Regiment of Infantry	1	1	1	2									
Eleventh Regiment of Infantry	1	1	1	2									
Twelfth Regiment of Infantry	1	1	1	2									
Thirteenth Regiment of Infantry	1	1	1	2									
Fourteenth Regiment of Infantry	1	1	1	2									
Fifteenth Regiment of Infantry	1	1	1	2									
Sixteenth Regiment of Infantry	1	1	1	2									
Seventeenth Regiment of Infantry	1	1	1	2									
Eighteenth Regiment of Infantry	1	1	1	2									
Nineteenth Regiment of Infantry	1	1	1	2									
Twentieth Regiment of Infantry	1	1	1	2									
Twenty-first Regiment of Infantry	1	1	1	2									
Twenty-second Regiment of Infantry	1	1	1	2									
Twenty-third Regiment of Infantry	1	1	1	1									
Twenty-fourth Regiment of Infantry	1	1	1	2									
Twenty-fifth Regiment of Infantry	1	1	1	2									
Aggregate of Infantry	25	25	25	49									
West Point detachment													
Recruits at rendezvous, stations, and en route													
Indian scouts													
Grand aggregate	40	40	40	59	10	10	99	90	80	106	94	1	1
Military Academy													
Retired	6		3	12	8		117	56	10	41			

Enlisted men (continued); Military Academy; Aggregate.

	First sergeants.	Sergeants.	Corporals.	Trumpeters.	Musicians.	Farriers and blacksmiths.	Artificers.	Saddlers.	Wagoners.	Privates, first class.	Privates, second class.	Privates, Hospital Corps.	Privates.	General-service clerks.	General-service messengers.	Total.	Professors.	Cadets.	Aggregate.
General officers																			9
Aids-de-camp to general officers																			
Adjutant-General's Department																			15
Inspector-General's Department																			7
Judge-Advocate-General's Department																			8
Quartermaster's Department																80			138
Subsistence Department																90			110
Medical Department												507				c 707			880
Pay Department																			26
Corps of Engineers		40	37		8					203	175					465			577
Ordnance Department		52	74							225	120					570			627
Signal Corps		49														49			59
Post chaplains																			30
Chief of Record and Pension Office																			1
First Regiment of Cavalry	10	49	39	17		19		9	10				461			619			664
Second Regiment of Cavalry	10	50	39	20		20		10	9				472			635			680
Third Regiment of Cavalry	11	54	42	19		20		9	10				427			597			642
Fourth Regiment of Cavalry	10	50	40	20		20		10	10				422			587			632
Fifth Regiment of Cavalry	10	50	40	18		20		10	10				414			577			623
Sixth Regiment of Cavalry	10	50	37	15		20		9	10				474			630			675
Seventh Regiment of Cavalry	12	55	44	20		20		11	11				497			675			721
Eighth Regiment of Cavalry	10	49	40	20		20		10	10				409			573			618
Ninth Regiment of Cavalry	10	50	38	20		20		10	6				423			582			628
Tenth Regiment of Cavalry	10	47	39	19		20		10	10				410			570			616
Aggregate of Cavalry	103	504	398	188		199		98	96				4,409			6,045			6,499
First Regiment of Artillery	12	52	47		22		11		5				595			749			807
Second Regiment of Artillery	12	51	47		24		15		5				598			757			815
Third Regiment of Artillery	12	51	46		24		20		8				603			769			828
Fourth Regiment of Artillery	12	51	47		22		10		3				622			672			830
Fifth Regiment of Artillery	12	52	44		23		21		8				591			756			815
Aggregate of Artillery	60	257	231		115		77		29				3,009			3,803			4,095
First Regiment of Infantry	9	30	30		14		7						394			489			525
Second Regiment of Infantry	8	32	32		14		13		1				389			494			530
Third Regiment of Infantry	8	32	36		13		15		3				387			499			535
Fourth Regiment of Infantry	8	32	32		16		15		1				372			481			517
Fifth Regiment of Infantry	8	32	32		15		15		4				402			513			549
Sixth Regiment of Infantry	8	32	32		16		15		3				406			517			553
Seventh Regiment of Infantry	9	32	31		14		14						403			508			544
Eighth Regiment of Infantry	8	32	32		16		13		3				377			486			522
Ninth Regiment of Infantry	8	32	32		15		16		6				365			479			515
Tenth Regiment of Infantry	9	32	32		16		15		2				393			504			540
Eleventh Regiment of Infantry	8	32	31		16		16		5				397			510			546
Twelfth Regiment of Infantry	7	32	31		16		16		6				384			497			533
Thirteenth Regiment of Infantry	9	35	36		16		12		1				396			510			546
Fourteenth Regiment of Infantry	8	32	32		16		16		2				408			519			555
Fifteenth Regiment of Infantry	9	36	33		14		16		1				378			492			527
Sixteenth Regiment of Infantry	8	32	31		13		16		1				400			506			542
Seventeenth Regiment of Infantry	9	36	36		16		16		2				393			513			549
Eighteenth Regiment of Infantry	8	32	30		13		16		7				412			523			559
Nineteenth Regiment of Infantry	8	32	32		16		15		7				395			510			545
Twentieth Regiment of Infantry	8	32	30		13		12		3				376			479			514
Twenty-first Regiment of Infantry	8	32	31		16		15		2				390			499			534
Twenty-second Regiment of Infantry	8	32	31		16		14		1				373			480			515
Twenty-third Regiment of Infantry	8	32	32		15		16		8				377			492			528
Twenty-fourth Regiment of Infantry	8	32	32		16		13		2				414			522			558
Twenty-fifth Regiment of Infantry	7	32	28		16		1						433			522			560
Aggregate of Infantry	204	809	797		377		348		71				9,814			12,544			13,441
West Point detachment		14	11		37		2		1				152			217			217
Recruits at rendezvous, stations, and en route		2											235			237			237
Indian scouts		5	3										54			62			62
Grand aggregate	367	1,732	1,551	188	537	199	427	98	197	428	295	507	17,673			24,869			27,038
Military Academy																	7	337	344
Retired	102	302	114		15	16				40	4	18	244			1,108	1		1,750

a The aids-de-camp, being included in the strength of their regiments, are excluded as staff officers from the "total commissioned" and "aggregate."
b The adjutant and quartermaster of the Battalion of Engineers, being included in the strength of their corps, are excluded as staff officers from the "total commissioned" and "aggregate."
c Are here included in the total enlisted and aggregate, but are exclusive of the 25,000 enlisted men allowed by law.

B.—*Position and distribution of troops, by departments, taken from*

Post.	Situation.	Commanding officer.	GARRISONS. Number of companies.	GARRISONS. Regiments.	PRESENT. General officers.	PRESENT. Aids-de-camp.	PRESENT. Adjutant-General's Department.	PRESENT. Bureau of Military Justice.	PRESENT. Quartermaster's Department.
Department of the East.									
Headquarters	Governors Island, N. Y.	Maj. Gen. T. H. Ruger	...	Department staff.	1	2	2	1	5
Fort Preble, Me	Portland	Capt. R. M. Rogers, 2d Art.	1	2d Art	--	--	--	--	--
Fort Ethan Allen, Vt.	Near Burlington	Maj. L. T. Morris, 3d Cav.	4	3d Cav	--	--	--	--	--
Fort Warren, Mass	Boston Harbor	Maj. C. A. Woodruff, 2d Art.	2	2d Art	--	--	--	--	--
Fort Adams, R. I	Newport	Col. R. Lodor, 2d Art	4	2d & 4th Art	--	--	--	--	--
Fort Trumbull, Conn.	New London	Capt. F. C. Grugan, 2d Art.	1	2d Art	--	--	--	--	--
Fort Columbus, N. Y.	Governors Island	Lieut. Col. W. S. Worth, 13th Inf.	3	13th Inf	--	--	--	--	--
Fort Hamilton, N. Y.	New York Harbor.	Lieut. Col. M. P. Miller, 1st Art.	4	1st Art	--	--	--	--	--
Fort Wadsworth, N. Y.	do	Maj. W. L. Haskin, 1st Art.	3	1st Art	--	--	--	--	--
Fort Schuyler, N. Y.	Throggs Neck	Lieut. Col. J. I. Rodgers, 2d Art.	2	2d Art	--	--	--	--	--
Fort Slocum, N. Y	Near New Rochelle.	Maj. J. H. Calef, 1st Art.	3	1st Art	--	--	--	--	1
Madison Barracks, N. Y.	Sacket Harbor	Col. W. J. Lyster, 9th Inf.	8	9th Inf	--	--	--	--	--
Plattsburg Barracks, N. Y.	Plattsburg	Col. Horace Jewett, 21st Inf.	8	21st Inf	--	--	--	--	--
Fort Niagara, N. Y.	Youngstown	Col. A. T. Smith, 13th Inf.	3	13th Inf	--	--	--	--	--
Fort Porter, N. Y.	Buffalo	Maj. P. H. Ellis, 13th Inf.	2	13th Inf	--	--	--	--	--
Fort McHenry, Md.	Baltimore	Maj. G. B. Rodney, 4th Art.	3	4th Art	--	--	--	--	--
Washington Barracks, D. C.	Washington	Col. F. L. Guenther, 4th Art.	5	3d and 4th Art.	--	--	--	--	--
Fort Myer, Va.	Near Washington, D. C.	Col. S. S. Sumner, 6th Cav.	4	6th Cav	--	--	--	--	--
Fort Monroe, Va		Col. R. T. Frank, 1st Art.	8	1st, 2d, 3d, 4th, and 5th Art.	--	--	--	--	1
Columbus Barracks, Ohio.	Columbus	Col. J. S. Poland, 17th Inf.	8	17th Inf	--	--	--	--	1
Fort Thomas, Ky.	Near Newport	Col. M. A. Cochran, 6th Inf.	8	6th Inf	--	--	--	--	--
Fort McPherson, Ga	Atlanta	Col. W. L. Kellogg, 5th Inf.	8	5th Inf	--	--	--	--	--
Jackson Barracks, La	New Orleans	Maj. J. G. Ramsay, 3d Art.	2	3d Art	--	--	--	--	--
St. Francis Barracks, Fla.	St. Augustine	Col. E. C. Bainbridge, 3d Art.	2	3d Art	--	--	--	--	--
Key West Barracks, Fla.	Key West	Maj. J. R. Myrick, 3d Art.	2	3d Art	--	--	--	--	--
Fort Barrancas, Fla.	Warrington	Lieut. Col. E. B. Williston, 3d Art.	2	3d Art	--	--	--	--	--
Total Department of the East			100		1	2	2	1	8
Department of the Missouri.									
Headquarters	Chicago, Ill	Maj. Gen. Wesley Merritt	...	Department Staff.	1	3	1	1	2
Fort Wayne, Mich.	Detroit	Col. Simon Snyder, 19th Inf.	4	19th Inf	--	--	--	--	--
Fort Brady, Mich.	Sault Ste. Marie	Lieut. Col. C. A. Wikoff, 19th Inf.	4	19th Inf	--	--	--	--	--
Fort Sheridan, Ill.	Highwood	Col. R. E. A. Crofton, 15th Inf.	11	1st Cav., 1st Art., and 15th Inf.	--	--	--	--	1

the latest returns on file in the Adjutant-General's Office, 1896.

PRESENT.																ABSENT.						AGGREGATE.		
Subsistence Department.	Medical Department.	Pay Department.	Corps of Engineers.	Post chaplains.	Colonels.	Lieutenant-colonels.	Majors.	Captains.	Regimental chaplains.	Regimental adjutants.	Regimental quartermasters.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and regimental staff officers.	Captains.	Subalterns.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate
1	4	4	...	...	...	1	...	2	...	...	...	...	.....	23	23	...	...	...	...	...	...	23	.....	23
...	1	...	...	...	...	...	...	1	...	...	...	2	63	4	67	...	...	...	1	1	1	5	63	68
...	2	...	...	...	...	...	1	3	...	...	...	6	235	12	247	...	...	1	2	3	3	15	235	250
...	1	...	...	...	...	...	1	2	...	...	...	5	124	9	133	...	...	...	1	1	1	10	124	134
...	2	...	...	...	1	...	...	4	...	1	1	10	294	19	313	...	1	...	2	3	3	22	294	316
...	1	...	...	...	...	...	...	1	...	...	...	2	68	4	72	...	...	...	1	1	1	5	68	73
...	2	...	...	...	...	1	...	3	...	...	...	7	220	13	233	...	...	...	...	...	...	13	220	233
...	1	...	...	...	...	1	...	3	...	1	1	10	299	17	316	...	...	1	3	4	4	21	299	320
...	1	...	...	...	...	...	1	1	...	...	...	5	209	8	217	...	1	2	4	7	7	15	209	224
...	1	...	...	...	...	1	...	2	...	...	...	4	120	8	128	...	...	...	2	2	2	10	120	130
...	2	...	...	...	...	...	1	3	...	...	...	5	180	12	192	...	...	...	5	5	5	17	180	197
...	2	...	...	...	1	1	1	9	...	1	1	16	494	32	526	...	...	1	4	5	5	37	494	531
...	2	...	...	...	1	1	1	9	...	1	1	15	528	31	559	...	...	1	5	6	6	37	528	565
...	1	...	...	...	1	...	...	3	...	1	1	5	203	12	215	...	...	2	5	7	7	19	203	222
...	1	...	...	...	...	...	1	2	...	...	...	4	123	8	131	...	...	...	...	...	...	8	123	131
...	1	...	...	...	...	...	1	3	...	...	...	6	198	11	209	...	...	...	3	3	3	14	198	212
...	3	...	...	...	...	...	1	5	...	1	1	12	386	24	410	...	1	...	3	4	4	28	386	414
...	2	...	...	...	1	...	1	6	...	1	1	11	298	23	321	...	...	...	2	2	2	25	298	323
...	2	...	...	1	1	...	1	8	...	...	...	24	495	38	533	...	...	1	...	1	1	39	495	534
...	3	...	...	...	1	1	1	9	...	1	1	15	533	33	566	...	...	1	5	6	6	39	533	572
...	2	...	...	1	1	1	1	8	...	1	1	15	529	31	560	...	...	2	5	7	7	38	529	567
...	3	...	...	...	1	1	1	8	...	1	1	17	524	33	557	...	1	2	3	6	6	39	524	563
...	1	...	...	...	...	...	1	2	...	...	...	3	131	7	138	...	...	...	3	3	3	10	131	141
...	1	...	...	...	1	...	...	2	...	1	1	3	157	9	166	...	...	...	3	3	3	12	157	169
...	1	...	...	...	...	...	1	2	...	...	...	3	125	7	132	...	...	...	3	3	3	10	125	135
...	1	...	...	...	...	1	...	1	...	...	...	4	134	7	141	...	...	1	3	4	4	11	134	145
1	44	4	...	2	11	10	16	102	...	11	11	209	6,670	435	7,105	...	4	15	68	87	87	522	6,670	7,192
2	1	3	1	...	...	...	...	...	...	...	...	1	.....	16	16	...	...	...	...	...	...	16	.....	16
...	2	...	...	...	1	...	1	4	..	1	1	6	281	16	297	...	...	2	6	8	8	24	281	305
...	1	...	...	...	...	1	...	4	...	...	...	6	246	12	258	...	...	...	2	2	2	14	246	260
...	3	...	...	1	1	1	2	13	...	1	1	21	741	45	786	...	...	...	3	3	3	48	741	789

B.—*Position and distribution of troops, by departments, taken from*

Post.	Situation.	Commanding officer.	GARRISONS.		PRESENT.				
			Number of companies.	Regiments	General officers.	Aids de-camp.	Adjutant-General's Department.	Bureau of Military Justice.	Quartermaster's Department.
Department of the Missouri—Cont'd									
Fort Leavenworth, Kans	.....	Col. H. S. Hawkins, 20th Inf	12	6th Cav. and 20th Inf.					1
Fort Riley, Kans	Junction City	Col. A. K. Arnold 1st Cav.	11	1st and 2d Cav. 2d, 3d and 4th Art.	..	..	..	..	..
Fort Reno Okla	Near Cheyenne Agency.	Col E. P. Pearson, 10th Inf.	6	1st Cav. and 10th Inf	..	..	..	..	..
Fort Sill, Okla	29 miles from Rush Springs.	Col. E. R. Kellogg, 10th Inf.	7	1st and 7th Cav. and 10th Inf.	..	..	..	..	..
Jefferson Barracks, Mo.	10 miles below St Louis.	Lieut. Col. G. V. Henry 3d Cav.	6	3d Cav.					1
Near Little Rock, Ark.	.....	Capt. J. A. Buchanan, 11th Inf.	2	11th Inf.	..	..	..	..	..
Total Department of the Missouri			63		1	3	1	1	5
Department of Dakota.									
Headquarters	St. Paul, Minn	Brig. Gen J. R. Brooke	..	Department staff.	1	2	1	1	3
Fort Snelling, Minn	Near St. Paul	Col. J. H. Page 3d Inf.	8	3d Inf.	..	..	..	..	..
Fort Yates, N. Dak	60 miles from Bismarck	Maj. J. N. Wheelan 8th Cav.	4	8th Cav. and 2d Inf.	..	..	..	..	..
Fort Keogh, Mont	Near Miles City	Col. J. C. Bates 2d Inf.	5	10th Cav. and 2d Inf.	..	..	..	..	..
Fort Custer, Mont	.....	Lieut. Col. David Perry, 10th Cav.	6	10th Cav. and 25th Inf.	..	..	..	.	.
Fort Assiniboine, Mont.	Near Assiniboine	Col. J. K. Mizner, 10th Cav.	7	10th Cav. and 25th Inf.	..	..	..	..	..
Fort Harrison, Mont.	Helena	Lieut. Col. W. M. Wherry, 2d Inf.	2	2d Inf.	..	..	..	..	..
Fort Missoula Mont.	Missoula	Col. A. S Burt, 25th Inf.	4	25th Inf.	..	..	..	..	..
Fort Yellowstone, Wyo.	Yellowstone Park	Capt. G. S. Anderson, 6th Cav.	2	6th Cav.	..	..	..	..	1
Total Department of Dakota			38		1	2	1	1	4
Department of the Colorado.									
Headquarters	Denver, Colo	Brig. Gen Frank Wheaton.	..	Department staff.	1	2	1	..	2
Fort Logan, Colo	Denver	Col. H. C Merriam, 7th Inf.	10	2d Cav. and 7th Inf.	..	..	..	..	..
Fort Du Chesne, Utah.	Uintah Agency	Maj. J. F. Randlett, 9th Cav.	2	9th Cav.	.	..	..	..	..
Fort Douglas, Utah	Salt Lake City	Col. H. A. Theaker, 16th Inf.	8	16th Inf.	..	..	..	..	..
Fort Wingate, N. Mex.	Near Wingate	Col. G. G. Huntt, 2d Cav.	2	2d Cav	..	..	..	..	..
Fort Bayard, N. Mex.	Halls	Col. J. F. Kent, 24th Inf.	6	1st and 7th Cav. and 24th Inf.	..	..	..	..	..
Fort Grant, Ariz	27 miles from Willcox.	Col. E. V. Sumner, 7th Cav.	7	7th Cav. and 24th Inf.	..	..	..	..	..
Fort Apache, Ariz	90 miles from Holbrook.	Lieut. Col. W. H. Powell, 11th Inf.	6	7th Cav. and 11th Inf.	..	..	..	..	..

the latest returns on file in the Adjutant-General's Office, 1896—Continued.

PRESENT.															ABSENT.						AGGREGATE.		
Subsistence Department	Medical Department	Pay Department.	Corps of Engineers	Post chaplains.	Colonels.	Lieutenant-colonels.	Majors.	Captains.	Regimental chaplains.	Regimental adjutants.	Regimental quartermasters.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and regimental staff officers.	Captains.	Subalterns.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.
...	4	...	...	1	1	2	3	17	...	1	1	53	764	84	848	....	....	....	....	....	....	84	764	848
...	3	...	...	1	1	1	2	11	...	1	1	26	781	47	828	....	1	2	3	6	6	53	781	834
...	2	...	...	1	1	...	1	6	...	1	1	9	394	22	416	....	1	2	3	6	6	28	394	422
...	3	...	...	1	...	1	1	5	...	....	....	9	427	20	447	....	....	2	5	7	7	27	427	454
..	2	...	...	....	..	1	1	5	...	1	1	9	439	21	460	....	1	3	7	11	11	32	439	471
...	1	...	...	..	..	....	....	1	...	....	....	4	130	6	136	....	....	1	1	2	2	8	130	138
2	22	3	1	5	5	7	11	66	...	6	6	144	4,203	289	4,492	....	3	12	30	45	45	334	4,203	4,537
1	1	3	1	...	....	....	....	1	...	....	....	....	.....	15	15	....	....	....	....	....	....	15	.....	15
...	2	...	...	1	1	1	1	9	...	1	1	16	523	33	556	....	....	...	4	4	4	37	523	560
...	2	...	...	1	...	...	1	4	...	....	....	8	240	16	256	....	....	...	1	1	1	17	240	257
...	2	...	...	1	1	...	1	6	...	1	1	8	325	21	346	....	....	1	6	7	7	28	325	353
...	2	...	...	....	....	1	1	4	1	....	....	11	362	20	382	....	....	2	1	3	3	23	362	385
...	2	...	...	1	1	...	3	4	...	1	1	13	444	26	470	....	....	4	3	7	7	33	444	477
...	1	...	..	....	....	1	...	2	...	....	....	3	131	7	138	....	....	...	1	1	1	8	131	139
...	2	...	..	...	1	1	...	2	1	....	1	7	283	16	299	....	....	4	5	9	9	25	283	308
...	1	...	...	...	....	....	....	2	...	....	....	4	125	8	133	....	....	....	....	....	....	8	125	133
1	15	3	1	4	4	4	7	34	2	4	4	70	2,423	162	2,595	....	....	11	21	32	32	194	2,433	2,627
2	1	2	...	...	....	....	....	2	...	....	....	....	.....	13	13	....	....	....	....	....	....	13	.....	13
...	3	...	...	1	1	1	1	10	...	1	1	20	651	39	690	....	....	2	4	6	6	45	651	696
...	1	...	...	....	....	....	1	2	...	....	....	3	128	7	135	....	....	....	1	1	1	8	128	136
...	2	...	...	...	1	1	1	7	...	1	1	15	516	29	545	1	....	3	5	9	9	38	516	554
...	2	...	...	...	1	1	1	1	...	1	1	4	163	12	175	....	1	3	4	8	8	20	163	183
...	2	...	...	...	1	1	...	4	1	1	1	10	401	21	422	....	....	4	6	10	10	31	401	432
...	4	...	...	...	1	...	1	3	...	1	1	12	479	23	502	....	1	5	4	10	10	33	479	512
...	2	...	...	1	...	1	...	4	...	....	....	8	385	16	401	....	....	4	4	8	8	24	385	409

B.—*Position and distribution of troops, by departments, taken from*

Post.	Situation.	Commanding officer.	GARRISONS.		PRESENT.				
			Number of companies.	Regiments.	General officers.	Aids-de-camp.	Adjutant-General's Department.	Bureau of Military Justice.	Quartermaster's Department.
Department of the Colorado—Cont'd.									
Fort Huachuca, Ariz.	Near Huachuca station.	Lieut. Col. J. M. Bacon, 1st Cav.	5	1st and 7th Cav. and 24th Inf.	..	..	..	..	..
Whipple Barracks Ariz.	Prescott	Col. I. D. De Russy, 11th Inf.	2	11th Inf.	..	..	..	..	..
Total Department of the Colorado			48		1	2	1	..	2
Department of the Columbia.									
Headquarters	Vancouver Barracks, Wash.	Brig. Gen. E. S. Otis	..	Department staff.	1	1	1	..	3
Vancouver Barracks, Wash.	Vancouver	Col. T. M. Anderson, 14th Inf.	9	4th Cav. and 14th Inf.	..	..	..	..	..
Fort Canby, Wash	Mouth of the Columbia River.	Maj. D. H. Kinzie, 5th Art.	1	5th Art	..	..	..	..	..
Fort Walla Walla, Wash.	Walla Walla	Col. C. E. Compton, 4th Cav.	4	4th Cav	..	..	..	..	..
Fort Spokane, Wash.	Spokane Falls	Maj. G. S. Carpenter, 4th Inf.	3	4th Inf.	..	..	..	..	..
Fort Sherman, Idaho.	Cœur d' Alene	Col. R. H. Hall, 4th Inf.	4	4th Inf.	..	..	..	..	..
Boise Barracks, Idaho	Boise City	Lieut. Col. H. C. Cook, 4th Inf.	2	4th Cav. and 4th Inf.	..	..	..	..	..
Total Department of the Columbia			23		1	1	1	..	3
Department of California.									
Headquarters	San Francisco, Cal.	Brig. Gen. J W. Forsyth	..	Department staff.	1	2	1	1	1
Fort Mason, Cal	do	Capt. A. W. Vogdes, 5th Art.	1	5th Art	..	..	..	..	..
Presidio, Cal	do	Col. W. M. Graham, 5th Art.	11	4th Cav. and 5th Art.	..	..	..	..	1
Alcatraz Island, Cal	do	Lieut. Col. Wm. Sinclair, 5th Art.	2	5th Art	..	..	..	..	..
Angel Island, Cal	do	Col. W. R. Shafter, 1st Inf.	4	1st Inf.	..	..	..	..	..
Benicia Barracks, Cal	Benicia	Lieut. Col. Evan Miles, 1st Inf.	3	1st Inf.	..	..	..	..	..
San Diego Barracks, Cal.	San Diego	Maj. T. M. K. Smith, 1st Inf.	1	1st Inf.	..	..	..	..	..
Total Department of California			22		1	2	1	1	2
Department of Texas.									
Headquarters	San Antonio, Tex	Brig. Gen. Z. R. Bliss	..	Department staff.	1	2	1	..	2
Fort Sam Houston, Tex.	do	Col. J. F. Wade, 5th Cav.	11	5th Cav., 3d Art., and 18th Inf.	..	..	..	..	1
Fort Brown, Tex	Brownsville	Maj. Henry Wagner, 5th Cav.	2	5th Cav. and 23d Inf.	..	..	..	..	..
Fort Ringgold, Tex	Rio Grande	Maj. D. W. Burke, 23d Inf.	2	5th Cav. and 23d Inf.	..	..	..	..	..
Fort McIntosh, Tex	Laredo	Maj. Wirt Davis, 5th Cav.	2	5th Cav. and 23d Inf.	..	..	..	..	..

the latest returns on file in the Adjutant-General's Office, 1896—Continued.

PRESENT.															ABSENT.						AGGREGATE.		
Subsistence Department.	Medical Department.	Pay Department.	Corps of Engineers.	Post chaplains.	Colonels.	Lieutenant-colonels.	Majors.	Captains.	Regimental chaplains.	Regimental adjutants.	Regimental quartermasters.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and regimental staff officers.	Captains.	Subalterns.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.
...	2	...	...	1	...	1	1	4	...	....	....	9	303	18	321	....	....	1	1	2	2	20	303	323
...	2	...	...	...	1	...	...	2	...	1	1	5	153	12	165	....	1	2	3	6	6	18	153	171
2	21	2	...	3	6	6	6	39	1	6	6	86	3,179	190	3,369	1	3	24	32	60	60	250	3,179	3,429
1	1	2	...	...	...	...	...	1	...	....	....	.....	.....	11	11	....	....	...	...	...	....	11	.....	11
...	2	...	...	...	1	...	1	9	...	1	1	14	577	29	606	....	....	2	6	8	8	37	577	614
...	1	...	...	...	...	...	1	1	...	....	....	2	65	5	70	....	....	...	1	1	1	6	65	71
...	2	...	...	...	1	...	2	2	...	1	1	7	267	16	283	1	1	4	5	11	11	27	267	294
...	1	...	...	1	...	...	1	3	...	....	....	4	193	10	203	....	....	...	2	2	2	12	193	205
...	2	...	...	...	1	...	...	3	...	1	1	8	275	16	291	....	....	3	4	7	7	23	275	298
...	1	...	...	...	...	1	...	1	...	....	....	4	124	7	131	....	....	1	...	1	1	8	124	132
1	10	2	...	1	3	1	5	20	...	3	3	39	1,501	94	1,595	1	1	10	18	30	30	124	1,501	1,625
1	1	2	...	...	...	...	...	1	...	....	....	1	.....	12	12	....	....	...	...	...	....	12	.....	12
...	1	...	...	...	...	...	...	1	...	....	....	2	71	4	75	....	....	...	1	1	1	5	71	76
...	3	...	...	...	1	1	2	9	...	1	1	20	725	39	764	....	....	2	9	11	11	50	725	775
...	1	...	...	1	...	1	...	2	...	....	....	2	124	7	131	....	....	...	4	4	4	11	124	135
...	2	...	...	1	1	...	...	3	...	1	1	7	281	16	297	....	....	3	5	8	8	24	281	305
...	1	...	...	...	...	1	...	2	...	....	....	3	186	7	193	....	....	1	3	4	4	11	186	197
...	1	...	...	...	...	...	1	...	...	....	....	2	68	4	72	....	....	1	...	1	1	5	68	73
1	10	2	...	2	2	3	4	17	...	2	2	37	1,455	89	1,544	....	....	7	22	29	29	118	1,455	1,573
1	1	2	1	...	...	...	...	1	...	....	....	1	.....	13	13	....	....	...	...	...	....	13	.....	13
...	3	...	...	...	1	1	1	11	...	1	1	16	715	36	751	....	1	2	10	13	13	49	715	764
...	1	...	...	...	...	...	1	2	...	....	....	3	125	7	132	....	....	...	1	1	1	8	125	133
...	1	...	...	1	...	...	1	2	...	....	....	4	144	9	153	....	....	...	...	...	....	9	144	153
...	1	...	...	...	...	...	1	1	...	....	....	4	120	7	127	1	....	1	1	3	3	10	120	130

B.—*Position and distribution of troops, by departments, taken from*

Post.	Situation.	Commanding officer.	GARRISONS.		PRESENT.				
			Number of companies.	Regiments.	General officers.	Aids-de-camp.	Adjutant-General's Department.	Bureau of Military Justice.	Quartermaster's Department.
Department of Texas—Continued.									
Fort Clark, Tex	Bracketville	Col. S. Ovenshine, 23d Inf.	6	5th Cav. and 23d Inf.	..	..	..	..	..
Fort Bliss, Tex	El Paso	Col. D. D. Van Valzah, 18th Inf.	3	5th Cav. and 18th Inf.	..	..	..	..	..
Eagle Pass. Tex	.....	Capt. Ira Febiger, 23d Inf.	1	23d Inf.	..	..	..	..	..
Total Department of Texas			27		1	2	1	..	3
Department of the Platte.									
Headquarters	Omaha, Nebr	Brig. Gen. J. J. Coppinger.		Department staff.	1	2	1	1	1
Fort Crook, Nebr	Bellevue	Col. J. S. Casey, 22d Inf.	8	22d Inf.	..	..	..	..	..
Fort Niobrara, Nebr.	Valentine	Col. J. N. Andrews, 12th Inf.	8	12th Inf.	..	..	..	..	..
Fort Robinson, Nebr.	.....	Col. James Biddle, 9th Cav.	6	9th Cav	..	..	..	..	..
Fort D. A. Russell, Wyo.	Cheyenne	Col. J. J. Van Horn, 8th Inf.	8	8th Inf.	..	..	..	..	..
Fort Washakie, Wyo.	Shoshone Agency	Capt. J. S. Loud, 9th Cav.	2	9th Cav	..	..	..	..	..
Fort Meade, S. Dak.	Near Sturgis	Col. C. H. Carlton, 8th Cav.	8	8th Cav	..	..	..	..	..
Total Department of the Platte			40		1	2	1	1	1

the latest returns on file in the Adjutant-General's Office, 1896—Continued

PRESENT.															ABSENT.						AGGREGATE.		
Subsistence Department.	Medical Department.	Pay Department.	Corps of Engineers.	Post chaplains.	Colonels.	Lieutenant-colonels.	Majors.	Captains.	Regimental chaplains.	Regimental adjutants.	Regimental quartermasters.	Subalterns.	Enlisted men.	Total commissioned.	Aggregate.	General and staff officers.	Field and regimental staff officers.	Captains.	Subalterns.	Total commissioned.	Aggregate.	Commissioned officers.	Enlisted men.	Aggregate.
...	2	...	...	1	1	1	...	5	...	1	1	9	384	21	405	....	....	3	5	8	8	29	384	413
...	1	...	...	...	1	1	...	3	...	1	1	8	215	16	231	....	....	2	2	4	4	20	215	235
...	1	...	...	...	...	...	...	1	...	...	....	2	68	4	72	....	....	....	....	....	....	4	68	
1	11	2	1	2	3	3	4	26	...	3	3	47	1,771	113	1,884	1	1	8	19	29	29	142	1,771	1,913
1	1	2	...	...	...	...	...	...	...	...	....	.....	.....	10	10	....	....	....	....	....	....	10	.....	10
...	2	...	...	...	1	1	1	6	...	1	1	11	506	24	530	....	....	4	9	13	13	37	506	543
...	2	...	...	1	1	1	1	5	...	1	1	10	507	23	530	....	....	5	10	15	15	38	507	545
...	2	...	...	...	1	1	2	7	1	1	1	12	385	28	413	....	....	1	4	5	5	33	385	418
...	2	...	...	...	1	1	1	7	...	1	1	14	511	28	539	....	....	3	6	9	9	37	511	548
...	1	...	...	...	...	...	...	1	...	....	....	4	127	6	133	....	....	1	...	1	1	7	127	134
...	2	...	...	...	1	1	2	7	...	1	1	12	481	27	508	1	....	3	8	12	12	39	481	520
1	12	2	...	1	5	5	7	33	1	5	5	63	2,517	146	2,663	1	....	17	37	55	55	201	2,517	2,718

C.—*Military commands and posts, with post-offices, telegraph stations, and nearest railroad stations or boat landings.*

ARMY OF THE UNITED STATES.

Headquarters, Washington, D. C., Maj. Gen. N. A. MILES, commanding.

DEPARTMENT OF THE EAST.

Maj. Gen. T. H. RUGER, commanding. Headquarters, Governors Island, New York City.

Geographical limits.—The New England States, States of New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Louisiana, Mississippi, Alabama, Kentucky, Tennessee, Ohio, and the District of Columbia.

DEPARTMENT OF THE MISSOURI.

Maj. Gen. WESLEY MERRITT, commanding. Headquarters, Chicago, Ill.

Geographical limits.—States of Michigan, Wisconsin, Indiana, Illinois, Missouri, Kansas, and Arkansas, and Indian and Oklahoma Territories.

DEPARTMENT OF DAKOTA.

Brig. Gen. JOHN R. BROOKE, commanding. Headquarters, St. Paul, Minn.

Geographical limits.—States of Minnesota, South Dakota (excepting so much as lies south of the forty-fifth parallel west of the Missouri River, and all south of the forty-fourth parallel east of that river), North Dakota, and Montana and the post of Fort Yellowstone, Wyo.

DEPARTMENT OF THE COLORADO.

Brig. Gen. FRANK WHEATON, commanding. Headquarters, Denver, Colo.

Geographical limits.—States of Colorado and Utah, and the Territories of Arizona and New Mexico.

DEPARTMENT OF THE COLUMBIA.

Brig. Gen. ELWELL S. OTIS, commanding. Headquarters, Vancouver Barracks, Wash.

Geographical limits.—States of Oregon, Washington, and Idaho, and Alaska Territory, excepting so much of Idaho as is embraced in the Department of the Platte.

DEPARTMENT OF CALIFORNIA.

Brig. Gen. JAMES W. FORSYTH, commanding. Headquarters, San Francisco, Cal.

Geographical limits.—States of California and Nevada.

DEPARTMENT OF TEXAS.

Brig. Gen. ZENAS R. BLISS, commanding. Headquarters, San Antonio, Tex.

Geographical limits.—State of Texas.

DEPARTMENT OF THE PLATTE.

Brig. Gen. JOHN J. COPPINGER, commanding. Headquarters, Omaha, Nebr.

Geographical limits.—States of Iowa, Nebraska, and Wyoming (excepting the post of Fort Yellowstone, Wyo.); so much of Idaho as lies east of a line formed by the extension of the western boundary of Utah to the northeastern boundary of Idaho, and so much of South Dakota as lies south of the forty-fifth parallel west of the Missouri River, and all south of the forty-fourth parallel east of that river.

POSTS.

[Those not garrisoned are indicated thus *.]

Adams, Fort, R. I. (Dept. East).—P. O., R. R. and tel. stn. Newport, R. I.; boat from Newport, dist. 1½ m.

Alcatraz Island, Cal. (Dept. Cal.).—P. O. same; tel. and R. R. stn. San Francisco, Cal., dist. 4 m.; Govt. steamer daily (except Sunday) to post.

Angel Island, Cal. (Dept. Cal.).—P. O. and tel. stn. same; R. R stn. San Francisco, Cal., dist. 7 m.; Govt. steamer daily (except Sunday) to post.

Apache, Fort, Ariz. (Dept. Colo.).—P. O. and tel. stn. same; stage daily from Holbrook, on A. and P. R. R., dist. 90 m.

Army and Navy General Hospital, Ark.—P. O., tel. and R. R. stn. Hot Springs, Ark.

Assiniboine, Fort, Mont. (Dept. Dak.).—P. O. same; tel. and R. R. stn. (G. N. R.) Assiniboine, Mont., dist. 1¾ m.

Barrancas, Fort, Fla. (Dept. East).—P. O. Warrington, Fla.; tel. stn. Pensacola Navy-Yard, Fla.; R. R. stn. at post.

Bayard, Fort, N. Mex. (Dept. Colo.).—P. O. and tel. stn. same; R. R. stn. (S. C. and N. R.) Halls, dist. 3 m.

Benicia Barracks, Cal. (Dept. Cal.).—P. O., tel. stn., R. R. stn. and boat landing Benicia, Cal., dist. 1 m.

Bliss, Fort, Tex. (Dept. Tex.).—P. O. and R. R. stn. El Paso, Tex., dist. 6 m.; tel. stn. at post.

Boise Barracks, Idaho (Dept. Columbia).—P. O., tel. and R. R. stn. Boise City, Idaho.

Brady, Fort, Mich. (Dept. Mo.).—P. O., tel. and R. R. stn. Sault Ste. Marie, Mich., dist. 1 m.

Brown, Fort, Tex. (Dept. Tex.).—P. O., tel. and R. R. stn. (R. G. R. R.) Brownsville, Tex.

Canby, Fort, Wash. (Dept. Columbia).—P. O. and tel. stn. at post; daily steamer from Portland, Oreg., to Astoria, dist. 98 m., and thence by steam tug daily (except Sunday) to post, dist 14 m.

Carroll, Fort, Md.—P. O. and tel. stn. Baltimore, Md., dist. 6½ m. by water from Light st. wharf.

**Caswell, Fort, N. C.*—P. O. and tel. stn. Southport, N. C., dist. 2 m.; steamer daily from Wilmington to Southport, dist. 22 m.

Clark, Fort, Tex. (Dept. Tex.).—P. O. Brackettville, Tex.; tel. stn. Fort Clark, via Spofford Junction, Tex.; daily stage from Spofford Junction, on S. P. R. R., dist. 9 m.

**Clarks Point, Mass., fort at.*—P. O. and tel. stn. New Bedford, Mass., dist. 4 m.

**Clinch, Fort, Fla.*—P. O., tel. and R. R. stn. Fernandina, Fla., dist. 3 m.

Columbus Barracks, Ohio (Dept. East).—P. O. and R. R. stn. Columbus, Ohio; tel. stn. at post.

Columbus, Fort, N. Y. (Dept. East).—P. O. and tel. stn. Governors Island, New York City; Govt. steamer to post.

**Constitution, Fort, N. H.*—P. O. New Castle, N. H.; tel. and R. R. stn. Portsmouth, N. H.; stage or steamer from Portsmouth, dist. 3 m.

Crook, Fort, Nebr. (Dept. Platte).—(10 miles south of Omaha) P. O. and tel. stn. Bellevue, Nebr., dist. 3 m.; R. R. stn. at post.

Custer, Fort, Mont. (Dept. Dak.).—P. O., tel. and R. R stn. same.

D. A. Russell, Fort, Wyo. (Dept. Platte).—P. O., tel. and R. R. stn. (U. P., D. and G.) Fort Russell, Wyo.

**Delaware, Fort, Del.*—P. O. and tel. stn. Delaware City, Del.; daily steamer from Philadelphia to Delaware City, dist. 2 m. from post.

Douglas, Fort, Utah (Dept. Colo.).—P. O., tel. and R. R. stn. Salt Lake City, Utah, dist. 3 m.; city railway to post.

Du Chesne, Fort, Utah (Dept. Col.).—P. O. and tel. stn. same; R. R. stn. (R. G. W. R. R.) Price's Station, dist. 94 m.; stage line to post daily (except Mondays).

**Dutch Island, R. I., fort on.*—P. O. Jamestown, R. I.; tel stn. Newport, R. I.; steam ferry from Newport to Jamestown, dist. 4 m., and private boat thence to post, dist. 1 m.

Eagle Pass, Camp (subpost of Fort Clark, Tex.) (Dept. Tex.).—P. O., tel. and R. R. stn. Eagle Pass, Tex.

Ethan Allen, Fort, Vt. (Dept. East).—P. O. and R. R. stn. Essex Junction, Vt., dist. 2 m., tel. stn. Burlington, Vt., dist. 5 m.

**Finns Point, N. J., battery at.*—P. O., R. R. and tel stn. Salem, N. J., dist. 6 m.

**Foote, Fort, Md.*—P. O. New Glatz, Md.; tel. stn. Alexandria, Va.; steamer from Washington, D. C., dist. 9 m.

**Gaines, Fort, Ala.*—P. O., tel. and R. R. stn. Mobile, Ala.; boat from Mobile, dist. 30 m.

**Gorges, Fort, Me.*—P. O., R. R. and tel. stn. Portland, Me., dist. 3 m.

Grant, Fort, Ariz. (Dept. Colo.).—P. O. and tel. stn. same; daily stage (except Sunday) from Willcox, on S. P. R. R., dist. 27 m.

**Griswold, Fort, Conn.*—P. O. Groton, Conn.; tel. and R. R. stn. New London, Conn.; ferry from New London, dist. 1 m.

Hamilton, Fort, N. Y. (Dept. East).—P. O. and tel. stn. same; city railroad from Brooklyn, dist. 6 m.

**Hancock, Fort, New York Harbor.*—P. O. Governors Island, New York City; tel. stn. Sandy Hook, N. J.; Govt. steamer daily from New York City, dist. 20 m.

Harrison, Fort, Mont. (Dept. Dak.).—P. O., tel. and R. R. stn. Helena, Mont., dist. 4 m.

Huachuca, Fort, Ariz. (Dept. Colo.).—P. O. and tel. stn. same; daily buckboard (except Sunday) from Huachuca Siding on N. Mex. and A. R. R., dist. 7 m.

**Independence, Fort, Mass.*—P. O. and tel. stn. Boston, Mass.; Govt. tug from Boston, dist. 3 m.

Jackson Barracks, La. (Dept. East).—P. O. and R. R. stn. New Orleans, La., dist. 6 m.; street cars from New Orleans pass the post; tel. stn. Slaughter House, St. Bernard Parish, La.

**Jackson, Fort, La.*—P. O. and R. R. stn. Buras, La., dist. 5 m.; tel. stn. Quarantine, La.

Jefferson Barracks, Mo. (Dept. Mo.).—P. O., tel. and R. R. stn. same.

**Jefferson, Fort, Fla.*—P. O. and tel. stn. Key West, Fla.; boat from Key West, dist. 71 m.

**Johnston, Fort, N. C.*—P. O. and tel. stn. Southport, N. C.; steamer daily from Wilmington, N. C., dist. 26 m.

Keogh, Fort, Mont. (Dept. Dak.).—P. O., tel. and R. R. stn. (N. P. R. R.) same.

Key West Barracks, Fla. (Dept. East).—P. O., tel. stn. and boat ldg. Key West, Fla.

**Knox, Fort, Me.*—P. O. Prospect Ferry, Me.; tel. and R. R. stn. Bucksport, Me.; ferry from Bucksport, dist. ¼ m.

**Lafayette, Fort, N. Y. H.*—P. O. and tel. stn. Fort Hamilton, N. Y.; city railroad from Brooklyn, dist. 6 m.

Leavenworth, Fort, Kans. (Dept. Mo.).—P. O., tel. and R. R. stn. same.

Little Rock, Ark., Post near (Dept Mo.).—P. O. Baring Cross, Ark.; tel. and R. R. stn. Little Rock, Ark., dist. 4 m.

**Livingston, Fort, La.*—P. O. Grand Isle, La.; tel. stn. New Orleans, La.; steamer weekly from New Orleans, dist. 95 m.

Logan, Fort, Colo. (10 miles south of Denver) (Dept. Colo.).—P. O., tel. and R. R. stn. (D. and R. G. and U. P. R. R.) same.

**Macon, Fort, N. C.*—P. O. and tel. stn. Beaufort, N. C.; R. R. stn. Morehead City, N. C., dist. 2 m.

Madison Barracks, N. Y. (Dept. East).—P. O., tel. and R. R. stn. Sacketts Harbor, N. Y.

**Marion, Fort, Fla.* (Dept. East).—P. O., tel. and R. R. stn. St. Augustine, Fla.

Mason, Fort, Cal. (Dept. Cal.).—P. O. Station A, San Francisco, Cal.; R. R. stn. San Francisco, Cal., dist. 3 m.; street cars ¼ m. from post; tel. stn. at post.

**McClary, Fort, Me.*—P. O., tel. and R. R. stn. Kittery Point, Me.

McHenry, Fort, Md. (Dept. East).—P. O., tel. and R. R. stn. Baltimore, Md.

McIntosh, Fort, Tex. (Dept. Tex.).—P. O., tel. and R. R. stn. Laredo, Tex.

McPherson, Fort, Ga. (Dept. East).—(4 m. from Atlanta, Ga.) P. O., tel. and R. R. stn. same.

Meade, Fort, S. Dak. (Dept. Platte).—P. O. same; tel. and R. R. stn. (F. E. and M. V.) Sturgis City, dist. 3 m.

Merritt, Camp (subpost of Fort Keogh, Mont.) (Dept. Dak.).—P. O. Lame Deer, Mont.; tel. and R. R. stn. (N. P. R. R.) Rosebud, Mont.; triweekly stage from Rosebud, dist. 60 m.

**Mifflin, Fort, Pa.*—P. O., Paschallville stn., Philadelphia, Pa.; R. R. and tel. stn. Philadelphia, Pa., dist. 5 m.

Missoula, Fort, Mont. (Dept. Dak.).—P. O. same; tel. and R. R. stn. (N. P.) Missoula, Mont., dist. 4 m.

Monroe, Fort, Va. (Dept. East).—P. O. and tel. stn. same; steamers daily from Baltimore, Washington, Norfolk, and New York, and railroad (C. and O.) from Richmond, Va.

**Montgomery, Fort, N. Y.*—P. O., tel. and R. R stn. Rouse's Point, N. Y., dist. 1½ m.

**Morgan, Fort, Ala.*—P. O. Herndon, Ala.; tel. stn. at post; steamer from Mobile, dist. 30 m.

**Moultrie, Fort, S. C.*—P. O. Moultrieville, S. C.; tel. and R. R. stn. Charleston, S. C., dist. 5 m.

Myer Fort, Va. (Dept. East).—P. O. same, tel. and R. R. stn. Washington, D. C., dist. 4 m.; telephone to post.

Niagara, Fort, N. Y. (Dept. East).—P. O. Youngstown, N. Y.; tel. stn. Niagara Falls, N. Y.; R. R. stn. Lewiston, N. Y., dist. 7 m.; electric road to post.

Niobrara, Fort, Nebr. (Dept. Platte).—P. O. and tel. stn. same; R. R. stn. (F. E. and M. V.) Valentine, Nebr., dist. 4½ m.

**Oglethorpe, Fort, Ga.*—P. O., tel. and R. R. stn. Savannah, Ga., dist. 3 m.

**Omaha, Fort, Nebr.* (Dept. Platte).—P. O., tel. and R. R. stn., Omaha, Nebr.

**Ontario, Fort, N. Y.* (Dept. East).—P. O., tel. and R. R. stn. Oswego, N. Y.

**Phœnix, Fort, Mass.*—P. O., R. R. and tel. stn. Fairhaven, Mass.

**Pickens, Fort, Fla.*—P. O. Warrington, Fla.; tel. stn. Pensacola Navy Yard; R. R. stn. Fort Barrancas, Fla., dist. 1 m.

Pilot Butte, Camp (subpost of Fort D. A. Russell, Wyo.) (Dept. Platte).—P. O., tel. and R. R. stn. (U. P.) Rock Springs, Wyo.

Plattsburg Barracks, N. Y. (Dept. East).—P. O., tel. and R. R. stn. Plattsburg, N. Y.

**Popham, Fort, Me.*—P. O. Popham Beach, Me.; tel. and R. R. stn Bath, Me., dist. 12 m. by water, 15 m. by land.

Porter, Fort, N. Y. (Dept. East).—P. O., tel. and R. R. stn. Buffalo, N. Y.

Preble, Fort, Me. (Dept. East).—P. O., tel. and R. R. stn. Portland, Me., dist. 1¾ m.

Presidio of San Francisco, Cal. (Dept. Cal.)—P. O. and tel. stn. same; R. R. stn. San Francisco, Cal., dist. 4½ m.; city railway to post.

**Pulaski, Fort, Ga.*—P. O., R. R. and tel. stn. Savannah, Ga., dist. 14 m.

Reno, Fort, Okla. T. (Dept. Mo.).—P. O., tel. and R. R. stn. same.

Riley, Fort, Kans. (Dept. Mo.).—P. O., tel. and R. R. stn. same.

Ringgold, Fort, Tex. (Dept. Tex.).—P. O. Rio Grande, Tex.; tel. stn at post; stage from Hebbronville, on T. M. R. R., dist 76 m., and from San Miguel, Mex., on Mex. N. R. R., dist. 23 m.

Robinson, Fort, Nebr. (Dept. Platte).—P. O., tel. and R. R. stn. (F. E. and M. V.) same.

Sam Houston, Fort, Tex. (Dept. Tex.)—P. O., tel. and R. R. stn San Antonio, Tex.

San Carlos (subpost of Fort Grant), *Ariz.* (Dept. Colo.).—P. O. and tel. stn. same; daily stage from Geronimo, Ariz., terminus of Gila Valley, Globe and Northern R. R., dist. 35 m.

San Diego Barracks, Cal. (Dept. Cal.).—P. O., tel. and R. R. stn. (C. S.) and boat ldg. San Diego, Cal.

**Scammel, Fort, Me.*—P. O., tel. and R. R. stn Portland, Me., dist. 2 m.

Schuyler, Fort, N. Y. (Dept. East).—P. O., tel. and R. R. stn. West Chester, N. Y., dist. 4½ m.

**Sewall, Fort, Mass.*—P. O., tel. and R. R. stn. Marblehead, Mass., dist. 1½ m.

Sheridan, Fort, Ill. (Dept. Mo.).—P. O., R. R. and tel. stn. same.

Sherman, Fort, Idaho (Dept. Columbia).—P. O. Sherman, Idaho; tel. and R. R. stn. Cœur d'Alene, Idaho (on branch N. P. R. R.), dist. ¾ m.

**Ship Island, Miss., Fort at.*—P. O., tel. and R. R. stn. (L. and N.) Biloxi, Miss., dist. 15 m.; special boat to post.

Sill, Fort, Okla. T. (Dept. Mo.).—P. O. and tel. stn. same; stage daily from Rush Springs, Ind. T., on C., R. I. and P. R. R., dist. 29 m.

Slocum, Fort, N. Y. (Dept. East).—P. O. and tel. stn. New Rochelle, N. Y.; horse car and boat from New Rochelle, dist. 3 m.

Snelling, Fort, Minn. (Dept. Dak.).—P. O., tel. and R. R. stn. same; electric st. R. R. to St. Paul, Minn., dist. 7 m.

Spokane, Fort, Wash. (Dept. Columbia).—P. O. Miles, Wash.; tel. and R. R. stn. Davenport, Wash., on C. W. R. R., dist. 25 m.

**Stevens, Fort, Oreg.*—P. O. and tel. stn. (Govt. tel. to post) Astoria, Oreg.; steamer daily from R. R. stn. Portland, Oreg., to Astoria, dist. 98 m.

St. Francis Barracks, Fla. (Dept. East).—P. O., tel. and R. R. stn. St. Augustine, Fla.

**St. Philip, Fort, La.*—P. O. Neptune, La.; tel. stn Old Quarantine stn., La.; steamer daily (except Sunday) from New Orleans, dist. 73 m.

**Sumter, Fort, S. C.*—P. O. Moultrieville, S. C.; tel. and R. R. stn. Charleston, S. C., dist. 5 m.

**Taylor, Fort, Fla.*—P. O., tel. stn. and boat ldg. Key West, Fla.

Thomas, Fort, Ky. (Dept. East).—P. O., tel. and R. R. stn. Newport, Ky., dist. 3 m.

Trumbull, Fort, Conn. (Dept. East).—P. O., tel. and R. R. stn. New London, Conn., dist. 1 m.

Vancouver Barracks, Wash. (Dept. Columbia).—P. O. and boat ldg. Vancouver, Wash.; tel. stn. at post; R. R. stn. at Portland, Oreg.; boat from Portland, Oreg., daily, dist. 18 m., and by ferry and city R. R., dist. 9 m.

Wadsworth, Fort, N. Y. (Dept. East).—P. O. Rosebank, Staten Island, N. Y.; tel. stn. Quarantine, Clifton, Staten Island, N. Y.

Walla Walla, Fort, Wash. (Dept. Columbia).—P. O., tel. and R. R. stn. (O. R. and N. Co., and W. and C. R. R. R.) Walla Walla, Wash., dist. 1 m.

Warren, Fort, Mass. (Dept. East).—P. O. and tel. stn. Boston, Mass.; steamer from Boston, dist. 7 m.

Washakie, Fort, Wyo. (Dept. Platte).—P. O. and tel. stn. same; daily stage from Rawlins, Wyo., on U. P. R. R., dist. 147 m.

Washington Barracks, D. C. (Dept. East).—P. O., tel. and R. R. stn. Washington, D. C.

**Washington, Fort, Md.*—P. O. same; tel. stn. Alexandria, Va.; stmbt. from Washington, D. C., dist. 13 m.

Wayne, Fort, Mich. (Dept. Mo.).—P. O. and tel. stn. Detroit, Mich.; city railway from Detroit, dist. 4 m.

West Point, N. Y. (U. S. Mil. Acad.).—P. O., tel. and R. R. stn. same.

Whipple Barracks, Ariz. (Dept. Colo.).—P. O. and R. R. stn. Whipple, Ariz.; tel. stn. Prescott, Ariz.

Willets Point, N. Y. (U. S. Engineer School).—P. O. and tel. stn. same; R. R. stn. Whitestone, N. Y., dist. 2½ m. (See Engineer Depot.)
**Winfield Scott, Fort, Cal.* (Dept. Cal.).—P. O. and tel. stn. Presidio of San Francisco, Cal.; R. R. stn. San Francisco, Cal.
Wingate, Fort, N. Mex. (Dept. Colo.).—P. O. and tel. stn. same; R. R. stn. (A. and P.) Wingate, dist. 3 m.
**Winthrop, Fort, Mass.*—P. O. and tel. stn. Boston, Mass.; stmbt. from Boston, dist. 2 m.
Wood, Fort (subpost of Fort Columbus), *N. Y.* (Dept. East).—P. O., tel. and R. R. stn. N. Y. City.
Yates, Fort, N. Dak. (Dept. Dak.).—P. O. and tel. stn. same; R. R. stn. Mandan, on N. P. R. R., dist. 60 m.
Yellowstone, Fort, Wyo. (Dept. Dak.).—P. O. Mammoth Hot Springs, Wyo.; tel. stn. June 1 to October 1, Mammoth Hot Springs, October 1 to May 31, Cinnabar, Mont.; R. R. stn. Cinnabar, Mont., via Livingston, on N. P. R. R., dist. 8 m.

ARMORIES, ARSENALS, AND DEPOTS.

ARMORIES, ARSENALS, AND ORDNANCE DEPOTS.

Allegheny Arsenal, Pa.—P. O., tel. and R. R. stn. Pittsburg, Pa.; Lieut. Col. F. H. Parker, comdg.
Augusta Arsenal, Ga.—P. O., tel. and R. R. stn. Augusta, Ga., dist. 3 m.; electric R. R. from Augusta to arsenal; Capt. D. M. Taylor, comdg.
Benicia Arsenal, Cal.—P. O., tel., R. R. stn. and boat landing Benicia, Cal., dist. 1 m.; Lieut. Col. L. S. Babbitt, comdg.
Columbia Arsenal, Tenn.—P. O., tel. and R. R. stn. Columbia, Tenn.; Maj. J. E. Greer, comdg.
Fort Monroe Arsenal, Va.—P. O. and tel. stn. Fort Monroe, Va.; stmbts. daily from New York, Baltimore, Washington, and Norfolk, and railroad (C. and O.) from Richmond, Va.; Lieut. Col. W. A. Marye, comdg.
Frankford Arsenal, Pa.—P. O. (Station F) and tel. stn. (telephone to post) Philadelphia, Pa.; Lieut. Col. J. P. Farley, comdg.
Indianapolis Arsenal, Ind.—P O., tel. and R. R. stn. Indianapolis, Ind.; Maj. A. L. Varney, comdg.
Kennebec Arsenal, Me.—P. O., tel. and R. R. stn. Augusta, Me.; Maj. J. R. McGinness, comdg.
New York Arsenal, N. Y.—P. O. and tel. stn. Governors Island, New York City; Govt. steamer to post; Maj. F. H. Phipps, comdg.
Rock Island Arsenal, Ill.—P. O. and tel. stn. Rock Island, Ill.; special conveyance from R. R. stns. and boat ldgs. in Rock Island, Ill., and Davenport, Iowa, dist. 2 m.; Col. A. R. Buffington, comdg.
St. Louis Powder Depot, Mo.—P. O., tel. and R. R. stn. Jefferson Barracks, Mo.; Maj. J. A. Kress comdg.
Sandy Hook Proving Ground, N. J.—P. O. Governors Island, New York City; tel. stn. Sandy Hook, N. J.; Govt. steamer daily from New York City, dist. 20 m.; Capt. Frank Heath, comdg.
San Antonio Arsenal, Tex.—P. O., tel. and R. R. stn. San Antonio, Tex.; Maj. C. E. Dutton, comdg.
Springfield Armory, Mass.—P. O., tel. and R. R. stn. Springfield, Mass.; Col. A. Mordecai, comdg.
U. S. Powder Depot, N. J.—P. O., tel. (telephone to post) and R. R. stn. Dover, N. J., dist. 4½ m.; Col. J. M. Whittemore, comdg.
Watertown Arsenal, Mass.—P. O., tel. and R. R. stn. Watertown, Mass.; Maj. J. W. Reilly, comdg.
Watervliet Arsenel, N. Y.—P. O. and tel. stn. (telephone to post) West Troy, N. Y.; R. R. stn. Troy, N. Y., dist. 1 m.; electric street cars to Albany, N. Y.; Maj. Isaac Arnold, jr., comdg.

RECRUIT RENDEZVOUS.

Fort Slocum, N. Y.—P. O. and tel. stn. New Rochelle, N. Y., horse car and boat from New Rochelle, dist. 3 m.
Columbus Barracks, Ohio.—P. O. and R. R. stn. Columbus, Ohio; tel. stn. at post.
Jefferson Barracks, Mo.—P. O., tel. and R. R. stn. same.
Fort Sheridan, Ill.—P. O., tel. and R. R. stn. same.

ENGINEER DEPOT.

Willets Point, N. Y.—P. O. and tel. stn. same; R. R. stn. Whitestone, Queens County, N. Y., dist. 2½ m; Maj. J. G. D. Knight, comdg.

HEADQUARTERS OF REGIMENTS.

CAVALRY.

1. Fort Riley, Kans.
2. Fort Wingate, N. Mex.
3. Jefferson Barracks, Mo.
4. Fort Walla Walla, Wash.
5. Fort Sam Houston, Tex.
6. Fort Myer, Va.
7. Fort Grant, Ariz.
8. Fort Meade, S. Dak.
9. Fort Robinson, Nebr.
10. Fort Assiniboine, Mont.

ARTILLERY.

1. St. Francis Barracks, Fla.
2. Fort Adams, R. I.
3. Presidio of San Francisco, Cal.
4. Washington Barracks, D. C.
5. Fort Hamilton, N. Y.

INFANTRY.

1. Angel Island, Cal.
2. Fort Keogh, Mont.
3. Fort Snelling, Minn.
4. Fort Sheridan, Ill.
5. Fort McPherson, Ga.
6. Fort Thomas, Ky.
7. Fort Logan, Colo.
8. Fort D. A. Russell, Wyo.
9. Madison Barracks, N. Y.
10. Fort Reno, Okla. T.
11. Whipple Barracks, Ariz.
12. Fort Niobrara, Nebr.
13. Fort Niagara, N. Y.
14. Vancouver Barracks, Wash.
15. Fort Bayard, N. Mex.
16. Fort Sherman, Idaho.
17. Columbus Barracks, Ohio.
18. Fort Bliss, Tex.
19. Fort Wayne, Mich.
20. Fort Leavenworth, Kans.
21. Plattsburg Barracks, N. Y.
22. Fort Crook, Nebr.
23. Fort Clark, Tex.
24. Fort Douglas, Utah.
25. Fort Missoula, Mont.

ADJUTANT-GENERAL'S OFFICE,
Washington, D. C., October 1, 1896.

D.—*Statement showing gain and loss in the enlisted strength of the Army during the fiscal year ended June 30, 1896.*

GAIN.	
Enlisted	5,676
Reenlisted	2,960
From desertion	363
Total	8,999
LOSS.	
By promotion	13
Expiration of service	2,235
For disability	416
By purchase	387
For fraudulent enlistment	84
By favor	235
As veterans	101
Under General Orders, No. 80, of 1890	2,895
By sentence of general court-martial	597
For other causes	551
Retired	139
Deserted	1,365
Died of disease, etc	130
Total	9,148
Enlisted strength June 30, 1895	25,018
Gain	8,999
	34,017
Loss	9,148
Enlisted strength June 30, 1896	[1] 24,869

[1] In this are included 707 men of the Hospital Corps, which by law are excluded from the 25,000 enlisted men authorized, leaving the actual strength on June 30, 1896, of 24,162 enlisted men.

NOTE.—Indians belonging to the line of the Army	69
Indian scouts	62

REPORT OF THE INSPECTOR-GENERAL.

WAR DEPARTMENT,
INSPECTOR-GENERAL'S OFFICE,
Washington, D. C., November 4, 1896.

SIR: I have the honor to submit the following report of matters pertaining to this department for the fiscal year ending June 30, 1896:

INSPECTION DISTRICTS.

The present inspection districts were established by General Orders, No. 18, Adjutant-General's Office, March 30, 1895, and are as follows: North Atlantic district, New York City; South Atlantic district, Washington, D. C.; Middle district, Chicago, Ill.; Northern district, Denver, Colo.; Southern district, Santa Fe, N. Mex.; Pacific district, San Francisco, Cal. The officers as first assigned continue in charge.

OFFICERS AND DUTIES.

No change has occurred in the personnel of the permanent officers of the department during the year. During this period they have been stationed as follows:

Brig. Gen. J. C. Breckinridge, Inspector-General of the Army, in charge of the Inspector-General's Office, War Department, Washington.

Col. R. P. Hughes, inspector general, North Atlantic district, New York City, N. Y., until November 2, 1895, when he availed himself of a leave of absence for six months with permission to cross the sea, granted by Special Orders, No. 224, A. G. O., dated September 25, 1895, which was further extended six months by Special Orders, No. 66, A. G. O., dated March 19, 1896.

Col. G. H. Burton, inspector-general, Pacific district, San Francisco, Cal.

Lieut. Col. H. W. Lawton, inspector-general, Southern district, Santa Fe, N. Mex.

Lieut. Col. P. D. Vroom, inspector-general, Middle district, Chicago, Ill.

Maj. J. P. Sanger, inspector general, continued on duty as military secretary to the Lieutenant-General of the Army until September 30, 1895, when he was assigned as assistant to the Inspector-General of the Army, Washington, D. C., and as inspector-general, South Atlantic district, by Special Orders, No. 228, A. G. O., dated September 30, 1895.

Maj. E. A. Garlington, inspector-general, continued on duty as assistant to the Inspector-General of the Army, and as inspector-general, South Atlantic district, until June 21, 1896, when he availed himself of a leave of absence for two months, granted by Special Orders, No. 142, A. G. O., dated June 7, 1896.

Maj. Francis Moore, Fifth Cavalry, acting inspector-general, Northern district, Denver, Colo.

Maj. H. C. Hasbrouck, Fourth Artillery, was detailed as acting inspector-general, North Atlantic district, with station at Fort Monroe, Va., by Special Orders, No. 294, A. G. O., dated December 17, 1895, and assumed duties December 29, 1895.

SPECIAL INSPECTORS.

The following officers were detailed as inspectors of the military departments of certain educational institutions, where officers of the Army are detailed under section 1225, Revised Statutes, as amended by the act of November 3, 1893, under instructions contained in letters from the Adjutant-General of the Army of March 11, March 20, and April 30, 1896, and letters from the Inspector General of the Army of March 26 and May 1, 1896: Lieut. Col. E. M. Coates, Sixteenth Infantry; Maj. G. S. Carpenter, Fourth Infantry; Maj. C. W. Miner, Sixth Infantry; Maj. C. F. Robe, Fourteenth Infantry; Capt. C. S. Roberts, Seventeenth Infantry; Capt. H. R. Brinkerhoff, Fifteenth Infantry; Capt. James Fornance, Thirteenth Infantry; Capt. G. K. Hunter, Third Cavalry; Capt. W. C. Buttler, Third Infantry; Lieut. A. R. Paxton, Fifteenth Infantry.

The following is a summary of the work performed by the permanent and these special officers of the Inspector-General's Department during the past fiscal year:

Officer.	Station or district.	Disbursements.		Posts.	Staff posts, soldiers' homes, branches, depots.	Colleges.
		Number of inspections.	Amount involved.			
Brig. Gen. J. C. Breckinridge.	Washington, D. C.	8	$5,826,796.82	....	8	1
Col. R. P. Hughes	North Atlantic	69	4,780,602.22	16	16	....
Col. G. H. Burton	Pacific	105	6,262,923.55	15	4	3
Lieut. Col. H. W. Lawton	Southern	69	4,425,214.26	18	1	3
Lieut. Col. P. D. Vroom	Middle	180	15,499,651.84	7	12	15
Maj. J. P. Sanger	South Atlantic	80	9,345,131.85	9	3	10
Maj. E. A. Garlington	do	67	6,757,045.25	....	5	16
Maj. Francis Moore	Northern	87	5,213,388.82	17	2	14
Maj. H. C. Hasbrouck	North Atlantic	81	7,849,403.16	....	6	....
Total		746	65,960,157.77	82	57	62
Special inspectors.						
Lieut. Col. E. M. Coates	Fort Douglas, Utah	....	....	....	....	1
Maj. G. S. Carpenter	Fort Spokane, Wash	....	....	....	....	2
Maj. C. W. Miner	Fort Thomas, Ky	....	....	....	....	5
Maj. C. F. Robe	Vancouver Barracks, Wash	....	....	....	....	3
Capt. C. S. Roberts	Columbus Barracks, Ohio	....	....	....	....	2
Capt. H. R. Brinkerhoff	Fort Sheridan, Ill	....	....	....	....	4
Capt. J. Fornance	Fort Columbus, N. Y. H.	....	....	....	....	21
Capt. G. K. Hunter	Jefferson Barracks, Mo	....	....	....	....	2
Capt. W. C. Buttler	Fort Snelling, Minn	....	....	....	....	1
Lieut. A. R. Paxton	Harrisburg, Pa	....	....	....	....	1
Total		....	....	....	....	42
Grand total		746	65,960,157.77	82	57	104

Officers.	Students.	National cemeteries.	Recruiting rendezvous.	Special investigations.	Sets of inventory and inspection reports.	Persons inspected, exclusive of students.	Total inspections.	Ascertained cost price of property inspected.	Miles traveled.
Brig. Gen. J. C. Breckinridge	95	.....	.....	.....	.....	16,478	17	.....	10,042
Col. R. P. Hughes	.....	.....	.....	2	160	4,354	263	$345,041.10	2,390
Col. G. H. Burton	626	.....	.....	.....	170	3,767	297	183,640.43	12,778
Lieut. Col. H. W. Lawton	369	.....	.....	1	227	4,781	319	117,731.90	11,249
Lieut. Col. P. D. Vroom	1,592	2	3	2	178	3,397	398	178,023.07	11,829
Maj. J. P. Sanger	1 622	2	.....	.....	146	2,438	250	42,794.69	7,715
Maj. E. A. Garlington	1,779	.....	.....	1	77	.....	166	54,208.78	9,264
Maj. Francis Moore	1.463	1	.....	.....	268	4,946	389	145,158.19	10,620
Maj. H. C. Hasbrouck	.....	1	.....	1	37	.....	126	52,187.49	5,098
Total	7,546	6	3	7	1.263	40,161	2,225	1,118,785.65	80,985
Special inspectors.									
Lieut. Col. E. M. Coates	81	.....	.....	.....	.....	.....	1	.....	208
Maj G. S. Carpenter	164	.....	.....	.....	.....	.....	2	.....	352
Maj. C. W. Miner	506	5	.....	.....	2	.....	12	139.57	611
Maj. C. F. Robe	318	.....	.....	.....	.....	.....	3	.....	600
Capt. C. S. Roberts	440	.....	.....	.....	.....	.....	2	.....	188
Capt. H. R. Brinkerhoff	948	.....	.....	.....	.....	.....	4	.....	584
Capt. J. Fornance	2,533	.....	.....	.....	.....	.....	21	.....	2,465
Capt. G. K. Hunter	371	.....	.....	.....	.....	.....	2	.....	724
Capt. W. C. Buttler	53	.....	.....	.....	.....	.....	1	.....	654
Lieut. A. R. Paxton	51	.....	.....	.....	.....	.....	1	.....	72
Total	5,465	5	.....	.....	2	.....	49	139.57	6,458
Grand total	13,011	11	3	7	1,265	40,161	2,274	1,118,925.22	87,443

Whether the general inspection should be complete and thorough and fairly alike for all and include every phase of national military effort and organization, and be performed by the legally authorized Inspector-General's Department, will hardly be disputed now. Evidently all that has been assigned to the department has been faithfully performed. Omitting Sundays and holidays, the task each day has been to inspect 0.84 places; 15,945 things, valued at $215,556; 174 persons; travel 286 miles, and submit 7 reports. It is not the quantity but quality of work of this sort that deserves attention; and no effort is being spared by every inspector to warrant favorable judgment and submit acceptable work.

MILITARY POSTS.

Since the date of my last annual report the garrisons have been withdrawn from Forts Buford and Pembina, N. Dak.; Fort Hancock, Tex., and Fort Stanton, N. Mex., and two new posts have recently been garrisoned—Fort Harrison, Mont., and post near Little Rock, Ark.—making a net reduction of two military posts. During the past year inspectors have visited and inspected all garrisoned posts except one, which was garrisoned since the inspection tour in that section was finished; and the record which has been made, both as to the extent of ground covered and thoroughness and completeness of the work done, will, it is believed, surpass all other former efforts, and may establish a standard that will be worthy of the best endeavor of those upon whom the duty may devolve hereafter if they wish to excel it in the future.

Eighty-two posts have been inspected, distributed among the several inspection districts as follows, viz: North Atlantic, 16; South Atlantic, 9; Middle, 7; Pacific, 15; Southern, 18; and Northern, 17. The average number of days spent at a post by an inspector is 5.3, and the inspector's work keeps him long on the move and is done without regard to hours.

It is desired that nothing will be allowed to interfere with this soldierly branch of our duties, for wherever a military organization exists

no higher nor more exacting duty can devolve during peace upon the corps of inspectors-general, and it is being performed with perfect zeal, so that the excellent results being attained by the Army in its modern training is clearly recognized and well attested; and it is believed the best informed do not question the utility nowadays of these 434 days inspection of commands. The only question concerns those which escape such inspections.

The following return of troops gives data concerning the troops at the time of inspections:

Inspection district.	Organizations.								Present and absent.		Present at post.		Present at inspection.	
						Detachments.								
	Bands.	Troops.	Batteries.	Companies.	Skeletons.	Recruits	Indian scouts.	Other.	Commissioned officers.	Enlisted men.	Commissioned officers.	Enlisted men.	Commissioned officers.	Enlisted men.
North Atlantic	5	4	20	24	6	1	....	....	247	3,216	179	3,054	.....	.....
South Atlantic	5	4	16	16	4	....	....	....	210	2,442	151	2,204	144	1,878
Middle	6	6	1	40	11	3	....	....	238	3,159	173	3,014	144	2,443
Pacific	7	12	11	36	2	....	....	....	306	3,884	193	3,574	.....	3,012
Southern	8	34	1	40	14	....	2	....	355	4,821	220	4,561	190	3,907
Northern	10	36	3	58	18	....	....	1	440	6,258	317	5,633	280	4,670
Total	41	96	52	214	55	4	2	1	1,796	23,780	1,233	22,040	758	15,910

Inspection district.	Absent from post.																
	Officers.									Enlisted men.							
	Detached service.	Leave.	Sick.	In arrest or confinement.	En route to join.	In field or camp.	Under orders for station.	Before board for promotion.	Awaiting retirement	Other reasons.	Detached service.	Furlough.	Without leave.	Sick.	In arrest or confinement.	In hands of civil authorities.	Special duty.	Reason not stated.
North Atlantic	43	17	2	....	1	....	....	....	....	5	30	114	5	1	6	2	....	....
South Atlantic	45	3	4	....	....	6	....	....	....	7	10	92	4	8	6	....	....	....
Middle	48	15	1	1	....	....	....	....	....	....	15	109	8	10	3	....	....	....
Pacific	60	14	3	....	....	....	....	....	....	....	19	139	2	6	10	....	1	....
Southern	56	23	3	....	1	3	2	2	1	45	15	43	8	2	3	1	7	....
Northern	74	37	2	....	....	....	....	....	....	10	120	148	5	9	6	....	....	110
Total	326	109	15	1	2	9	2	2	1	67	209	645	32	36	34	3	8	11

Inspection district.	Present at post, but absent from inspection.															
	Officers.								Noncommissioned officers.							
	Guard.	Sick.	Special duty.	Excused.	Awaiting arrival of troop.	In arrest or confinement.	Leave.	Reason not stated.	Guard.	Sick.	In arrest or confinement.	Extra duty.	Special duty.	Charge of quarters.	Without leave.	On pass.	Dismounted.
South Atlantic	....	....	....	1	....	....	....	6	26	20	.....	2	7	.....	....	....	....
Middle	5	11	10	....	1	2	....	....	24	9	1	2	11	24	....	....	....
Pacific	....	....	....	....	....	....	....	....	....	....	....	....	1	22	....	....	....
Southern	7	3	13	4	.....	....	2	....	41	22	3	9	16	2	....	....	....
Northern	7	8	7	2	.....	.....	.....	13	48	25	3	5	32	22	1	1	
Total	19	22	30	7	1	2	2	19	139	76	7	18	67	70	1	1	

Inspection district.	Present at post, but absent from inspection—Continued.																							
	Artificers, musicians, and privates.																							
	Guard.	Sick.	In arrest or confinement.	Extra duty.	Special duty.	Recruits.	Cooks.	Market men.	Bakers.	Dining room.	Orderlies.	Room orderlies.	Engineers.	With colors.	Stable.	Mail carriers.	Charge of quarters.	Without mount.	Excused.	Without leave.	Could not be found.	General mess.	Other reasons.
South Atlantic	118	77	10	8	3	47	48	3	8	1	20	3	2	1	4	1	1	...	...	...	...	...	...	32
Middle	143	100	48	12	76	105	1	..	....	..	3	8	..	..	1	..	..	3	...	...	...	...	...	...
Pacific	220	91	36	13	2	45	62	..	10	..	7	6	..	..	10	..	..	...	...	...	...	...	...	18
Southern	211	128	58	22	26	123	95	..	20	..	35	12	..	..	4	..	1	...	7	..	..	...	...	...
Northern	281	203	97	13	137	157	34	..	7	..	9	21	..	..	14	..	..	15	10	3	1	24	26	
Total	973	599	249	68	244	477	240	3	45	1	74	50	2	1	33	1	2	18	17	3	1	24	76	

To this may be added the garrisons at West Point and Willets Point, N. Y., consisting of 84 commissioned officers, 322 cadets, and 715 enlisted men, making a grand aggregate of 26,697. Of the total strength represented in the above table, 1,233 officers and 22,040 enlisted men were present at the posts. From the data given it seems that there was a total of 1,175 officers and 18,341 enlisted men present at the inspections, or an aggregate of 19,516, which is 76.2 per cent of the present and absent. At Fort Washakie, Wyo., the number present at inspection was 85.3 per cent of the aggregate strength for one company, and at Fort Reno, Okla., garrisoned by band, companies A, B, F, and H, Tenth Infantry, and troops B and D, First Cavalry, 84.8 per cent was present at the inspection. The number of posts having a percentage present at inspection of 80 or above is 12, and these are divided among the several districts as follows, viz: South Atlantic, 1; Middle, 1; Southern, 7, and Northern, 3. The minimum percentage of aggregate strength present at inspection was 51.5. Some of the percentages may be approximately indicated by the following table:

Inspection district.	Present at post.		Present at inspection.		Absent from post.				Enlisted men present at post, but absent from inspection.			
					Commissioned officers.		Enlisted men.					
	Commissioned officers.	Enlisted men.	Commissioned officers.	Enlisted men.	Detached service.	Leave.	Detached service.	Furlough.	Guard.	Sick.	Extra duty.	Special duty.
North Atlantic	72.4	94.9	.....	.....	17.4	6.9	0.9	3.5	.....	.....	.....	.....
South Atlantic	71.9	90.2	68.6	76.9	21.4	1.4	.4	3.8	5.9	3.9	0.4	0.4
Middle	72.7	95.4	60.5	77.3	20	6.3	.5	3.5	5.3	3.2	.4	2.7
Pacific	63.1	92	.....	77.5	19.6	4.6	.5	3.6	5.7	2.4	.3	.0008
Southern	62	94.6	53.5	81	15.7	6.5	.3	.9	5.2	3.1	.6	.9
Northern district	72	90	63.6	74.5	16.8	8.4	1.9	2.4	5.2	3.7	.3	2.7
Average	69	92.9	61.6	77.4	18.5	5.7	.9	3	5.5	3.3	.4	1.3

The number of officers present at the posts and absent from inspections was exceedingly small. The Pacific district reported the least number of men, as compared with the total enlisted strength, on extra and special duty, and the Northern district the greatest number; the figures being three-tenths of 1 per cent and 3 per cent, respectively.

Apparently still further progress has been made during the past year toward uniting regimental organizations and concentrating the scattered troops. The following table shows the gradual increase in the number of companies, exclusive of Indians, at permanent and sub posts:

Year.	Number of posts.	Average strength.
1893	89	4.04
1894	88	4.09
1895	82	4.39
1896	80	4.50

Since 1893 the number of posts with garrisons of individual regiments has increased from 3 to 10, and of those with garrisons of more than a regiment from 1 to 4. The habit of responsibility which comes with independent command, and the skill and resourcefulness and endurance which experience gives in conducting a military force through natural difficulties or an enemy's country, does not depend wholly upon the size of the command; and our antebellum army acquired a knack and self-reliance, especially in the company grades, that we should in every way guard against losing now that the army is being concentrated into larger commands amidst restricting environment. There is something of good to be found in both types of soldierly training, and it will be the better for us if we can retain all there is of good in both.

Irregularities and deficiencies.

Under the operations of paragraph 875, Army Regulations, 1,141 irregularities and deficiencies were reported in the several inspection reports of posts. Of this number 413, or 36.1 per cent, were remedied, leaving 728 still existing, which at the next inspection will probably be found generally corrected as far as the powers of the local authorities will permit. Most of them are in a single district. All were reported as already remedied at certain posts in widely separated districts.

With the Army Regulations and orders as a guide, a classification of the 728 reported defects that are not yet remedied may not be an impracticable undertaking; for instance, 25.7 per cent appears to result from the condition of buildings and 9.3 per cent from the lack of proper instruction; but they usually refer to transient matters and situations, and are being remedied as promptly as possible, so their classification is unnecessary now.

Commissioned officers.

The reports indicate a very satisfactory state of affairs as to harmony and efficiency among the commissioned officers; and the number of all ranks serving at posts who possess zeal and ability of a high order and excel in the particular duties to which they have been assigned receives frequent recognition.

Enlisted men

The condition and character of the enlisted men appear to be generally satisfactory, and the growing improvement in the quality of the young men entering the Army, which has been so noticeable during the past few years, has not abated in the least. In many instances the recruits are said to be of excellent quality, and at only three posts is there any adverse criticism.

Discipline.

Both discipline and behavior have been generally reported to be very good. There appears to be about an average of 48.5 courts-martial per organization

and 138.8 per post. The maximum number of trials reported for any one cavalry regiment is 483 and the minimum 216. For the infantry the maximum is 429 and the minimum 189. The number of trials reported for the only regiment of artillery for which this data has been ascertained regimentally is 480. So far as reported the regiment of the three arms having the least number of trials during the year is the Twenty-third Infantry, with 189, and the one having the largest number was in another arm and had 483. In the minor organizations one infantry company appears with a total of two trials (summary), and the largest number reported, again in a different arm, was 111—100 summary and 11 general.

An analysis of the percentage of enlisted men not in confinement during the year for the three arms shows, so far as reported, that the general average for the Army is 77.6 per cent; for the cavalry, 82; for the artillery, 73.7, and for the infantry, 77.2 per cent. The best general and worst regimental averages are 87 and 65.8 per cent. Some of the higher troop, battery, and company records ranged as follows, viz: Cavalry, 99.6; artillery, 99.7, and infantry, 99 per cent.

Desertions.

The number of enlisted men who deserted during the year has been compiled for all posts and camps except six, and foots up 1,075, which gives an average of 14.5 per post. At Alcatraz Island, California, and Fort Duchesne, Utah, there were no desertions reported during the year.

Desertions reported during the fiscal year 1895–96.

District.	Total number.	Average per post.	Minimum.		Maximum.	
			Post.	Per cent.	Post.	Per cent.
North Atlantic	142	6 1	Fort Preble, Me	1.4	Fort Warren, Mass	14.7
South Atlantic	101	4.1	St Francis Barracks, Fla	1.6	Washington Barracks, D. C.	6.6
Middle	144	4 6	Fort Wayne, Mich	1.8	Jefferson Barracks, Mo	7.5
Pacific	133	3.4	Alcatraz Island, Cal Fort Duchesne, Utah	0	Fort Mason, Cal	12.1
Southern	205	4.4	Fort Apache, Ariz	1	Fort Hancock, Tex	10.1
Northern	350	5 6	Fort Custer, Mont	1.4	Fort Riley, Kans	12.5

From these reports the Pacific district has the least general average, 3.4 per cent, and the North Atlantic the greatest, 6.1 per cent. Of the three military posts having the largest number of desertions during the year, viz, Fort Warren, Mass., Fort Riley, Kans., and Fort Mason, Cal., it will be noted that the location of two of them is adjacent to large cities and the other one is in a thickly populated country. The quarters at Fort Warren, Mass., are in casemates; on the other hand, the quarters at Fort Riley are excellent and supplied with every modern convenience. Attention has been called frequently to the unsatisfactory condition of the casemates at Fort Warren, which have been reported "not fit for human habitation." Fort McPherson, Ga., and Fort Monroe, Va., with a difference in enlisted strength of only 18 men, and widely separated but having somewhat similar surroundings, have each reported 19 desertions, giving a percentage of 3.6 and 3.7, respectively. Fort Duchesne, Utah, one of the two posts with zero to represent the number of desertions, appears also to have the banner organization in this respect. The inspector states that Troop B, Ninth Cavalry, has not had a desertion for more than twelve years.

Instruction

The organizations are generally reported in a good state of instruction and a reasonable state of proficiency, and the regulations and orders have been complied with. The troops at 5 posts did not recognize readily the call "To arms," and at 14 posts instruction in hasty cover appears to have been neglected. Generally the facilities for practical instruction are reported ample and convenient with a few marked exceptions. Drill halls are reported needed at Fort Brady, Mich., Fort Sheridan, Ill., Fort Wingate, N. Mex., Fort Assinniboine, Mont., and Fort Wayne, Mich. The reports indicate that the number of men absent from drills was excessive at several posts. In the Atlantic districts the lack of proper and modern artillery equipment militates against thorough artillery instruction, and the practice in the principles of attack and defense were circumscribed. Subcaliber practice with the artillery promises similarly economical opportunity to acquire experience and skill in handling cannon effectively that gallery practice gave for musketry, but the artillery have not yet been given much advantage of it. The introduction of modern breech-loading cannon and pneumatic dynamite guns and the construction of others of still larger caliber and greater penetration or more rapid fire make familiarity with these weapons and their accessories of growing importance and their skillful and expeditious firing an absolute necessity. The time has come when the men behind the gun deserve increased attention. Much has been done, but more is needed.

One of the novelties of the year was the simple and ingenious method of studying the speed of the projectile within the bore of the cannon, introduced by Dr. A. C. Crehore and Lieut. G. O. Squier at Fort Monroe. Nothing but good results can be anticipated from the careful, original, and scientific study of exterior and interior ballistics, electricity, and high explosives which has within recent years added so much to the well-founded reputation of the artillery school.

Might not some military exercises be wisely adopted and practiced, at least at the annual general inspection, suitable to test and demonstrate the practical and general efficiency of the garrison artillery for actual and immediate defensive military service under the modern system? It could embrace the complete service of the cannon, torpedoes, magazines, range finding, means of rapid communication, field defenses, and the care and transport of the wounded, and all that is essential to a state of sudden war. The artillery is of course fully capable of meeting the test of simulated war, now so familiar to the other arms of the military service and recognized indeed among soldiers generally as the inspection that possesses the principal merit, if not the only acceptable test of military condition. The recent change in artillery armament has at some places been very radical, and thorough familiarity with, and instruction in, the new system are of the first importance. This has received some attention for the inspections of the current fiscal year; and this Department is more than ready to extend the same sound principles of inspection to all branches of the military service.

The scope of both the theoretical and practical military instruction appears to have been more comprehensive than in any preceding year and with promising efforts toward further improvement. In the cavalry, instruction in individual horsemanship has received general attention. The course of equitation as prescribed in the Cavalry Drill Regulations is being more thoroughly and more extensively applied than ever before. Wherever proper facilities exist this instruction has progressed systematically with reasonable success. The good results are

evidenced in the better horsemanship of the individual soldier and improvement in the training of the cavalry horse.

The system of training remounts needs attention and readjustment. It is not every man who can train a young horse, nor does every troop necessarily have on its rolls men skilled in this line; but it is probable that at every cavalry post at least one officer and enlisted men are available who have the kind of skill required. It is therefore suggested that, in the interest of good instruction and as a measure of economy, at each cavalry post a school for training remounts should be established under an officer, with the necessary assistants, selected for skill in training and handling young horses. While in this school horses should be bitted, suppled, gaited to the regulation paces, and accustomed to fire, they should not be turned over to the troops until the officer in charge reports them fit.

It might be better to organize these schools at regimental headquarters and concentrate all regimental remounts there, but the expense of collecting and redistributing them after training makes the post plan more feasible. If such a scheme of training remounts were adopted the efficiency of the cavalry would be much improved and the terms "vicious" or "unmanageable" as a cause for condemnation would rarely appear. It would not be very long before every regiment would have not only trained horses, but a certain number of officers and men skilled in the art. These schools would approximate to the depot system of foreign services.

While considering the improved type of training for the mounted service, it is natural to refer to "cavalry inspections."

To the principles laid down by General von Schmidt, General von Pelet-Narbonne, one of the leading cavalry experts of Germany, adds the following:

In the drill inspection of closed squadrons the first point to grasp is, that the foundation of all cohesion and precision of maneuver lies in the capacity of the squadron to ride straight to the front.

This riding "straight to the front" can only be attained when every rider has his horse well between his hands and legs, understands "pace," and, without turning his head to either flank, follows his troop leader at the prescribed distance, looking straight to his front. The degree of accuracy, therefore, attained in a simple advance is in itself a test of the value of the instruction imparted in individual horsemanship. But the required accuracy can not be obtained unless, before moving off, every horse stands absolutely square in the ranks, poised in hand, ready to move at the last sound of the word; hence the importance which attaches to accurate dressing when halted.

This riding "straight to the front" must be judged either from front or rear, never from flank. It is a good plan when the squadron has proceeded a few hundred yards to sound fours about, and note whether it returns to its original starting point; but this should be done unexpectedly, otherwise the troop leaders will soon find out some dodge of throwing dust in the inspecting officer's eyes.

The correct maintenance of the prescribed distance between the ranks is of the greatest importance; this must be judged from the flank.

Particular attention should be devoted to the endurance of the horses at the gallop. Five minutes at this pace is the least, even in heavy ground, to be followed by a charge well ridden home, after which the squadron disperses, rallies, and halts, whilst the inspector goes round the horses, noting heaving flanks, displaced kits, or any other sign of neglect or distress. During the gallop the riders must sit still and the horses move in long, steady strides, without crowding, pulling, or changing, all of which indicate waste of energy. The squadron should be maneuvered throughout the duration of the gallop, and, if possible, taken over reasonable obstacles.

The charge should be delivered absolutely en muraille, with no thought of a possible mêlée to follow. The enemy must be made to feel your determination to ride him down, not merely to mingle with him. The ranks must be kept clear and distinct, the troop leaders well to the front, and the pace regulated to the best speed of the slowest horse, which implies that up to the last the horses are still in hand.

The practice founded upon these principles is not untried, for an English officer writes in August, 1889, immediately after returning from the German parade ground on which the inspection took place, with the facts still fresh and vivid in his memory:

The first thing that struck me on riding down to the ground was the extraordinary precision with which the alignment was taken up—every horse dead square to the front, and when the line was called to attention every man took up his reins, collected his horse, and sat ready to obey the word of command. This is an important feature, for it is on this that the extraordinary precision with which a maneuver is commenced depends. Again and again, on subsequent occasions, I saw a whole brigade move off at a trot simultaneously, literally before the eye could sweep from end to end of the formation. Of the march past at a walk with which the proceedings began I need only notice that it was neither better nor worse than what we usually see; but the small horses looked altogether overweighted by their riders, and the want of smartness in the turn-out also unfavorably impressed me.

But all this was changed when they began to move. After the march past, the regiment was drawn up in line of squadron column at close interval. The "trot" was sounded, and they moved off with absolute precision, and, after advancing a couple of hundred yards, opened out by inclining to full intervals. Then they wheeled into half column of squadrons, and continued the advance in perfect order for about 400 yards, still trotting. Then followed "front form" and line to the front on the leading squadron, to effect which the rearmost squadron had a considerable gallop. A few more yards to the front to steady them down, and then they broke into column of divisions (Züge) to the left, and immediately afterwards the "gallop" sounded, and away they went at their full gallop of maneuver of 15 miles an hour without the slightest opening out. This pace was maintained for about 1,200 yards, then the head of the column wheeled to the right, and as soon as the tail of the column passed the wheeling point the "wheel into line" sounded, and the movement was executed with an accuracy I could hardly believe possible. The advance was continued some 300 yards, and then the "charge" sounded, and it was delivered almost like a wall; then mêlée and rally followed, and the regiment drew up in its original formation of line of squadron columns at close interval. I subsequently measured up the distance covered at the gallop on a large scale map, and could not make it less than 3,000 yards, take it any way I would.

The next operation was the debouching from a wood and charging infantry. The regiments, which, I should have mentioned, numbered five squadrons of 62 to 65 files, trotted off down one of the numerous cuts through the forest which borders the drill ground, and when all had well disappeared we heard the "halt" and "threes about"—the Germans still work by threes, and not by fours—and the next moment the "gallop" sounded. The regiment came out, not at the gallop, but at the charge. Each squadron front formed as it got room, and, selecting its own object about 600 yards from the wood, charged down on it at the fullest extended speed of their horses; and then all idea of the little horses being overweighted vanished from my mind. They came on like the fastest rush on a polo ground, though, of course, the lines were not so well closed up as before. I had to confess, infantryman as I am, that even repeaters would have had a poor chance of stopping the rush. Then followed a short halt without dismounting, and then three more long advances, ending with a charge, mêlée, and pursuit, were ridden. None of the advances were less than 2,000 yards, and in two out of the three the line was formed after the "gallop" had been sounded, and not whilst the heads of the columns were still trotting. The charges were beautifully ridden, boot to boot throughout. In only one point could I find an opening for criticism, viz, that the mêlée were hardly satisfactory, the men scarcely leaving the ranks, but only making a pretense of doing so. Probably, as it was only an infantry general inspecting them, they thought it safe to try a little "eye-wash." I must confess, however, that under no circumstances have I ever seen this part of the show as well done in Germany as I used to see the Eleventh Bengal Lancers do it in India.

The day wound up with a gallop past, for which I have nothing but praise. The squadrons swept by at their full 15 miles an hour, horses in hand, and that smooth, rythmical swing of the plumes (they wore plumes that day) which implies a total absence of wasted energy. One might live long at Aldershot and see nothing better. Next day I went down to see the brigade inspection. The brigade turned out two regiments of five squadrons each, the squadrons the same strength as the day before. After the march past the maneuvering commenced, as the third line of a division in line of squadrons at close interval, at a trot, and it would be difficult to imagine anything more perfect than the way they changed front and wheeled. There was no trace of raggedness anywhere. They looked just like two squares off a chessboard maneuvering about. Then came a repetition of the gallop to a flank in column of divisions (Züge) of the day before. For about 1,500 yards this tremendous column,

nearly half a mile long, moved with the same precision as the regiment had done. Then they simultaneously wheeled into half column to the left. Just at this moment the head of an infantry column emerged from the wood to the right rear, and the general commanding took them for his target. He sounded "Troops about," which brought them into half column right in front, and his gallopers flew. As the leading one reached the right-hand regiment I heard "Line to the front" sound, and the regiment formed to the front, not at the gallop of maneuver, but at racing pace, and went straight for the enemy. The three squadrons on the right of the second regiment completed their wheel, which brought them into column and enabled them to gain the rear of the first regiment, when they again wheeled into line and charged right into the mêlée of the first line, and the last two squadrons cantered up and halted as last reserve. I have never seen anything faster or more perfect than the way this attack was delivered.

The infantry, of course, had nothing to do with the performance, but were only coming out to drill, and therefore took no notice of the cavalry; but still, had it been an ordinary defile, the cavalry were down on them before 300 men had passed, and under such circumstances that even repeaters could not have given them more than an average of five shots, or 1,500 bullets, of which probably not 15 would have taken serious effect. The remainder of the inspection consisted of two more long advances and charges against a skeleton cavalry, all delivered with the same precision as the day before, and after a critique and final gallop past we all marched home together, the squadron leaders congratulating each other on having had two such easy days for their horses. And indeed, in comparison to the previous fortnight, they had been easy days, for they had had five days a week of from five to six hours a day, and on these two days the last squadron was back in barracks in three and a half hours only. It is difficult to estimate the ground actually covered, but to the drill ground and back was 8 miles, and in the hour and a half's maneuvering they had covered at least 12 more, or 20 in all. During the preceding period they could never have done less than 30 miles all told. Yet in spite of this the horses were in perfect condition, far superior to what I remember them at similar periods five and six years ago. Going round their stables afterwards, I was simply astounded at the condition of the animals' legs and sinews. Not a sign of overwork was there amongst them, the sick lines being nearly empty. Afterwards, in conversation with the officers who remembered the old pre-'70 days, I was assured that the improvement in the remounts and the way of managing horses had been so marked that whereas formerly it was difficult to make up one's mind as to which of horses ought to be cast, because they were all so miserable, nowadays it was difficult to find enough to cast, so few really being literally past work.

The same English officer writes concerning field artillery driving:

What we really require is a uniform standard of excellence throughout our batteries, so high that we can count on the delivery of, say, 20 batteries on a given point, perhaps 20 miles distant, in the least possible time and with the greatest possible certainty. Assuming moderate ground in the first place, the thing required to turn the fate of an action is the simultaneous appearance of from 10 to 20 batteries, at decisive range, over against the enemy's position.

For the last twenty-five years or more in Germany, ever since, in fact, Von Hindersinn took the matter in hand, the battery commanders have been working against one another to discover some system by which to insure the endurance of their horses under the strain that the requirement of modern tactics places on them, chief amongst which is the exact equality of every team, for no battery commander, when trotting out in column of route, with perhaps 10 batteries behind him, can afford to have a single team break down.

Under pressure of this necessity the German battery leaders have evolved for themselves a system of training which, judged by the results achieved, is above and beyond anything elsewhere attained.

It is based on the gymnastic training of the young horse to use his back muscles for draft purposes, and on careful stable management, apportioning accurately to every individual horse the amount of feed necessary to supply the waste of his own tissues, and maintaining each and all of them in the highest possible condition of training; indeed, it amounts to nothing less than accomplishing for every individual horse in the battery what the skilled trainer secures in the case of the young horses committed to his charge. (Journals R. U. S. I. and U. S. M. I.)

The lyceums and noncommissioned officers' schools have been carried on in accordance with the regulations and orders. The orders of department commanders have been noticeably full, exacting, and detailed, and their personal interest and attention have greatly developed, systematized, and perfected both drill and practice, such as reconnoissance.

As far as reported, the troops of 37 posts have had practice marches and encampments; others have had experience in camping, and a few have had practice marches only, while only a comparatively few have remained strictly sedentary. The Army received some practice in one or all of the important features of mobile military life in changing station, or in movements for instruction or target practice, etc. Time and money and restricted stations limit the training in the open field, which becomes far more necessary with a short-service army. Some of our Western stations are large enough if they can be retained and utilized for this essential practice, without which we may have soldiers, but hardly an army.

Army schools.

Perhaps no more marked change in routine military affairs has occurred since the last war than the type of instruction imparted and expected in the several arms of the service; and nothing could well be more interesting than its development, especially to this Department, which should possess special relations with the military instruction and discipline prevailing in the Army. Some pressing need was possibly indicated by the establishment of service schools for the heavy artillery at Fort Monroe in 1858; for the engineers at Willets Point in 1866; for the infantry and cavalry at Fort Leavenworth in 1881; for the cavalry and light artillery at Fort Riley in 1887, besides the several special schools like that for army surgeons at Washington City in 1893, and that for the Signal Corps originally at Fort Myer. Such prototypes as existed in the old Army doubtless did similar work and met with similar opposition to that existing to-day, whether company schools, post schools, service schools, noncommissioned officers' schools, lyceums, examination for promotion, essays, or what not. As our army organization possesses no higher strategic general staff, there is no staff school, which is made so important in European armies; nor do the schools for enlisted men show such perfect organization nor receive such assistance and fostering care nor attain such success as there. Whether schools, post graduate or otherwise, which make the highest demands upon the class attending them and promise the highest results and greatest benefit both to the instructed and the public service would be more unpopular than an inferior type is hardly a question of judgment.

We have had all sorts—good, bad, and indifferent—in our service, and such as we have were never better than, if indeed ever so good as, to-day. And if there is any better kind which we have not yet adopted ought we not to have them, even if it is a little hard upon the juniors who have to go through them? Opportunity and practice for our brightest military minds is a much more important preparation for future contingencies than any curriculum for the general average. Perhaps if we had one school that was not compulsory, but voluntary (say a school where the several arms were combined for the handling of mixed commands, and where some proper recognition could be bestowed certainly and justly upon any special ability displayed), it might find a field of usefulness and win as high esteem and popularity as the staff colleges of Europe. We can hardly rest entirely content as long as any other military force has developed any higher type of instruction than we possess, either for officers or enlisted men.

Minor tactics.

Twenty-three problems in minor tactics are shown by the reports to have been submitted for solution by the several inspectors at the date of their inspection of the posts. Of these, 19 were solved practically and the others theoretically. The exercises appear to have been generally satisfactory and

fairly creditable. How admirably this practice has been developed at some of the service schools is easily recognized in the mastery and grasp displayed by their élèves, both while at these schools and at their permanent stations or on such detached service as staff duty and at colleges. Neither a lack of enthusiasm, interest, intelligent comprehension, proper military forethought and preparation, nor tardy formations have been reported where they have had charge or direction of these military exercises and duties, and their best skill is frequently rivaled or surpassed by those whose experience was acquired in the school of actual war.

During the past year a very successful camp of instruction was held at Monterey, Cal., in which all the available troops stationed in the Department of California participated. The troops assembled for the sole purpose of practice in marching and camping and for instruction in the minor operations of war, guard duty being restricted to the least number of men consistent with the proper protection of camps and Government property, and the usual camp duties were made as light as possible. The careful modification of routine instruction at the posts, accompanied by such encampments, and the zealous practice of the usual requirements of campaign and battle give fair promise for the future. No army has had riper experience in all the responsibilities of rough and exacting military service in the past, nor learned better how to care for and give good account of itself in all the exigencies of military experience, and it is now due that all its excellent qualities and traditions shall be maintained amid circumstances that are rapidly and radically changing.

Post schools.

As far as reported, post schools for enlisted men and noncommissioned officers' schools appear to have been generally maintained throughout the Army. It may be a question whether any better results can be obtained by change of method, system, instruction, or supervision, and so insure that as complete military instruction shall be given to the enlisted men of our Army as to those of any other. At one post there was no school, and the post commander stated that none of his men needed such instruction. Excellent progress and satisfactory interest by the enlisted men are reported at some posts where these schools are of great value, and little or no interest manifested at an equal number. The buildings, rooms, and furniture have been subjects of some criticism at a number of posts.

The average daily attendance at post schools reported is found to be 10½ per cent of the enlisted strength present, or 30.9 men per post; and for the several districts it is as follows, viz: North Atlantic, 30; South Atlantic, 22.4; Middle, 55; Pacific, 21.7; Southern, 20; and Northern, 19.7. The three posts having the highest percentage of average daily attendance are Fort Hancock, Tex.; Benicia Barracks, Cal., and Key West Barracks, Fla.

Small arms target practice.

As far as reported target practice has been held at all posts except four, and the results appear to have given general satisfaction. Practice at moving targets, both with cannon or small arms, may still be improved, and the latter has not been very general throughout the service. It is certainly unfortunate that at comparatively new posts like Fort McPherson, Ga., and Fort Logan, Colo., this important duty should have been hampered by the lack of suitable target ranges. Classifications were not made universally in consequence of the change of the service arm.

Signaling.

The reports indicate that the provisions of paragraph 1544, Army Regulations, have been complied with and that greater proficiency seems to have been attained with the flag and torch than with the heliograph. If company commanders desire to impart instruction in signaling they can possibly find plenty of opportunities for doing so in harmony with the work of the officer detailed for the purpose at each post.

Paragraph 694, Army Regulations, authorizes signal corps sergeants to account for public property, and it is suggested that all the signal property at posts where the latter are stationed should be transferred to and accounted for by them. This would evidently simplify matters, reduce the number of papers, and obviate the necessity of a divided responsibility for the same class of property at the same post.

Hospital corps.

The reports indicate a very satisfactory state of affairs in respect to the efficiency of hospital corps men, and that this instruction is equal to and in many cases beyond the average standard of proficiency. Maj. J. P. Sanger, inspector-general, South Atlantic district, in his report of inspection of Fort Myer, Va., makes the following pertinent remarks concerning the equipment of the hospital corps, which are concurred in by the chief surgeon of the Department of the East and the commanding officer of the post:

> The knapsack packed of the hospital corps is entirely inappropriate for men whose most difficult work begins when the marching ends. It weighs 34½ pounds, and with the canteen filled, the haversack with three days' rations, the knife and dressing case, makes a total weight of 38 pounds. Some other arrangement should be devised for transporting these effects, or the corps should always be mounted.

Fire drill and protection against fire.

Organized fire departments appear to have been maintained at all posts from which reports have been received, and the practice instruction seems to be generally satisfactory, though in one or two instances the test resulted in a rather slow response to the alarm. At seven posts the pressure or supply of water has been reported insufficient, and at eight the appliances are reported inadequate. Fire engines are needed at several posts. The recent destructive fires at two of our Western posts, and the inflammable character of many buildings, emphasize the necessity of looking well to the condition that makes the organization effective.

Equipment of troops.

With the exception of half a dozen posts and field equipage for bands, the troops appear to be properly equipped and in readiness for field service; and the condition of the arms, accouterments, and equipments were generally reported excellent.

The cavalry has been equipped with the new carbine, caliber .30, model 1896, which appears to give general satisfaction except as to the absence of a wind gauge on the rear sight. A new scabbard or boot for carrying the carbine when mounted is now being issued.

Gymnasia.

Instruction in gymnastics in some form or other appears to have been given at about one-half of the military posts, and the tendency to recognize the importance of, and devote some attention to, having enlisted men acquire the art of swimming seems to be on the increase. At one post it has been reported that the commanding officer is determined to have all his men learn to swim. The percentage of posts having suitably equipped gymnasium buildings is much smaller than the importance of the subject would seem to warrant. That the physical development of the soldier is of the very highest importance—greater, perhaps, than in

any other single profession—will hardly be questioned, and the most approved way of securing it is by systematic athletic exercise under the direction of experienced instructors.

Messing.

The ratio of company to post messes is about as 4 to 1. The lack of complaints would appear to indicate that both systems have given very general satisfaction, although at stations where the post mess is in operation inquiry usually develops the fact that the old system of company messes is preferred. It would hardly seem probable that improved military instruction has been aided by freeing the company organizations from furnishing food for the men and running company gardens and messes, which demanded much attention before the increase of the ration and the establishment of canteens; and possibly there has been no such coincidence even at the discontinued recruiting depots where the general mess was first tried. At any rate, they can be considered separately now.

Drainage and sewerage.

The reports indicate the condition of the drainage and sewerage at the several posts is about as reported in former years. Some improvements are still urgently needed, and extensions of the systems are required, as at Fort Assiniboine, Mont., and Fort Robinson, Nebr. Eleven posts are reported in excellent sanitary condition, seven very good, fourteen good, and one satisfactory.

Bathing facilities.

The bathing facilities appear to be ample and convenient at a number of posts, and at others they are reported to be inadequate or need improvement. For instance, at Fort Du Chesne, Utah, the facilities were reported to be miserable and inadequate, and at Fort Brown, Tex., they were reported sufficient, but there were no hot-water connections with bathrooms.

Water supply.

Water is furnished by every variety of means, from wagon to pipe connection with city supply. It is sometimes a problem quite as difficult to solve satisfactorily as a perfect sewer system. At Fort Logan, near Denver, both the city connection and an air pump is in use, while at the Presidio of San Francisco the flume in use for so many years is broken nearly under the pneumatic-gun battery, though this novel, interesting, and expensive plant is still supplied from it, and rather a short supply has been furnished the post at times since the flume was broken and while the experimental system under development is being completed.

The supply of water has been reported insufficient at the following posts, viz: Fort Monroe, Va.; St. Francis Barracks, Fla.; Jefferson Barracks, Mo.; Fort Snelling, Minn.; Fort Canby, Wash.; Fort Douglas, Utah; Fort Du Chesne, Utah; Fort Apache, Ariz.; Fort Grant, Ariz.; Fort McIntosh, Tex., and Whipple Barracks, Ariz., and the quality has not been satisfactory at a few others. So far as reported, the cost of water at posts where it is supplied under contract ranges from 12½ to 40 cents per 1,000 gallons, and the consumption from 30 gallons at Fort Preble, Me., to 250 gallons at Fort Columbus, N. Y., per capita per day. It is probable that complete and accurate data for all the military posts would indicate a normal average daily consumption per capita. An average daily consumption of 100 gallons would not appear extravagant when compared with some of the large cities of the country. In the city of Washington, at a time when the demands should not have been above normal, careful measurements by reliable officials indicated a daily consumption of 173 gallons per capita.

Post exchanges.

These institutions were in operation at the time of the last reports of inspections at all posts except Fort Ethan Allen, Vt., Jackson Barracks, La., Key West Barracks, Fla., St. Francis Barracks, Fla., Angel Island, Cal., San Diego Barracks, Cal., Fort Brown, Tex., and Camps Eagle Pass, Texas, Merritt, Montana, and Pilot Butte, Wyoming. The first-named is located in a prohibition State, and it is understood that orders have been issued for the establishment of exchanges at Key West Barracks, Fla., and Angel Island, Cal. At Jackson Barracks, La., a post garrisoned by two batteries of artillery, one of the batteries maintained a company canteen, which was reported as doing a good business. There has been little or no discussion as to whether a company canteen by one organization is more advantageous and desirable at a post than the institution prescribed by the Regulations in the successful operation of which all the troops of the garrison could join and partake equally of the benefits derived therefrom; but some tendency seems to exist toward establishing sales and billiard tables, etc., in company barracks, though of no special utility for field service, which is one of the most acceptable tests of company methods and organization.

The following statement may indicate something concerning the range of profit reported in the exchanges:

Articles.	Average.	Maximum.	Place.
	Per cent.	*Per cent.*	
Beer	91.8	285	Fort Leavenworth.
Cigars	28.4	66	Fort Wingate.
Eatables	9	55	Fort Sam Houston.
Other articles	14.4	39	Presidio of San Francisco.

Perhaps the percentage of profit might be more nearly equalized throughout the Army if it is preferred to have all treated with fair uniformity. The data reported from 40 military posts indicate that the profit on beer is less than 100 per cent at 22 and 100 per cent or over at 18 posts. Fort Brady, Mich., is the only post in the Middle district where this profit is less than 100 per cent, the others ranging from 100 to 200. The general average for that district is found to be 128.6 per cent, which is 36.8 in excess of the general average for the Army, but on all other articles the district average is less than that for the Army. In the Southern district the opposite condition appears to prevail, as the average profit on beer, cigars, eatables, and all other articles is 59.3, 31.9, 11.4, and 14.5 per cent, respectively. Whether the profit should be regulated at all in such sales under Government supervision and how it should compare with subsistence sales, and what profit is fair, and how it should be distributed, has of course been carefully considered.

These institutions appear to be giving satisfaction, and their importance to the Army, even as an aid in the maintenance of good order and discipline, has received some study and recognition from various sources, especially by those most directly concerned. There are still criticisms in regard to the buildings occupied by some of them, which are reported limited, inadequate, or poor at a number of posts.

The inspection reports at 44 posts, scattered throughout all the inspection districts except the Pacific, show 99 civilian and 110 soldiers, or a total of 209 employees, with a monthly compensation of $5,238, giving about twice as much to the former as the latter. This is not quite five employees and $119.05 per month to each of these

exchanges. The largest number was reported at Fort Monroe, Va., where there were five civilians and four soldiers, with a compensation of $186 per month, giving $130 to the former and $56 to the latter. The post having the heaviest pay roll appears to be Fort Custer, Mont., where all the employees are civilians, and are designated and paid as follows, viz: Steward, $1,325; 2 salesmen, $780 each; 1 salesman, $540; 1 bartender, $540; 1 billiard-room attendant, $480; total, 6, at $4,445 per annum. The operations of the exchange were reported very satisfactory.

At Fort Grant, Ariz., Fort Stanton, N. Mex., Fort Custer, Mont., Fort D. A. Russell, Wyo., Fort Omaha, Nebr., and Fort Yellowstone, Wyo., all exchange employees were reported as civilians, while all were soldiers at Forts Hancock and McIntosh, Tex., San Carlos and Whipple Barracks, Ariz., and Fort Washakie, Wyo. Among the stewards reported still in active service, 1 is a quartermaster-sergeant, 1 is a chief trumpeter, 11 are sergeants, and 6 are corporals; and among those retired there is 1 commissary-sergeant and 5 sergeants. The number of exchanges having enlisted men as bartenders appears to be decreasing rapidly. A novel exchange feature is indicated by the following extract from the report of inspection of Fort McPherson, Ga., made by Maj. J. P. Sanger, inspector-general, South Atlantic district:

> A notable and profitable feature of the post exchange here, introduced by Captain Rice, is the hire of bicycles, of which the exchange has eight, and which are loaned at the rate of 10 cents an hour. As an inducement to a healthy and pleasant exercise this addition to the exchange is commended to notice. It might well be adopted by the other army exchanges.

Despite the sales by the Subsistence Department and post exchanges, it is reported post traders are still doing business at Fort Du Chesne, Utah, Fort Sill, Okla., and Fort Washakie, Wyo.

Public buildings.

The new buildings erected during the year appear to be giving very general satisfaction, and in their interior arrangements due attention seems to have been directed toward the incorporation of the most approved appliances and conveniences. When it is considered that the buildings that are now being erected at military posts are of a permanent character, of the most modern plan, requiring the expenditure of large sums of public money, it must be evident that too many safeguards can not be placed around the subject of their proper location and suitability; and an unbiased consideration of this matter with particular reference to economy, comfort, and health may indicate the wisdom of giving the opinion of department and post commanders consideration in determining the location and plan of buildings. A fair allowance of sun and untainted air is as much due every man as proper food; and the best way to supply it in fairly equal distribution is a recognized branch of study for the medical profession, and seems to deserve, and has doubtless received, careful study in buildings both for active and disabled soldiers.

Dormitories for soldiers are something more than their sleeping places; much of their daily life is spent around their barracks. Barrack plans giving more than two rows of beds seem to deprive men of their average ration of light and air; and when six or nine long rows of beds are reached, as at the National Home for Disabled Volunteer Soldiers, it seems increasingly questionable. Perhaps all has been done that is absolutely necessary, or could be done under the circumstances, with due consideration of proper economy; and artificial ventilation may be thought to adequately replace natural light and air;

but the old and probably the best design is still thought by some to be more satisfactory and comfortable, when only a double row of beds was allowed in a dormitory, and adequate light and air was given by a corresponding double row of windows.

For 26 military posts in three of the inspection districts, extending across the continent upon our southern border, the amount estimated for repairs, etc., was $123,520.84, allotted $54,472.72, and received $29,513.64. Of the amount estimated about 44 per cent, or not quite one-half, was allotted, and about 24 per cent received. The estimates from the South Atlantic district were largest, and average $6,578.44 per post. In the Southern the average per post was $5,735.36, and in the Pacific district $3,579.18. The minimum allotments and maximum estimate seemed to go hand in hand, so the most liberal allotments occur where the estimates were the lowest among these posts.

With few exceptions the officers and enlisted men are housed as well as can be desired or circumstances permit, and the comfortable and well appointed modern structures that gradually replace the buildings of half a century or more ago compare very favorably with those of the same class anywhere. The improvements in post buildings have been marked for a quarter of a century. The defects reported from time to time by inspectors have been brought to the attention of the proper authorities, and all that is possible seems to have been done to remedy objectionable features. It is submitted that the interests of the public service would be subserved by immediate liberal Congressional appropriations for new buildings rather than by expending large sums for constant repairs on some of the old and dilapidated buildings. In this connection the remarks of Col. H. W. Lawton, inspector-general of the Southern district, on the condition of the public buildings at Fort Grant and Whipple Barracks seem pertinent. Of the former he says:

> This post, like others of its class in this department, seems never to have been "constructed," but apparently to have "grown up" from a camp, as the necessities or the conveniences of the garrison demanded and in accordance with the ideas of the commanding officer or others most interested. The officers' quarters, while habitable, are neither convenient nor desirable. The barracks, with one exception, are not fit to more than shelter the men. The storehouses, shops, corrals, and in fact all other buildings at the post, with a few exceptions, are unsubstantial and unsuitable and not worth the money to make them satisfactory.

In regard to Whipple Barracks he reports:

> The condition of the buildings at this post is such that unless large sums of money are expended in the near future for their repair or rebuilding they will soon become uninhabitable. The barracks are already dilapidated, and, such as they are, are overcrowded, uncomfortable, and inconvenient. Some of the officers' quarters are little better. The general arrangement of the post is bad, rambling, and without any general plan. * * * Practically, if a garrison is maintained here indefinitely a new post must be constructed.

At a few of the artillery posts on the Atlantic coast casemates are still occupied for want of better accommodations.

The post hospital buildings are generally reported in satisfactory condition; indeed, the structures often seem decidedly in excess of any ordinary demands, and provide for an unusual exigency, though the reports indicate that new hospitals are needed at several posts.

The defects noted in other buildings, such as storehouses, noncommissioned officers' quarters, guardhouses, etc., have already been acted upon, and a detailed report here may not be necessary.

Married enlisted men.

In the Southern district the reports indicate that 5.7 per cent of the aggregate strength, or 273 enlisted men, are married, as follows, viz: Ninety-six sergeants, 19 corporals, 1 chief trumpeter, and 157 privates. If this percentage holds for the aggregate enlisted strength of all the inspection districts, the number of married enlisted men may be about 1,400.

Sleeping out of quarters.

In the Southern district 323 enlisted men have been reported as sleeping out of quarters, viz, 91 sergeants, 1 acting sergeant-major, 21 corporals, 7 musicians, 4 trumpeters, and 199 privates. This gives an average of not quite 18 men per post, and is 6.7 per cent of the aggregate enlisted strength. Applying the above percentage to the six inspection districts, the number indicated is about 1,600.

Census of posts.

The census of 41 posts shows a total of 3,712 non-military persons, or an average of about 90 per post. These are classified as follows: Officers' families, 1,149; enlisted men's families, 1,704; civilians, 484; unclassified, mostly Indians, 375. The three posts reporting the largest such census, Indians excepted, were the Presidio of San Francisco, 271; Fort Monroe, Va, 247, and Fort Sill, Okla., 185; and San Diego Barracks, Cal., Camp Eagle Pass, Texas, and Key West Barracks, Fla., report but 7, 8, and 12 persons, respectively.

SUPPLY DEPARTMENTS.

The purchase, distribution, and accountability of supplies of all kinds appear to have received very careful consideration by the responsible officers, and in many cases the performance of these important duties has been so thorough and complete as to call forth the most flattering commendatory remarks by inspecting officers. The following are some of the principal supplies taken up on returns during the year under the operations of army regulation 1063, viz: Three spring wagons, 1 boat, 37 summer coats, 1,209 cords of wood, 834,610 pounds of coal, 124,966 pounds of oats, 158,704 pounds of hay, and 5,380 gallons of oil. The following extract from the report of a post inspection made by Col. George H. Burton, inspector-general, Pacific district, may be of interest in connection with this subject:

> The post quartermaster intrusts the weighing of fuel, forage, and straw to a forage master. I observed during the inspection of this department that there was no surplus of importance found at the last quarterly inspection of these supplies. At a large majority of the posts inspected in this district there has been more or less grain, fuel, and mineral oil taken up as surplus from savings. In all cases such accumulations appear to have resulted from the personal weighing of such supplies when received by the quartermaster in person. * * * The money value of the contract for furnishing fuel, forage, and straw at a post of such magnitude is so great and the opportunities for collusion are so direct that no one short of a commissioned officer should stand between the contractor and the Government interests.

Quartermaster's Department.

The quartermaster supplies appear to have given very general satisfaction. Complaint at a single post of such an article as the campaign shoe, or the shelter-tent pins, or the mess ware but indicates how generally they are accepted as satisfactory. Complaints about the clothing seem to be less this year than formerly. It has been suggested that if the cloth and trimmings were issued in bulk the Government expense for cutting would be wholly eliminated and the expense to the soldier should be the same.

In the following list of nine articles it will be observed that the maximum cost of six of them occurs in Arizona Territory, viz, hard and soft coal, hay, oats, corn, and bran:

Articles.	Maximum cost.	Place.	Minimum cost	Place.
Hard wood ..per cord..	$10.00	San Diego Barracks	$1.70	Fort Ringgold.
Soft wood .....do....	7.25	Fort Ringgold	1.95	Fort Brady.
Hard coal ....per ton..	18.00	San Carlos.....	3.28	Fort McHenry.
Soft coal.....do....	40.00	Whipple Barracks.....	1.60	Jefferson Barracks.
Hay .....do....	30 20	Fort Apache.....	5.24	Fort Buford.
Straw .....do....	20.00	St. Francis Barracks	4.10	Fort Meade.
Oats .....per cwt..	2.34	Fort Apache.....	.83	Fort Riley.
Corn .....do....	2.64	.....do	.50	Do.
Bran .....do....	2.17	.... do	.21	Fort Wayne.

Reports of 51 posts show 445 civilian employees, receiving $23,000.92 per month. The heaviest disbursements are reported in the Northern district. The three posts with the largest number of employees and heaviest monthly pay rolls, respectively, are as follows, viz: Fort Bayard, N. Mex., 36, $1,535; Fort Riley, Kans., 27, $1,533.33, and Fort Sam Houston, Tex., 22, $1,448.67. There were no civilian employees reported at some posts, the necessary clerical work, labor, etc., being performed by soldiers.

The number of soldiers employed on extra duty in the Quartermaster's Department ranges from 45 at Fort Sam Houston, Tex., to 4 at Madison Barracks, N. Y., and Fort Stanton, N. Mex., and the general average reported per post is found to be 18. The reports indicate that at 47 posts there were 885 soldiers on extra duty, receiving an aggregate of $10,552.50 per month. This would give an average for these posts of $224.52 each.

The inspector-general on duty in the Southern district gives the following summary concerning the Quartermaster's Department therein:

Aggregate officers and enlisted men	5,264
Number on quartermaster duty.....	372
Extra-duty pay (daily).....	$140.80
Civilian employees.....	195
Pay of civilian employees (monthly).....	$8,379.17
Percentage of duty officers on quartermaster duty.....	5
Percentage of enlisted men on quartermaster duty.....	7.23
Mules.....	935
Vehicles.....	442
Men to 1 mule.....	5.11+
Men to 1 vehicle.....	11.05—

He also reports:

It has been observed that too much responsibility is thrown upon the post quartermaster-sergeant.

Since the policy of concentration has prevailed, and means of easy and frequent communication have been established, few stations exist where large accumulations are necessary or economical. It should be as great a fault for a quartermaster to have on hand articles not accounted for on his return as to have on his return articles not on hand. There exists now little necessity for supplying anything in advance or in anticipation of possible contingencies. The transfer of the accountability of all quartermaster property to the post quartermaster was a step in the way of curtailing returns and clerical work. From my experience in examining property submitted for condemnation it seems that the quantity has materially increased since the adoption of the present system.

I suggest that no property be turned back to the post quartermaster after having been issued for use, except on a list of said articles prepared and signed by the commanding officer of the organization having said articles in use, setting forth the time and character of use, this list to be submitted to the post commander, as, for

instance, knives, forks, and spoons broken into small pieces, axes upset at the head, showing that they had been used as sledge or stone hammers—in fact variations of this kind too numerous to mention.

The expenditures are perhaps as economical as in other branches of the service. It is an admitted fact that the administration of public affairs is more expensive than that of private individuals or enterprises. The business is more cumbersome, owing to the division of responsibility and system of checks, the hours of business fewer, and the fact that a force larger than is at all times required is maintained that capable and trained servants may be at hand when required.

Concerning the question of transportation, the subject of adopting the method practiced by private individuals of through billing, or of establishing a uniform rate over all lines by contract or otherwise, was considered; also the question of a uniform rate or ticket for all passenger travel. Some prominent transportation people were consulted, but their views were so discouraging that no scheme worthy suggesting was adopted. It would seem, however, that some better and more uniform system than that now practiced should be evolved.

Transportation.

The transportation is generally reported in excellent condition, except where constantly exposed to the elements from lack of sheds and buildings. The number of public animals is reported insufficient at 14 posts. The use of cavalry horses for policing purposes has been reported at several posts and at one post for draft purposes. Circular 9, A. G. O., 1883, provides that mules alone must be used for draft purposes. The price of horses is phenomenally low among civilians. The law requiring contracts for such purchases may prevent the Government benefiting as fully from the depressed market as if the purchases were made direct from the owners without the middleman's profits.

Subsistence Department.

With the exception of a very few and transient complaints about fresh beef, flour, and coffee, the subsistence stores appear to have been good and sufficient. The necessary labor of the department is performed by soldiers at all posts, so far as reported, except Washington Barracks, D. C., where there are 6 civilians, at $425 per month, instead of the depot which was maintained until recently. An examination of the reports shows an average of about 2 soldiers on extra duty per post, with 5 as the maximum and none as the minimum, the former at Fort Sam Houston, Tex., and Fort Logan, Colo., and the latter at Fort Stanton, N. Mex.

Since the wonderful success of the post exchange under the guidance of the Adjutant-General's Office there has been a diminution of the number of articles kept for sale by the Subsistence Department. The legislation (sec. 1144, Rev. Stat.) allowing these sales was wise and generous in its tone and did much to equalize the expense of rough, isolated, frontier stations with the more desirable eastern stations, practically without any excessive expense by the Government, and was intended to relieve the service and the soldier of the incubus imposed by the sutlers, whose profits and demoralizing influence became proverbial.

The law imposes upon this Department important duties similar to those which had pertained to it in connection with army sutlers; duties which have received constant and faithful attention and whose usefulness has not departed and can not soon expire. It is hoped its influence has been properly felt; and it is respectfully submitted that a law which has proved so beneficial to the enlisted force, especially upon frontier service, can wisely remain upon the statute books unchallenged, purely upon its own merits and without considering the effects of any former attempt to modify it.

Concerning this subject, Colonel Burton says:

"Paragraph 1285, Army Regulations, guards the Government from loss and at the same time protects the soldier in his rights guaranteed

by law. There are no officers in the Army better acquainted with the wants and needs of the soldier than the inspectors. There are none who know the soldier's supposed grievances, or who hearken more readily to his request for justice and the privileges which the War Department desires him to enjoy; hence there are no officials in the service who should be so fully equipped to represent to the Secretary of War the enlisted man's proper needs and how they should be bestowed. The law as it stands respecting sales to officers and enlisted men is wholesome, it works well, and it is appreciated by them, and it should not, in my judgment, be changed."

RETIRED ENLISTED MEN.

Perhaps a change in the law or rulings may be necessary to again relieve the enlisted men of the Army on the retired list from the 12½ cents monthly tax for the maintenance of the United States Soldiers' Home. These men have served thirty or more years and contributed during that time to the maintenance of the Home, and now their status seems somewhat anomalous in that they are compelled to pay a tax toward the support of an institution which has denied them admission, though ordinarily, under the provisions of section 4821, Revised Statutes, the benefits of the Home are extended to every soldier of the United States Army who has served faithfully for twenty years. It appears that soon after the retirement act for enlisted men was approved, February 14, 1885, the retired enlisted men were exempted from paying this tax (vide General Orders 55, H. Q. A., 1885), but in 1889 an amendment to the regulations was announced in General Orders, No. 43, H. Q. A., directing a monthly deduction of 12½ cents from their pay for support of the Home.

EXTENSION OF THE CIVIL SERVICE.

Section 1754, Revised Statutes, provides that "persons honorably discharged from the military or naval service by reason of disability resulting from wounds or sickness incurred in the line of duty shall be preferred for appointments to civil offices, provided they are found to possess the business capacity necessary for the proper discharge of the duties of such offices." Under Rule VII, section 2, of the Civil Service Rules, as revised May 6, 1896, all soldiers and sailors whose claims to preference under the provisions of section 1754, Revised Statutes, have been allowed by the Commission and who attain an average percentage of 65 or over shall be placed in the order of their average percentages at the head of the proper register of eligibles. It is earnestly recommended that steps be taken to have the section of the Revised Statutes referred to above so amended as to embrace all soldiers, sailors, and marines who have been honorably discharged from the service of the United States. It may not be necessary here to give in detail the advantages accruing to the Government, and especially the Army, by such a measure. It would be a rare incentive to good conduct, faithful service, and contentment, and fill our regiments with a desirable element; and this Government could secure for the civil branch employees whose habits of discipline and well-tested, trustworthy characters and patriotism, proved by hardships and honorable service under the flag, would give their services exceptionable value in whatever capacity they may be appointed.

INSPECTION OF UNSERVICEABLE PROPERTY.

For some years past the closest possible attention has been given to the inspection of the articles offered for condemnation in the Army. For the fiscal year ending June 30, 1896, 1,634 inventory and inspection reports were received at this office. This is 578 less than in the year 1895 and 748 less than in 1894.

Twelve hundred and sixty-seven inspections, or about 77 per cent of the total number, were made by officers of this Department, and 367, or 23 per cent, by officers especially designated.

While the number of the reports has decreased, the volume of the articles inspected and their approximate value indicate a decided gain over prior years.

The number of articles offered for inspection, including units of weights and measures, reached 4,879,121, and the original cost, approximately, was $1,332,206.50; and property which cost when new approximately $1,235,955.65 was condemned and $96,250.85 retained in service.

Last year the number of articles offered for inspection was 2,152,003; original value, $863,271.43. Of this amount $685,695.35 was condemned and $177,576.08 retained in service.

This year's reports show nearly 90 per cent to have the cost price given on a majority of the articles offered for condemnation.

In quartermaster supplies the reports show a considerable condemnation of hay, etc., caused in most cases from exposure to the weather. At Fort Meade 200 tons of hay, originally valued at $1,558, was condemned for being "rotten and mildewed," and at Assinniboine 100,000 pounds, 50 tons, were condemned as "rotten and worthless," and at this same post 50,000 pounds of coal were condemned for being in a slacked and powdered condition. At Logan 72,492 pounds of hay and 15,000 pounds of straw were condemned, damaged for want of proper protection, but it is understood that steps have been taken to provide sheds or ricks for the storage of such forage at this post. At Ringgold 14,500 pounds of hay were condemned and ordered dumped into the river, and corn, 2,523 pounds, oats, 2,498 pounds, and bran, 369 pounds, became infested with weevil and other vermin to such an extent as to be entirely worthless.

At the St. Louis clothing depot boots and shoes to the number of 13,125 pairs were condemned as "obsolete, mismated, and unfit for issue owing to a change in equipment," and ordered sold. These boots and shoes originally cost $28,650.41, as stated on the reports, or about $2.20 a pair. They were put up at auction and brought on an average 45 cents per pair. It is not known what per cent of similar stores are turned in to the depot in small lots from the various posts throughout the country, where probably as good prices at auction could be obtained; but an effort is being made to place some limit upon it or exercise some control over it, so as not to add the expense of transportation to the loss of forced sales.

In his report of inspection of the Philadelphia depot Major Sanger renews his recommendation of the preceding year in regard to the shipment of unserviceable property to the depot, as follows:

> I venture to again call attention to the recommendation made a year ago in regard to shipping to the depot unserviceable property and property no longer required for use but purporting to be serviceable. The practice still continues, to the detriment of the service and the proper and efficient administration of the arsenal. I acted as inspector on a large amount of such property, and while much of it would have been

perfectly serviceable at a military post, it was not fit for issue from the depot, because it would not have been received at any post as serviceable. As the practice referred to will no doubt continue as long as it is left to the discretion of inspectors or other officers, I recommend the issuance of an order from the War Department which will provide for the inspection, destruction, or sale of all unserviceable property at the place where it may be found, and the transfer to military posts or the sale of property and supplies no longer required for use. In exceptional cases, and only when express authority has been received, should such property be sent to this depot. It occupies room needed for other purposes; it makes a large and inconvenient demand on the services of the arsenal employees, already worked to their full capacity, and it involves needless expenditures in packing and transportation, for which neither its intrinsic nor marketable value is an equivalent.

This subject is also mentioned by Lieutenant-Colonel Vroom in his report of inspection of the Jeffersonville Depot, in connection with the shipment of property to depot for repairs, as follows:

My attention was invited to the fact that ranges and stoves are frequently shipped to this depot from posts for repair and reissue. It seems to me that this practice entails much unnecessary expense upon the Government and should be discontinued. The parts that must be used in making repairs are expensive and the cost of the repairs, added to the cost of transportation to the depot, frequently exceeds the original cost of the article. Ranges and stoves that can not be repaired at posts might better be sold.

In subsistence stores the amount condemned this year was valued at $2,617.57; last year it was $3,812.70. As observed last year the inspections of potatoes and the short time that elapses between their receipt and condemnation is conspicuous. As shown by the reports received in the fiscal year 1896, the condemnation of potatoes for that period reached 67,411 pounds. At one post (Grant) nine inspections of this article occurred and at another (Whipple) eight. A considerable percentage of these potatoes were purchased in Colorado, whose product is highly praised.

Two notable inspections in ordnance stores were made during the year, one at Springfield Armory, Mass., embracing articles on which the original cost is given as $298,986.73, and the other at Augusta Arsenal, Ga., which was nearly, if not quite, as large. The articles inspected at those places were principally accumulations of many years. Such accumulations occupy time and space, and are seldom beneficial in any way; and better prices can usually be obtained for goods if sold before long storage.

There were 168 inspections of engineer property this year, of an original value estimated to be about $496,254.40, while last year there were 127 reports acted on, and the estimated original cost was $251,032.67. Such articles as cups and saucers, sugar bowls, plates, etc., are frequently offered by engineer officers to inspectors for condemnation after they are broken and of no value whatever. Would it not be good policy to put at least a certain percentage of such articles on an expendable list, to be dropped when broken or worn out, without the action of an inspector, as is done in the Quartermaster's Department.

PUBLIC ANIMALS.

The number of public animals offered for condemnation during the fiscal year, as shown by the inventory and inspection reports received to June 30, 1896, was 1,514. One thousand three hundred and thirty-two, whose purchase price was about $179,055.61, were condemned, and 182, costing in the neighborhood of $25,325.69, retained in service.

Last year's reports showed 1,010 to have been offered for inspection during the year, and the purchase price was about $138,427.57. Sixty-six of these were retained in service.

A tabulation, by inspection districts, of the cavalry and artillery horses condemned during the year will be found hereunder.

It shows that cavalry horses to the number of 970, costing about $125,105.22, and 101 artillery horses, costing approximately $15,974.27, a total of 1,071 animals, whose purchase price was about $141,079.49, were condemned during the year. This number is one-sixth of the horses pertaining to the cavalry and artillery regiments in the Army.

In the Northern district about three-fifths of the 406 cavalry horses condemned were condemned by special inspectors, 84 as unmanageable, vicious, etc.

The average age reached by horses before condemnation is 12.9 years for cavalry horses, and 12.5 for artillery horses; one horse in the Northern district reached the age of 28, the oldest age reported.

The age at which the greatest number were condemned was 96 horses of 10 years of age, followed by 87 in their seventh year; and considering length of service when condemned, there were 97 animals near their fourth year of service, followed by 89 in their second.

Of the cavalry horses, those condemned in the Pacific district, with an average age of 14.7 years, seem to have reached the greatest age, while those condemned in the South Atlantic district, who have an average age of 11.3 years, were the youngest.

Nine artillery horses condemned in the Southern district had an average age of 18.2, while 11 in the Middle district reached an average age of only 7.3 years before condemnation.

The length of service of these animals, as near as can be determined, was 6.02 years for cavalry horses and 7.02 years for artillery horses. This would seem to indicate that artillery horses last just one year longer than cavalry horses.

Twenty-eight animals were condemned in the cavalry and 9 in the artillery before they had completed a year's service. Eight of these, in the artillery, in the Middle district, were condemned for the reason that they were "unfit for artillery service," and apparently did not see more than a few days' service. Eight cavalry horses in the Northern district are reported to have been about sixteen years in the service.

In most cases more than one blemish is assigned to each horse, making some 50 different classes. The maximum cause for condemnation was old age, for which 234 animals, or nearly 22 per cent of the total number, were condemned, and 214 animals, about 20 per cent, had lameness assigned as the cause. One hundred and fifty-six were condemned for being runaways, unmanageable, and vicious. This would seem to indicate a defect in the system of inspection prior to purchase or an insufficient system of training. In the Northern district, where the vicious and unmanageable horses appear in the largest numbers, "range horses" have been purchased. These horses are of the broncho strain, unsuited to cavalry purposes on account of the difficulty of training them and keeping them in a state of training. A few days' rest will undo many days' hard work and labor on the part of the trainer and the broncho tricks will reappear. Horses of this kind should not be purchased for the cavalry, as the injury they do the men is not to be measured in money; and the number condemned for viciousness and the damage they do adds much to their original cost. Much has been and is being done to improve the quality and suitability of the horses purchased, and an equally earnest and successful effort is shown toward improving the care and training of the horses after they enter the service; so definite items under the old system may have only a fleeting interest.

ACCOUNT OF SALES AT AUCTION.

It appears that the requirements of paragraph 679, Army Regulations, are not generally known to the officers making such sales, as the reports received pertaining to several of the departments have been very few in number.

UNGARRISONED POSTS.

The biennial inspection of the ungarrisoned posts in New England and New York has been made during the year, and they have usually been reported in satisfactory condition. A large supply of old powder was reported at Dutch Island, R. I., Fort Griswold, Conn., and Fort Winthrop, Mass., which the inspector thinks should yet be utilized for firing the morning and evening gun at military posts. Four 12-pounder guns were reported lying idle at Fort Constitution, N. H., which possibly might be put to practical use elsewhere whenever it may appear more feasible or desirable to fill requisitions from stores which have already been issued to such posts.

INSPECTION SERVICE.

The work done by this department during the past year under the new system of inspection districts has been fairly complete and very satisfactory, though there were fewer officers to do it and less miles traveled.

The Army is reported in as good a condition as ever in respect to instruction, discipline, and equipment, as well as quality and quantity of supplies. Considerable attention has been given by inspectors to problems in minor tactics and training in the field, which, under the present short-service term, have become more pressing and important, and much care has been bestowed upon the most economical disposition of property and public animals submitted for the action of an inspector. The progressive spirit of the recent orders concerning lyceums, practice marches, advance and rear guards, reconnoissance and outposts, and other field exercises warrants the hope that the reports a year hence will continue as satisfactory as they have been in the past.

Respectfully submitted.

J. C. BRECKINRIDGE,
Inspector-General.

The COMMANDING GENERAL, UNITED STATES ARMY.

CAVALRY AND ARTILLERY HORSES CONDEMNED, FISCAL YEAR 1896.

Table showing number of animals, value when purchased, age at condemnation, length of service, and cause of condemnation. Inspected by regular and special inspectors.

REPORTED AGE AT CONDEMNATION.

Designation.	Number of animals.	Value when purchased.	Years.																									Not given.	Average.
			4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28		
North Atlantic district:																													
Cavalry	43	$6,213.79	..	..	..	2	3	1	7	6	4	1	4	1	2	2	1	..	2	2	2	1	..	..	1	..	..	1	13.7
Artillery	27	4,338.50	..	..	1	1	3	3	1	1	..	2	3	3	3	3	1	1	..	..	..	..	1	..	..	..	..	..	13.3
Total	70	10,552.29	..	..	1	3	6	4	8	7	4	3	7	4	5	5	2	1	2	2	2	1	1	..	1	..	..	1	....
Average {Cav.	.....	144.51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Average {Art.	.....	160.68	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
South Atlantic district:																													
Cavalry	58	7,475.83	..	3	4	5	6	5	5	7	3	2	3	4	2	4	1	1	3	..	..	..	..	..	..	..	..	..	11.3
Artillery	13	2,206.99	..	..	..	..	1	..	..	1	1	1	2	..	4	1	1	..	..	..	..	..	..	..	..	..	..	..	14.2
Total	71	9,682.82	..	3	4	5	7	5	5	8	4	3	5	4	6	5	2	1	3	..	..	..	..	..	..	..	..	1	....
Average {Cav.	.....	128.89	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Average {Art	....	169.77	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Middle district:																													
Cavalry	57	7,344.52	..	..	1	1	5	5	14	2	3	2	5	4	3	2	2	2	2	..	1	..	..	..	..	..	..	3	12.4
Artillery	11	1,374.00	..	4	2	2	..	..	2	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7.3
Total	68	8,718.52	..	4	3	3	5	5	16	2	3	2	5	5	3	2	2	2	2	..	1	..	..	..	..	..	..	3	....
Average {Cav.	.....	128.85	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Average {Art.	.....	124.91	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Northern district:																													
Cavalry	406	49,960.30	4	3	17	32	25	38	32	29	26	20	22	21	32	23	23	11	14	5	8	4	4	3	1	..	1	8	12.9
Artillery	15	2,401.18	..	..	1	1	1	1	2	..	..	1	3	..	..	..	2	2	..	1	..	..	..	..	..	..	..	..	13.3
Total	421	52,361.48	4	3	18	33	26	39	34	29	26	21	25	21	32	23	25	13	14	6	8	4	4	3	1	..	1	8	....
Average {Cav.	.....	123.05	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Average {Art.	.....	160.08	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Southern district:																													
Cavalry	321	42,573.19	..	2	10	39	23	14	21	20	24	14	22	19	15	18	25	9	13	4	3	2	..	..	1	..	..	23	12.7
Artillery	9	1,330.00	..	..	..	..	..	..	..	..	..	..	1	..	..	1	4	..	2	1	..	..	..	..	..	..	..	..	18.2
Total	330	43,903.19	..	2	10	39	23	14	21	20	24	14	23	19	15	19	29	9	15	5	3	2	..	..	1	..	..	23	....
Average {Cav.	.....	132.63	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Average {Art.	.....	147.77	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Pacific district:																													
Cavalry	85	11,537.59	..	3	3	2	2	..	8	2	5	8	6	5	11	8	3	3	4	5	1	2	..	1	..	1	..	2	14.7
Artillery	26	4,323.60	..	2	2	2	5	3	4	2	..	..	..	1	..	1	1	1	2	..	..	..	..	..	..	..	..	..	10.5
Total	111	15,861.19	..	5	5	4	7	3	12	4	5	8	6	6	11	9	4	4	6	5	1	2	..	1	..	1	..	2	....
Average {Cav.	.....	135.73	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Average {Art.	.....	166.29	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Aggregate	1,071	141,079.49	4	17	41	87	74	70	96	70	66	51	71	59	72	63	64	30	42	18	15	9	5	4	3	1	1	38	....
Recapitulation:																													
Cavalry	970	125.105.22	4	11	35	81	64	63	87	66	65	47	62	54	65	57	55	26	38	16	15	9	4	4	3	1	1	37	12.9
Artillery	101	15,974.27	..	6	6	6	10	7	9	4	1	4	9	5	7	6	9	4	4	2	..	..	1	..	..	..	..	1	12.5
Grand total	1,071	141,079.49	4	17	41	87	74	70	96	70	66	51	71	59	72	63	64	30	42	18	15	9	5	4	3	1	1	38	....

Table showing number of animals, value when purchased, etc.—Continued.

REPORTED LENGTH OF SERVICE.

Designation.	Number of animals.	Value when purchased.	Years. Less than 1 year.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Not given.	Average.
North Atlantic district:																						
Cavalry	43	$6,213.79	....	..	5	1	3	5	5	8	4	...	...	...	2	...	1	...	...	...	9	6.1
Artillery	27	4,338.50	....	1	2	2	2	4	...	2	2	2	4	2	...	2	1	...	...	...	1	7.3
Total	70	10,552.29	....	1	7	3	5	9	5	10	6	2	4	2	2	2	2	...	...	...	10	....
Average {Cav.	.....	144.51	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Average {Art.	.....	160.68	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
South Atlantic district:																						
Cavalry	58	7,475.83	3	1	3	2	2	2	1	...	2	2	1	...	1	...	1	...	...	...	37	5.9
Artillery	13	2,206.99	....	..	..	1	..	..	..	1	1	1	1	...	..	..	..	..	..	..	8	7.4
Total	71	9,682.82	3	1	3	3	2	2	1	1	3	3	2	...	1	...	1	...	...	...	45	....
Average {Cav.	.....	128.89	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Average {Art.	.....	169.77	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Middle district:																						
Cavalry	57	7,344.52	2	3	5	9	5	...	9	3	1	2	3	1	...	1	...	...	...	...	13	5.1
Artillery	11	1,374.00	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	....
Total	68	8,718.52	10	3	5	9	5	...	9	3	1	2	3	1	...	1	...	...	...	...	16	....
Average {Cav.	.....	128.85	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Average {Art.	.....	124.91	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Northern district:																						
Cavalry	406	49,960.30	17	38	32	30	41	27	21	28	15	27	19	3	7	6	4	3	8	...	80	5.8
Artillery	15	2,401.18	....	1	1	1	3	1	1	1	...	1	...	...	...	4	...	...	...	...	1	6.9
Total	421	52,361.48	17	39	33	31	44	28	22	29	15	28	19	3	7	10	4	3	8	...	81	....
Average {Cav.	.....	123.05	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Average {Art.	.....	160.08	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Southern district:																						
Cavalry	321	42,573.19	3	29	36	16	30	7	27	37	14	21	11	17	12	4	5	...	...	...	52	6—
Artillery	9	1,330.00	....	..	..	..	..	....	1	...	1	...	...	1	...	6	...	...	...	...	....	11.4
Total	330	43,903.19	3	29	36	16	30	7	28	37	15	21	11	18	12	10	5	...	...	...	52	....
Average {Cav.	.....	132.63	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Average {Art.	.....	147.77	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Pacific district:																						
Cavalry	85	11,537.59	3	5	1	5	4	10	7	5	5	3	4	6	3	8	3	2	...	...	11	7.8
Artillery	26	4,323.60	1	3	4	2	7	3	...	...	1	...	...	...	4	1	...	...	...	...	....	5.2
Total	111	15,861.19	4	8	5	7	11	13	7	5	6	3	4	6	7	9	3	2	...	...	11	....
Average {Cav.	.....	135.73	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Average {Art.	....	166.29	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....
Aggregate	1,071	141,079.49	37	81	89	69	97	59	72	85	46	59	43	30	29	32	15	5	8	...	215	....
Recapitulation:																						
Cavalry	970	125,105.22	28	76	82	6	85	51	70	81	41	55	38	27	25	19	14	5	8	...	202	6.02
Artillery	101	15,974.27	9	5	7	6	12	8	2	4	5	4	5	3	4	13	1	...	...	...	13	7.02
Grand total	1,071	141,079.49	37	81	89	69	97	59	72	85	46	59	43	30	29	32	15	5	8	...	215	

Table showing number of animals, value when purchased, etc.—Continued.

Designation.	Number of animals.	Value when purchased.	CAUSE OF CONDEMNATION. Abscess and anæmia.	Blind.	Blind staggers.	Broken down.	Broken leg.	Burned.	Clumsy.	Cribber.	Elephantiasis and exostosis.	Farcy.	Foundered.	Fistula.	Fits.	Fractured jaw.	Glanders.	Heart disease.	Insane.	Lacerated tongue.	Lameness (chronic).	Near sighted.	No gait.	Old age.	Paralyzed.	Plug.	Rheumatism.	Ringbone.
North Atlantic district:																												
Cavalry	43	$6,213.79	..	1	..	6	..	..	..	..	..	..	1	..	..	1	..	..	2	..	4	..	..	4	..	..	..	..
Artillery	27	4,338.50	..	..	..	4	..	..	..	..	..	..	..	..	..	..	..	..	1	..	7	..	..	4	..	..	4	..
Total	70	10,552.29	..	1	..	10	..	..	..	..	..	..	1	..	..	1	..	..	3	..	11	..	..	8	..	..	4	..
Average {Cav.		144.51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Average {Art.		160.68	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
South Atlantic district:																												
Cavalry	58	7,475.83	1	1	..	1	..	..	..	..	..	..	2	..	..	..	..	..	..	..	12	1	..	10	..	..	1	..
Artillery	13	2,206.99	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	4	..	..	7	..	..	..	..
Total	71	9,682.82	1	1	..	1	..	..	..	1	..	..	3	..	..	..	..	..	..	..	16	1	..	17	..	..	1	..
Average {Cav.		128.89	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Average {Art.		169.77	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Middle district:																												
Cavalry	57	7,344.52	..	1	..	14	..	1	..	..	..	..	2	1	..	..	..	1	..	..	16	..	..	2	..	..	1	1
Artillery	11	1,374.00	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Total	68	8,718.52	..	1	..	14	..	1	..	..	..	..	3	1	..	..	..	1	..	..	16	..	..	3	..	..	1	1
Average {Cav.		128.85	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Average {Art.		124.91	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Northern district:																												
Cavalry	406	49,960.30	..	18	2	39	1	..	..	2	1	1	9	4	1	4	..	..	2	1	64	..	..	84	2	..	19	2
Artillery	15	2,401.18	..	..	..	2	..	..	1	1	..	..	..	..	..	..	..	..	..	..	9	..	..	2	..	..	..	..
Total	421	52,361.48	..	18	2	41	1	..	1	3	1	1	9	4	1	4	..	..	2	1	73	..	..	86	2	..	19	2
Average {Cav.		123.05	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Average {Art.		160.08	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Southern district:																												
Cavalry	321	42,573.19	1	17	..	23	..	1	..	2	1	..	27	..	..	..	..	..	3	..	72	..	1	82	..	1	3	7
Artillery	9	1,330.00	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	6	..	..	..	..
Total	330	43,903.19	1	17	..	23	..	1	..	2	1	..	27	..	..	..	..	..	3	..	74	..	1	88	..	1	3	7
Average {Cav.		132.63	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Average {Art.		147.77	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Pacific district:																												
Cavalry	85	11,537.59	..	2	..	3	..	..	1	1	..	1	2	..	..	2	1	..	..	..	18	..	..	29	..	..	..	1
Artillery	26	4,323.60	..	..	..	5	..	..	1	..	..	..	1	..	..	..	..	..	..	..	6	..	..	3	..	..	..	..
Total	111	15,861.19	..	2	..	8	..	..	2	1	..	1	3	..	..	2	1	..	..	..	24	..	..	32	..	..	..	1
Average {Cav.		135.73	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Average {Art.		166.29	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Aggregate	1,071	141,079.49	2	40	2	97	1	2	3	7	2	2	46	5	1	7	1	1	8	1	214	1	1	234	2	1	28	11
Recapitulation:																												
Cavalry	970	125,105.22	2	40	2	86	1	2	1	5	2	2	43	5	1	7	1	1	7	1	186	1	1	211	2	1	24	11
Artillery	101	15,974.27	..	..	..	11	..	..	2	2	..	..	3	..	..	..	..	..	1	..	28	..	..	23	..	..	4	..
Grand total	1,071	141,079.49	2	40	2	97	1	2	3	7	2	2	46	5	1	7	1	1	8	1	214	1	1	234	2	1	28	11

Table showing number of animals, value when purchased, etc.—Continued.

CAUSE OF CONDEMNATION—Continued.

Designation.	Number of animals.	Value when purchased.	Runaways and unmanageable.	Sore back.	Spasm of diaphragm.	Spavin.	Spine injured.	Stallion.	Stove up.	Stump sucker.	Sway back.	Too heavy.	Ulcerated jaw.	Unfit for cavalry service.	Unfit for artillery service.	Unsound eyes.	Vicious.	Weak back.	Weakness of bladder.	Weak kidneys.	Weak knees.	Wind broken.	Worn out.	Poll evil.
North Atlantic district:																								
Cavalry	43	$6,213.79	3	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	2	1	16	..
Artillery	27	4,338.50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	6	..
Total	70	10,552.29	3	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	2	2	22	..
Average {Cav.	..	144.51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Average {Art.	..	160.68	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
South Atlantic district:																								
Cavalry	58	7,475.83	15	..	..	..	..	..	3	..	..	..	..	..	..	2	1	2	..	..	..	6	..	..
Artillery	13	2,206.99	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	71	9,682.82	15	..	..	..	..	..	3	..	..	..	..	..	..	2	1	2	..	..	..	6	..	..
Average {Cav.	..	128.89	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Average {Art.	..	169.77	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Middle district:																								
Cavalry	57	7,344.52	5	3	1	1	..	..	2	..	..	..	..	1	..	..	2	1	..	..	..	1	..	..
Artillery	11	1,374.00	..	..	..	..	..	..	..	..	..	..	..	..	..	8	..	..	..	..	..	1	..	..
Total	68	8,718.52	5	3	1	1	..	..	2	..	..	..	..	1	8	..	2	1	..	..	..	2	..	..
Average {Cav.	..	128.85	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Average {Art.	..	124.91	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Northern district:																								
Cavalry	406	49,960.30	61	6	..	13	..	1	21	1	2	..	..	..	..	23	..	..	..	3	..	10	9	..
Artillery	15	2,401.18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	421	52,361.48	61	6	..	13	..	1	21	1	2	..	..	..	..	23	..	..	..	3	..	10	9	..
Average {Cav.	..	123.05	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Average {Art.	..	160.08	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Southern district:																								
Cavalry	321	42,573.19	25	10	..	7	1	1	10	..	..	2	1	..	..	8	3	..	..	1	1	6	3	1
Artillery	9	1,330.00	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	330	43,903.19	25	11	..	7	1	1	10	..	..	2	1	..	..	8	3	..	..	1	1	6	3	1
Average {Cav.	..	132.63	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Average {Art.	..	147.77	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Pacific district:																								
Cavalry	85	11,537.59	8	..	..	..	1	..	8	..	..	..	..	..	..	..	..	..	1	..	..	2	4	..
Artillery	26	4,323.60	2	..	..	1	..	..	5	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..
Total	111	15,861.19	10	..	..	1	1	..	13	..	..	..	..	..	..	1	..	1	1	..	2	4	..	
Average {Cav.	..	135.73	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Average {Art.	..	166.29	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Aggregate	1,071	141,079.49	119	20	1	22	2	2	49	1	2	2	1	1	8	2	37	6	1	5	3	28	38	1
Recapitulation:																								
Cavalry	970	125,105.22	117	19	1	21	2	2	44	1	2	2	1	1	..	2	36	6	1	4	3	26	32	1
Artillery	101	15,974.27	2	1	..	1	..	..	5	..	..	..	..	..	8	..	1	..	..	1	..	2	6	..
Grand total	1,071	141,079.49	119	20	1	22	2	2	49	1	2	2	1	1	8	2	37	6	1	5	3	28	38	1

Table showing number of animals, value when purchased, etc.—Continued.

NUMBER OF INSPECTIONS REPORTED IN EACH DISTRICT.

Inspection districts.	Made by regular inspectors.	Made by special inspectors.	Total.
North Atlantic	4	4	8
South Atlantic	19	3	22
Middle	11	2	13
Northern	27	38	65
Southern	22	19	41
Pacific	9	10	19
Total	92	76	168

Average price of cavalry horse condemned, $128.98 = $21.49 + per annum of work, approximately.
Average price of artillery horse condemned, $158.16 = $22.59 + per annum of work, approximately.

REPORT OF MAJ. GEN. THOMAS H. RUGER.

HEADQUARTERS DEPARTMENT OF THE EAST,
Governors Island, New York City, September 16, 1896.

SIR: I have the honor to submit report, as follows, of operations and occurrences in this department since the date, August 31, 1895, of the annual report for 1895, made by Maj. Gen. Nelson A. Miles, then commanding this department; also to offer some remarks and suggestions.

No military operations distinctively have taken place, but the cavalry garrisons and most of those of infantry have or will soon have had practice marches and limited instruction in field exercises away from their stations. Some organizations have had service in association with the troops of different States at encampments of instruction, as follows:

CAVALRY.

Troop G, Third Cavalry, Fort Ethan Allen, Vt., encamped with the New Hampshire National Guard at Concord, N. H., from June 8 to 12, 1896.

Troops E and C, Sixth Cavalry, Fort Myer, Va., encamped with the Pennsylvania State troops at Lewiston, Pa., from July 21 to 25, 1896.

Troop F, Third Cavalry, Fort Ethan Allen, Vt., encamped with the National Guard, State of New York, at Peekskill, N. Y., from July 30 to August 15, 1896.

Troop C, Third Cavalry, Fort Ethan Allen, Vt., encamped with the National Guard of Vermont at Burlington, Vt., from August 18 to August 21, 1896.

ARTILLERY.

Band and Battery G, Second Artillery, and Light Battery B, Fourth Artillery, Fort Adams, R. I., encamped with the Rhode Island Militia at Quonset Point, R. I., from July 7 to 10, 1896.

Light Battery C, Third Artillery, Washington Barracks, D. C., encamped with the Pennsylvania State troops at Lewiston, Pa., from July 21 to 25, 1896.

Light Battery K, First Artillery, Fort Hamilton, N. Y., encamped with the National Guard, State of New York, at Peekskill, N. Y., from August 7 to August 15, 1896.

INFANTRY.

Seventeenth Infantry, Columbus Barracks, Ohio, encamped with the National Guard of Ohio at Camp Moses, Cleveland, Ohio, from July 20 to August 26, 1896.

Companies D and F, Twenty-first Infantry, Plattsburg Barracks, N. Y., encamped with the National Guard of Vermont at Burlington, Vt., from August 18 to August 21, 1896.

This association of the troops with State forces for purposes of instruction has been productive of good results not only with reference to the

immediate purpose, but in promoting desirable good feeling between the troops and State organizations. It seems needless to say that hereafter, as heretofore, such association should be favored. It is especially desirable that opportunity should be afforded State artillery organizations for practical instruction with the seacoast defensive armaments. But few of the States, for evident reason, have organizations of heavy artillery. It would, I think, be well that action be had to induce in each State in which there are seacoast defensive works the designation of a regiment or of certain companies of the State troops as heavy artillery without abandonment necessarily of their instructions in general as infantry.

The instruction of the troops in this department is in general satisfactory under existing conditions of comparatively small isolated commands.

The chief desideratum now in respect to instruction, for the infantry and cavalry in particular, is periodical assemblages of sufficient forces of infantry, with proper proportions of cavalry, light artillery, engineer troops, and other organizations added for illustration of the operations and maneuvers of at least the division of infantry with the other arms in connection.

The Military Academy at West Point, the schools of application for engineers at Willets Point, for artillery at Fort Monroe, for infantry and cavalry at Fort Leavenworth, the practical schools for cavalry and light artillery at Fort Riley, and the supplemental yearly theoretical instruction and practical applications at the various posts, are, within their spheres, effective of their principal object, the training of officers for command in war. But considered as a whole the system lacks the final necessary element, that of illustration of the principles and methods taught by forces sufficient for proper representation in respect to command and direction of troops in war.

The efforts heretofore made to assemble troops for field exercises, depending upon funds available from appropriations, have been meager in results compared with necessities; nor does it seem that more effective outcome in such regard can be expected in future unless provision shall be expressly made for the purpose. I would suggest, therefore, whether it is not advisable that recommendation be made for a definite provision of a suitable sum by appropriation for the purpose of transportation and other necessary expenses for assemblages of troops for field instruction. Nor should the purpose be confined to collection of the regular forces only. It should include the intent of joining with them the organized forces of the different States within their respective limits for combined instruction, so far as might be practicable, by cooperative action of the State authorities.

The result of trial would doubtless be so evidently beneficial relative to both the troops and State forces that continuing appropriations would be deemed necessary as a matter of course.

The time is but short when, peace continuing, no officers remaining on the active list of the Army will have had opportunity for command of or even observation in our own country of military exercises by any considerable body of troops, and thereafter, unless something effective is meantime done to prevent, the officers of the higher grades even in the Regular Army will have had only elementary experience in field exercises, whilst possibly in case of war the maneuvers of the division and corps will have been a familiar practice to our enemy.

Present provision for field practice of the light batteries is insufficient. The school at Fort Riley answers very well the purpose for the

batteries assembled there, but all should have yearly practice on ground of sufficient extent and variety of surface to admit of free movements and firing without concern as to limit to simulate light artillery action in battle. Suitable ground, of little value for agricultural or other use, might be had at comparatively small cost and in convenient location for use by the batteries at eastern stations. Eventually, also, as garrisons may be withdrawn from stations no longer required, the ground obtained might be used for a large garrison under a general officer, to which several regiments of infantry, one of cavalry, and light batteries might be sent in turn for one or two years' stay, to constitute practically a training school, which would be of the greatest advantage for preparing our younger officers for the duties of command which will in due time devolve upon them and which in any case the country will expect them to perform worthily, even the highest, in time of war. After the first cost for buildings the expense consequent would be less than is now the case in maintaining a number of comparatively small and scattered garrisons.

Practice has been had by some and is in progress by other of the garrisons of heavy artillery with the new high-power guns and mortars at the stations where they are in position. Such practice has been generally satisfactory in result. It has demonstrated that facility in operating the appliances for use of such guns is readily acquired by the men of the batteries when intelligently directed.

It seems almost superfluous to allude in this report to the necessity for an increase of the artillery force, so fully has the case been presented in reports heretofore submitted by the War Department. The present force is inadequate as a reliable basis for the event of war with a maritime power. The most pressing need, I think, in respect to the personnel of the Army is an increase of the artillery force.

No special remarks respecting discipline or administration seem called for in this report; the condition as to both has not varied during the year from the usual general good state.

The present condition and expectable progress in construction of the seacoast defensive works and the armament of the same at the various points fixed therefor in this department will necessarily be fully presented in reports by the chiefs of engineers and ordnance, to whose functions these subjects particularly pertain. I may properly say, however, that the present state is in gratifying contrast to that of a few years past, consequent from the meager means then at command.

Accompanying this report are the annual reports by the chiefs of staff on duty at the headquarters of the department, to which attention is requested for information respecting matters of administration in the several departments represented by such officers, as follows. The further full report of the inspector of small-arms practice will be forwarded as soon as practicable after the close of the practice season.

Col. Henry C. Corbin, assistant adjutant-general, adjutant-general of department.

Brig. Gen. Charles G. Sawtelle, quartermaster-general, until recently chief quartermaster of the department.

Capt. William S. Patten, assistant quartermaster, assistant to the chief quartermaster, quartermaster, Governors Island and Fort Columbus, New York Harbor.

Col. Charles C. Byrne, assistant surgeon-general, chief surgeon.

Lieut. Col. Alexander C. M. Pennington, Fourth Artillery, artillery inspector and ordnance officer.

Lieut. Col. Thomas Ward, assistant adjutant-general, inspector of

small-arms practice, and in charge judge-advocate's office, and performing duties of judge-advocate during the absence of Col. Thomas F. Barr, assistant judge-advocate-general.

Lieut. Col. Asa B. Carey, deputy paymaster-general, chief paymaster.

Maj. Charles A. Woodruff, commissary of subsistence, chief commissary.

Capt. James Allen, Signal Corps, signal officer.

I take pleasure in testifying to their efficient performance of duty in their several departments, and also to the efficient assistance rendered me by the officers of my personal staff:

Capt. Stephen C. Mills, Twelfth Infantry, aid-de-camp.

First Lieut. Albert S. Cummins, Fourth Artillery, aid-de-camp.

Very respectfully, your obedient servant,

THOS. H. RUGER,
Major-General, Commanding.

The ADJUTANT-GENERAL, UNITED STATES ARMY,
Washington, D. C.

REPORT OF MAJ. GEN. WESLEY MERRITT.

HEADQUARTERS DEPARTMENT OF THE MISSOURI,
Chicago, Ill., September 15, 1896.

SIR: I have the honor to submit report of affairs in this military department covering the period from August 30, 1895, the date of the last annual report, to September 15, 1896.

As will be seen from the record of events herewith submitted, the year has been singularly free from military operations and the frontiers have enjoyed peace and quiet. In the meantime the troops have been engaged in perfecting themselves in drill, tactics, and gymnastics, and I feel confident that in all these particulars during the last year they have made important progress.

At every post in the department gymnastic work has been carried on during the past year, in the majority of cases under difficulties arising from lack of proper buildings and equipment, but always with an interest amounting to enthusiasm among both officers and men. Since experience has demonstrated the value of gymnastics in military training, it is hoped that in plans for the construction of future posts provision for gymnasiums will be included and that at the posts now garrisoned the necessary alteration or construction of buildings for such purpose will be authorized.

The past spring a uniform system of calisthenics, with rifle and carbine as bell bar, has been introduced as instruction to the garrisons in this department with satisfactory results, and during the coming winter season it is contemplated to continue this system and to elaborate it to such extent as is found possible with the means at hand.

During a short visit to southern California last spring I witnessed a drill by the naval brigade then rendezvoused at San Diego with rifles used instead of bell bars, to music, and, thanks to the courtesy of Commander Cotton, of the Navy, was enabled to secure the drill instruction and music, which, through Lieutenant Hale, of my personal staff, has been introduced at all the posts in this command. Before that I had seen a drill with bell bars during an inspection of Fort Wayne. This drill, while interesting and in no way irksome to the men, is a powerful

auxiliary in the setting up of the soldier, and should be made a part of the instruction of every soldier in the service.

Attention is invited to the report on lyceums by Lieutenant Mott, aid-de-camp, who is in charge. That the system of lyceums as carried out at the various posts has been of great benefit to the service can not be doubted. That that system is capable of improvement by alteration in its details is scarcely less certain, and a scheme for the conduct of the coming season's course is now being prepared at these headquarters, with a view of effecting such improvement.

The recent inspection of Forts Riley and Leavenworth and Jefferson Barracks impressed me very forcibly as to the great advantage of drill halls, especially for cavalry posts. The drill at Fort Riley of cavalry in riding-hall exercises is especially excellent. Men and officers take great interest in the exercises, which tend to educate the horses as well as the men. Without disparagement of the management at Fort Leavenworth, I feel called upon to especially commend the instruction at Fort Riley. It is especially good in being in furtherance of excellence in horsemanship and the use of arms mounted. This is noticeable in view of the fact that the tendency in riding-hall exercises generally is too much in the direction of circus performances.

I mention Jefferson Barracks with the other larger cavalry posts to point out the fact that the cavalry there has no riding hall and its absence is especially noticeable in the training of men and horses.

I earnestly recommend that at each post where cavalry is likely to be stationed a riding hall be constructed on the general plan of those at Forts Riley and Leavenworth. They are not expensive and the benefit which results from their use in winter and at other times to men and officers morally, physically, and professionally is so great that cost of construction should not be considered.

In this connection I especially call attention to the necessity for drill halls at all permanent infantry posts. In the winter season at any post, however propitiously situated as regards climate, there are many days when drill in the open, even if practicable, is not attended with good results. At many posts during the winter season, notably Forts Brady and Wayne, Mich., the winters are long and inclement and outdoor drills are impossible. At such posts drill halls are imperative necessities, and they should be built at once, being for the good of the service.

Encouraged by the satisfaction given by the photographs and prints of the different posts in the Department of Dakota made by Lieutenant Hale, aid-de-camp, when I was in command there, I, with the consent of the Secretary of War, have had similar photographs and prints made of the posts of this department and by the same officer. Lieutenant Hale has devoted time and attention to this work and deserves all credit for its perfection.

I feel justified by the conditions in the matter in calling special attention in this report to the hardship worked on a very deserving class of Army followers by the act of Congress of August 6, 1894, as set forth in the letter of the chief clerk in the Adjutant-General's Office at these headquarters, dated July 30, 1896, and published in full in appendix marked Exhibit No. 5. I concur most cordially in the concluding clauses of the indorsement of Colonel Barber, assistant adjutant-general at these headquarters, and ask that the attention of Congress may be called to the matter so that by legislation the apparently unintended injustice to the clerks and messengers at military headquarters may be remedied.

In conclusion, I call attention to the reports of the different staff

officers at these headquarters and to that of Captain Scott in charge of the Apache prisoners. This latter officer by his zeal and perseverance has made remarkable progress in the improvement of the minds, characters, and condition of the Apaches, and deserves great credit for the thoroughness and intelligence with which his work has been done. The report of Assistant Surgeon Glennan on the vital statistics of the Indians will be found interesting and instructive. I unite with Captain Scott in commending his assistants. They are fully worthy of all the praise bestowed.

I take it that these Indians during the next year will be turned over to the charge of the Indian Department. If such is the case ample notice should be given that everything may be prepared for the change.

To my staff officers, departmental and personal, I tender my cordial approbation for their good work in their respective positions. Their reputations as capable officers are too well established to require commendation from me to the War Department.

Very respectfully,

WESLEY MERRITT,
Major-General, Commanding.

The ADJUTANT-GENERAL UNITED STATES ARMY,
Washington, D. C.

REPORT OF BRIG. GEN. JOHN R. BROOKE.

HEADQUARTERS DEPARTMENT OF DAKOTA,
St. Paul, Minn., September 10, 1896.

SIR: I have the honor to submit my annual report in compliance with directions of the Major-General Commanding the Army.

The garrisoning of the new post of Fort Harrison, Mont., the removal of the remaining 3 companies of the Twelfth Infantry from this department to the Department of the Platte, the abandonment of Fort Buford, N. Dak., and the interchange of stations of the Twenty-second and Second Infantry necessitated the following changes in the station of troops in this department:

Companies B and E, Twenty-second Infantry, and 4 privates of the hospital corps, Capt. Mott Hooton commanding, left Fort Assinniboine, Mont., by rail September 22, 1895, and arrived and took station at Fort Harrison, Mont., on September 23. Distance traveled, 310 miles.

Company D, Twenty-second Infantry, left Fort Assinniboine, Mont., September 22, 1895, and Company A, of the same regiment, left Fort Keogh, Mont., September 24, both companies proceeding by rail to Bismarck, N. Dak., and thence by steamboat to Fort Yates, N. Dak., arriving and taking station there September 27. Distance traveled by Company D, 983 miles; by Company A, 380 miles.

Companies A, F, and H, Twelfth Infantry, having been ordered to take station at Fort Niobrara, Nebr., left Fort Yates, N. Dak., September 29, 1895, and proceeded by steamboat to Pierre, S. Dak., thence by rail to their new station.

Fort Buford, N. Dak., was discontinued October 1, 1895. The garrison, consisting of Troops D and H, Tenth Cavalry; Companies C and E, Twenty-fifth Infantry, and detachment of hospital corps, under command of Maj. Theo. J. Wint, Tenth Cavalry, left on that date by rail for Fort Assinniboine, Mont., arriving and taking station there

October 2. Capt. H. P. Ritzius, Twenty-fifth Infantry, and 15 enlisted men remained at Fort Buford until the final disposition of property, and left for Fort Assinniboine November 7, 1895.

The Twenty-second Infantry having been ordered from this department to Fort Crook, Nebr., and the Second Infantry from the Department of the Platte to the stations formerly occupied by the Twenty-second Infantry, the transfer was effected as follows:

Second Lieut. D. S. Stanley and 10 enlisted men, Twenty-second Infantry, left Fort Keogh, Mont., June 20, 1896, for Fort Crook, Nebr., for the purpose of receiving property and preparing the post for the reception of the regiment. They arrived there June 22.

Companies A and D, Twenty-second Infantry, under command of Second Lieut. W. H. Wassell, left Fort Yates, N. Dak., June 25, and proceeded by steamboat to Bismarck, N. Dak., thence by rail to Fort Crook, Nebr., arriving there June 28. Distance traveled, 858 miles.

Companies B and E, Twenty-second Infantry, commanded by Lieut. Col. J. H. Patterson, left Fort Harrison, Mont., June 26 by rail and arrived at Fort Crook, Nebr., June 28. Distance traveled, 1,145 miles.

Lieut. H. E. Ely and 16 enlisted men, Twenty-second Infantry, remained at Fort Harrison until the arrival of the Second Infantry. They left that post for Fort Crook, Nebr., July 7.

Headquarters, band, and Companies C, F, G, and H, Twenty-second Infantry, Col. James S. Casey commanding, left Fort Keogh, Mont., June 27, and proceeded by rail to Fort Crook, Nebr., arriving there June 29. Distance traveled, 966 miles.

The Second Infantry left Fort Omaha, Nebr., June 29, and arrived at the several stations in this department on the following dates:

Headquarters, band, and Companies A, E, F, and H, Col. J. C. Bates commanding, Fort Keogh, Mont., July 1.

Companies B and C, Lieut. Col. W. M. Wherry commanding, Fort Harrison, Mont., July 2.

Companies D and G, Capt. Charles Keller commanding, Fort Yates, N. Dak., July 2.

In addition to the foregoing changes, the following movements of troops took place in this department since my last annual report:

Upon the representation of the acting Indian agent at Tongue River Agency, Mont., that the Indians of the agency were killing cattle belonging to settlers in the vicinity, directions were received from the Secretary of War to order such cavalry troops as were necessary to assist the agent to protect citizens and prevent the killing of cattle. In compliance therewith, Troops B and E, Tenth Cavalry, under command of Maj. S. T. Norvell, were ordered to proceed to the agency for the purposes above indicated. They left Fort Custer, Mont., May 27, 1896, and remained in the vicinity of the agency until July 8. The presence of the troops being no longer required, they were then returned to their station, arriving there July 10, 1896.

Troop D, Sixth Cavalry, commanded by Capt. George L. Scott, left Fort Yellowstone, Wyo., May 29, 1896, and went into camp at Lower Geyser Basin, Yellowstone National Park, where they will remain during the summer tourist season. Distance marched, 38 miles.

Under instructions received from the Assistant Secretary of War, Maj. J. M. J. Sanno, Third Infantry, was ordered to proceed to certain points in Montana for the purpose of ascertaining and reporting the number of refugee Canadian Cree Indians in that State, where they were located, how many had certificates, length of time required to collect them at a given point on railroad for transportation to Coutts

Station, and what troops would be required to carry out the provisions of the act of Congress approved May 13, 1896, authorizing the President to deport from Montana and deliver at the international boundary line the Canadian Indians referred to above. He left Fort Snelling, Minn., June 3, 1896, and upon receipt of his report containing the required data the following troops were ordered out from Fort Assinniboine, Mont., for the purpose of rounding up and transporting these Indians to Coutts Station, Northwest Territories:

Troop D, Tenth Cavalry, Lieut. John J. Pershing commanding, left post June 13. Rejoined August 14.

Troop C, Tenth Cavalry, under command of Capt. Charles E. Nordstrom, left post June 15 and returned June 19. Distance marched, 300 miles (in detachments).

A detachment of Company C, Twenty-fifth Infantry, commanded by First Lieut. F. H. Albright, left post June 18 and returned June 21. Distance traveled by rail, 286 miles.

A detachment of Company E, Twenty-fifth Infantry, commanded by First Lieut. William T. Wilder, left post June 20 and returned June 23. Distance traveled by rail, 300 miles.

Troop I, Tenth Cavalry, Capt. S. L. Woodward commanding, left post June 24 and returned July 15, except a detachment under Second Lieut. J. A. Ryan, which returned July 28. Total distance traveled, 639 miles.

Camp Merritt, Mont., a subpost of Fort Keogh, Mont., was garrisoned during the past year by detachments consisting of 1 officer and 15 enlisted men each from the latter post, who were relieved every two months up to February, 1896, and every month since then.

Practice marches were made by the troops in this department since the last annual report as follows:

From Fort Assinniboine, Mont.—Troops C, F, and I, Tenth Cavalry, with 1 medical officer and a detachment of the hospital corps, under command of Capt. S. L. Woodward, left post August 13, 1895, marched via Big Sandy, Fort Benton, Great Falls, and Sun River Valley to Old Fort Shaw, Mont., and returned via a more westerly route August 31, having marched a distance of 283 miles.

From Fort Custer, Mont.—Troops B, E, G, and K, Tenth Cavalry, Maj. S. T. Norvell commanding, left post September 11 and returned September 20, 1895, having made a march of 138 miles.

Companies A and D, Twenty-fifth Infantry, commanded by Capt. O. J. Sweet, left post October 14 and returned October 23, 1895. Distance marched, 120 miles.

From Fort Keogh, Mont.—Troop A, Tenth Cavalry, Capt. Charles L. Cooper commanding, left post September 9, 1895, marched to Fort Custer, Mont., and returned September 21, covering a distance of 320 miles.

The band and Companies F, G, and H, Twenty-second Infantry, with 1 medical officer and a detachment of the hospital corps, under command of Col. James S. Casey, left post September 23, 1895, marched to Tongue River and established a camp of instruction. Returned to post September 28. Distance marched, 24 miles.

The band and Companies C, F, G, and H, Twenty-second Infantry, with 1 medical officer and a detachment of the hospital corps, Col. James S. Casey commanding, left post May 27, 1896, marched to a point about 4 miles from post and returned the same day.

Troop A, Tenth Cavalry, Capt. Charles L. Cooper commanding left post May 29, 1896, marched to Cooley's ranch, on the Tongue River, and returned the same day. Distance marched, about 24 miles.

From Fort Missoula, Mont.—Companies F and H, Twenty-fifth Infantry, under command of Maj. C. McKibbin, left post September 6, 1895, and marched to the valley of the Big Blackfoot River, returning to post September 19. Total distance marched, 123 miles.

Companies B and G, Twenty-fifth Infantry, under command of Capt. D. B. Wilson, left post October 2 and marched to Deerlodge, Mont., returning October 21, 1895. Distance marched, 190 miles.

From Fort Snelling, Minn.—Headquarters band and Companies A, B, C, D, E, F, G, and H, Third Infantry, with 1 medical officer and 5 enlisted men of the hospital corps (20 officers and 364 enlisted men), Col. John H. Page commanding, left Fort Snelling, Minn., June 17, 1896, and marched to Lake City, Minn., a distance of 68 miles, for encampment with the National Guard, State of Minnesota. The regiment arrived there June 22 and remained in camp until July 23, when it started on its return march to Fort Snelling, arriving there July 27.

From Fort Yates, N. Dak.—Troops A and C, Eighth Cavalry, and Company H, Twelfth Infantry, Maj. James N. Wheelan commanding, left post September 4, 1895, marched to Cannon Ball River, and returned September 14, covering a distance of 54 miles.

From Fort Yellowstone, Wyo.—Troop I, Sixth Cavalry, under command of Capt. George S. Anderson, left post October 9 and returned October 20, 1895, marching a distance of 188 miles.

Since my last annual report three fires have occurred at posts in this department. One at Fort Keogh, Mont., on December 1, 1895, partially destroyed officers' quarters No. 12; cause unknown. In the second the stables of Troop A, Eighth Cavalry, at Fort Yates, N. Dak., were completely destroyed on January 23, 1896, and with them 47 public and 6 private horses, together with nearly all the equipments of the enlisted men and some other public property. This fire is believed to have been the work of incendiarism, although the board of officers convened in the case was unable to discover the incendiary. The third fire partially destroyed officers' quarters Nos. 8 and 10 at Fort Assinniboine, Mont., July 31, 1896; cause unknown.

On the 27th of June last I left my headquarters to make the annual inspection of posts and garrisons as required by regulations. I visited the posts in the order named below.

FORT YATES, N. DAK.

The troops of this garrison are well instructed, except in some minor details, to which the attention of the post commander was called at the time, with instructions which will correct those points found defective.

The buildings at this post are, except the cavalry barracks, very old and dilapidated. Considerable repairs have been made the past year, but the amount allotted for this purpose merely enabled a system of patching to be applied, which is not sufficient to maintain the buildings in a serviceable condition for any length of time.

The bathroom at this post is under the old tank, and is in a very bad condition. New and better bathing facilities should be authorized.

FORT CUSTER, MONT.

The garrison of this post is well instructed and well disciplined. Such defects as were observed were called to the attention of the commanding officer, with instructions to correct them.

Repairs made to buildings under the allotment of last year were not sufficient. Their condition has not been much improved thereby. I

would renew my recommendation that if the post be maintained it should be rebuilt.

FORT ASSINNIBOINE, MONT.

The garrison is well disciplined and well instructed. Any defects noted were brought to the attention of the commanding officer, with instructions to correct them.

The enlargement of the barracks recommended last year is now being made. Other matters recommended have been approved, and each set of officers' quarters is now being supplied with a proper heating plant.

The question of water supply is now solved, I believe. All that is necessary is to protect the pipes in a proper manner, which has already been the subject of correspondence.

The allotment for repairs was insufficient and should be increased largely.

The post exchange buildings are still rented from the former post trader. I would recommend that these buildings be purchased by the Government.

I would renew my recommendation that a riding hall be built at this post at the earliest practicable moment.

FORT HARRISON, MONT.

This post is in process of construction. The garrison is in excellent condition as regards discipline and instruction.

There is much to be done at this post which will require a liberal expenditure of money and labor and a lapse of some years to accomplish the desired results.

FORT MISSOULA, MONT.

I found this post in the condition reported last year. The troops are well disciplined and well instructed.

Considerable repairs were made and a great deal more should be done. Particularly would I recommend that a bathroom be added to each set of officers' quarters.

FORT YELLOWSTONE, WYO.

The garrison of this post is, as is usual at this season of the year, scattered throughout the Yellowstone National Park. I found the various detachments in good condition, prompt and careful and attentive to their duties.

I would again recommend that buildings be erected at the post to take the place of those in the old post, and that a riding hall be built as soon as practicable.

FORT KEOGH, MONT.

The infantry part of the garrison of this post was changed since last year. I found it and the troop of cavalry well instructed and well disciplined.

Many repairs have been made, but much more is needed and should not be delayed if the post is to be maintained. I have directed the commanding officer to adapt one of the many storehouses at this station for the purpose of a gymnasium. The change can be made with but slight expense.

FORT SNELLING, MINN.

This post is garrisoned by the Third Infantry, which had but recently returned from an absence of over a month attending a camp of the National Guard of Minnesota at Lake City. I found the troops well disciplined and instructed, and the commanding officer was directed to correct such minor defects as were observed.

I would call attention to my remark of last year in regard to the widely scattered condition of the post, particularly the storehouses.

The water system is being enlarged, and it appears to me there will now be a sufficiency of water for all the needs of the garrison.

I would suggest that the method of heating of the company quarters be changed, substituting steam for the hot-air system now in use as being less expensive and more satisfactory.

In conclusion I would recommend that the matter of riding halls at Fort Assinniboine and Fort Yellowstone receive immediate attention, and that at Forts Missoula, Harrison, Assinniboine, Yellowstone, and Snelling suitable buildings be erected for gymnastic and athletic exercises, that the directions of the Major-General Commanding the Army may be carried out fully.

I would invite attention to the reports of the chiefs of the staff departments at these headquarters, which give in detail the matters pertaining to each. The officers stationed here as members of my staff have shown zeal and ability in their various departments to the benefit of the service and the satisfaction of their commander.

Respectfully,

JOHN R. BROOKE,
Brigadier-General, Commanding Department.

The ADJUTANT-GENERAL UNITED STATES ARMY,
Washington, D. C.

REPORT OF BRIG. GEN. FRANK WHEATON.

HEADQUARTERS DEPARTMENT OF THE COLORADO,
Denver, Colo., September 30, 1896.

SIR: I have the honor to submit my annual report of the Department of the Colorado for the year 1895–96 in compliance with the instructions of the Major-General Commanding the Army.

CHANGES AT MILITARY POSTS.

Fort Stanton, N. Mex., has been abandoned within the last year, thus reducing the number of regularly garrisoned posts in the department to nine.

The changes in stations of troops from and to the various posts will be found in Appendix B.

INDIANS.

As there are 49,894 Indians on reservations within the limits of my command, it is a satisfaction to be able to report that none are on the warpath, nor are there any present indications that settlers on our Arizona, New Mexico, or Utah sparsely settled frontiers will be disturbed by them. The Apaches are steadily though slowly improving, cultivating their little farms, supplying our military posts with the results

of their labor, and sending numbers of their brightest children to the Indian school at Albuquerque, N. Mex.

The progress of the Utes—Uintahs and Uncompahgres—has been most gratifying. Under the supervision of their able and devoted agent, Maj. James F. Randlett, Ninth Cavalry, they have opened during the past year miles of irrigating ditches, or rather irrigating canals. They are 12 feet wide, and constructed with a view to permanency, thus enabling them to add greatly to their number of very creditably cultivated farms.

INDIAN DEPREDATIONS.

While I am able to report as above concerning Indians located within this large military department, which embraces an area of 424,495 square miles, 33,863 of which are included in Indian reservations, I must also invite the attention of the Adjutant-General to the extraordinary amount of field service and laborious scouting performed by the troops in often successful pursuit of little parties of renegade Apaches, who at night skulk across our border from Mexico into Arizona, hiding in most inaccessible mountain ranges, and seek an opportunity to steal from unguarded herds, or, as has twice occurred, kill an isolated herder. One of these murderous little bands of Apaches—there were four in the party—worked their way stealthily across the border and north, up the San Simon Valley, past the Chiricahua range, to a point in Arizona east of the Peloncillo range, near the town of Duncan, on the 3d of December, 1895, and committed the first murderous depredation of the year by killing Mr. H. H. Merrill and his 17-year-old daughter. News of this raid reached me on the 4th. Troops from Forts Grant, Bayard, and Apache were promptly ordered to pursue and capture or destroy the invaders. Sheriffs and eager posses near at hand were at once on their trail and capture seemed inevitable, but the wily Apaches eluded them during their five days' effort, keeping in the mountains on foot, and it was not until after months of laborious scouting by all the available mounted troops in that portion of my department that the camp of the renegades was found, attacked, and the leader killed on the 17th of May by a detachment, Seventh Cavalry and Indian scouts, under command of First Lieut. Sedgwick Rice, Seventh Cavalry, aided by Second Lieut. N. K. Averill, of the same regiment.

On March 30 a telegram was received from the commanding officer, Fort Grant, that Alfred Hands, a sheep herder, was reported killed and cut to pieces by Indians on the 28th at the mouth of Cave Creek, 25 miles south of San Simon, Ariz., and that Lieut. Sedgwick Rice, Seventh Cavalry, with a detachment of scouts, had been sent from Fort Grant to investigate, and that the commanding officer, Fort Huachuca, had been advised.

The report of the killing of Hands having been verified, Capt. James M. Bell, Seventh Cavalry, was dispatched from Grant with his troop, F, Seventh Cavalry, to the Chiricahua Mountains, where the murderers were supposed to have fled, and later Capt. P. S. Bomus, First Cavalry, with his troop, A, First Cavalry, was sent from Fort Huachuca to the same region to cooperate with the Grant troop and scouts, their movements being directed, as I had authorized, by Col. E. V. Sumner, Seventh Cavalry, commanding Fort Grant and the Grant district of observation. On April 4 Lieutenant Rice telegraphed from San Bernardino, Ariz., that he had struck the trail of Hands's murderers near the mouth of Cave Creek and had followed it south from the Peloncillo Range until 1 p. m. April 3, where it crossed the line near the Cloverdale

ranch in the Animas Valley, about 40 miles east of San Bernardino; that the scouts estimated the band at 4 bucks and 1 squaw, with 8 horses, 3 rifles and ammunition, and plenty of provisions, which they had stolen from settlers.

Articles stolen from Hands's house were found on the trail, among them a receipt for money paid by Mr. Hands.

Troop F, Seventh Cavalry, was then established in camp at old Camp Rucker, with an outpost in Guadalupe Canyon, and courier posts between Rucker and the telegraph station at Willcox, with a view of patrolling and keeping under observation the adjacent country. First Lieut. E. C. Bullock, Seventh Cavalry, with Troop E, Seventh Cavalry, next relieved Captain Bell's troop, a detachment from the latter, and all the Indian scouts, with First Lieutenant Rice and Second Lieut. N. K. Averill, Seventh Cavalry, being retained at Rucker.

On May 8 Lieutenant Averill, while scouting with a detachment of 12 men, struck an Indian camp near Lang's ranch, southwest of Cloverdale. On account of the smallness of his force he could not completely surround and surprise the camp. The camp was attacked and 1 Indian buck mortally wounded, his body being afterwards found. The Indian scouts also reported that 1 squaw was wounded. A small Indian girl and the entire outfit of the hostiles, except their rifles, were captured, including 9 horses, 7 saddles, all their blankets, clothing, and supplies. Lieutenant Averill was of the opinion that this was not the same band pursued by Lieutenant Rice, as they did not have the same plunder. For this success Lieutenant Averill and his command were congratulated by the Commanding General of the Army and the department commander.

On the 17th of May Lieutenants Rice and Averill, while scouting in the Peloncillo Mountains with a detachment of 11 soldiers, 10 Indian scouts, and 4 civilians, located a camp of hostile Indians in the vicinity of Guadalupe Canyon. An attempt was made to surround and surprise the camp, but it was not successful, the Indians discovering them before the different detachments were in position and succeeding in escaping. A buck was severely wounded, and abandoned in his flight his rifle and a field glass, which were captured, together with clothing which was afterwards identified as belonging to the Merrill family, showing conclusively that these Indians were of the party that murdered the Merrills.

The Major-General Commanding the Army, by telegram dated June 6, highly commended First Lieut. Sedgwick Rice and Second Lieut. N. K. Averill, Seventh Cavalry, the noncommissioned officers, guides, and Indian scouts under their command, for their efforts and success, and expressed his high appreciation of the skill, fortitude, and perseverence of the troops engaged in pursuit of the small bands of hostile Indians.

An international agreement having been concluded on June 4 between the United States and Mexico providing for the reciprocal crossing of the border by troops of both countries in pursuit of hostile Indians, subject to certain enumerated conditions, was telegraphed to the department commander June 6, and repeated by him to Col. E. V. Sumner, Seventh Cavalry, then at Bisbee, Ariz., 45 miles west of San Bernardino, directing the movements of troops in the field. Colonel Sumner was directed to be guided strictly by the provisions of the international agreement and to caution all his officers accordingly, furnishing each troop, company, and detachment commander with a copy of the above-mentioned agreement.

By Special Field Orders, No. 33, dated San Bernardino, June 16, 1896, Colonel Sumner organized an expedition to pursue renegade Indians from the United States across the boundary line into Mexico. The troops comprising the expedition were Troop A, First Cavalry, Capt. P. S. Bomus and Second Lieut. William Yates; Troop F, Seventh Cavalry, Capt. H. G. Sickel; a detachment of Indian scouts and guides under First Lieut. Sedgwick Rice and Second Lieut. N. K. Averill, Seventh Cavalry. Colonel Sumner's orders provided for dividing this force into sections and detachments, each section to be commanded by a commissioned officer and each detachment by a noncommissioned officer; 2 Indian scouts without arms to accompany each detachment as trailers. The expedition was placed under the command of Capt. Peter S. Bomus, First Cavalry.

The troops comprising this expedition did exceptionally hard work, scouting in a very rugged country, and suffering much exposure and hardship.

The detachment under Lieutenant Yates, however, was the only one which came into actual contact with hostile Indians. On June 21 Lieutenant Yates while following a trail came upon and attacked a camp of hostiles on Pulpito Mountain in Sonora, Mex., 60 miles south of San Bernardino. An Indian girl about 5 years old was captured, together with a pony and all the camp equipage. Four bucks, 4 squaws, and 1 child escaped. Captain Bomus in his report states that the captured girl, an intelligent child, stated that the band attacked was known by the Mexicans as Zias's and by the Indians as Nechultpia's (or Nashultpie's) band, and that 2 bucks had been killed up to that date and 1 squaw was missing. Captain Bomus spoke very highly of all the men of his command and especially of Lieutenant Yates.

When the Indians fled after the attack on their camp, Lieutenant Yates started in pursuit with his detachment, and Colonel Sumner, on receiving information of the affair, dispatched First Lieut. W. J. Nicholson, Seventh Cavalry, with a picked detachment to overtake and relieve Lieutenant Yates, if broken down, and to continue the pursuit.

Lieutenant Nicholson cooperated with Colonel Kosterlitzky, of the Mexican army, and scouted into Mexico as far south as the line joining Oputo and Guanchinerau, but frequent rains caused the obliteration of the trail, and he returned to Fort Grant, reporting July 22 that he was satisfied Nashultpie's band was 150 miles south of the line in the mountains of Oputo, and that it was useless to attempt further operations in the rainy season (July, August, and September).

All the troops in the field were then ordered back to their respective stations, but orders were given for patrolling the border district and a troop of cavalry to be relieved monthly is to be stationed at San Bernardino with a detachment at Guadalupe Canyon to observe the trails usually followed by Apaches in crossing the border. Authority has also been obtained for building a telegraph line from Bisbee to San Bernardino, and work on this line is now in progress under the personal supervision of Capt. W. A. Glassford, signal officer.

Some idea can be conceived of the labor performed by the troops in their earnest and highly appreciated efforts to rid Arizona of the pestilent Apache renegades who have crossed our southern border from the Sierra Guadalupe, on the Mexican frontier, when I report that the number of miles marched in Arizona and New Mexico since the last annual report by officers, noncommissioned officers, and privates on this duty, scouting as organizations and detachments, is 42,457 miles.

SANTA TERESA FANATICS.

On the 12th of August, 1896, I was very much surprised by the receipt of telegrams from Lieut. Col. John M. Bacon, First Cavalry, commanding Fort Huachuca, Ariz., informing me that the Mexican custom-house at Nogales, Mexico, had been attacked that morning by filibusters, said to have been organized in Arizona and led by one Jose Gomez, of Santa Ritas, Ariz., the attack resulting in the killing of 3 Mexican citizens and 7 filibusters and the capture of 2 others of the attacking party.

Colonel Bacon's first information was received from Lieut. S. B. Piper, of the Arizona National Guard, and dated Nogales, Ariz. Lieutenant Piper also stated that the band had crossed to the Arizona side. Colonel Bacon at once dispatched Capt. P. S. Bomus, First Cavalry, with his troop and 3 Indian scouts to Harshaw, Ariz., to follow the trail, if found, and reported his action to me. Very soon afterwards Colonel Bacon received a telegram from United States Marshal Meade, at Tucson, Ariz., transmitting a dispatch he had just received from the collector of customs at Nogales giving an account of the assault on the Mexican custom-house, and stating that papers found on the filibusters proved that they had met at Tubac, Ariz., and later at Cuebabi, and that the names of the filibusters were Loreta Rivas, Miguel Leon, Juan Lungo, Franco Vasquez, Luis Liso, Jose Salcido, Miguel Alvarez, Juan Valencia, Jose Bacaceasi, Juan Buitemea, Franco Ramierez, Juan Cerano, Ygnacio Bachronio, Francisco Abram, Juan Ligiulinea, Juan Alvarez, Estevan Fusatajoy, Juan Molino, Raphael Cerbes.

It was added that they were Santa Teresa fanatics; that after the assault the survivors had recrossed into Arizona and were heading toward Tubac, to which point the marshal requested that a company of soldiers be sent to arrest them.

Lieutenant Piper telegraphed later to Colonel Bacon that it was reported about 50 Indians were moving on Nogales, Ariz., from about Tubac, Ariz., and requested that infantry be sent by rail the same night to protect the city. About the same time Colonel Bacon received a telegram signed by Sam F. Webb, collector, and T. J. Wylie, postmaster, Nogales, Ariz., requesting that troops be sent immediately to protect Nogales against Mexican raiders.

In response to these appeals Colonel Bacon immediately started by rail for Nogales with two companies of infantry, telegraphed me his action, and requested that instructions be sent him at Nogales.

Upon receipt of the first telegram announcing the attack on the custom-house and the dispatch of Bomus's troop to Harshaw to intercept the filibusters on this side, I telegraphed the commanding officer at Huachuca to dispatch Capt. L. R. Hare, Seventh Cavalry, with his troop to some point north of Harshaw to cooperate with Bomus should developments seem to justify it, placing both troops under command of Maj. H. J. Nowlan, Seventh Cavalry; also to keep the commanding officer at Fort Grant advised of the situation and the latter would cooperate with him, sending a troop to the westward for that purpose if necessary, and I telegraphed the commanding officer at Fort Grant instructions to this effect.

Colonel Bacon having arrived with the infantry at Nogales, Ariz., about midnight August 12, and having advised me of his arrival, I telegraphed him commending his promptness in going himself with an adequate force to protect the customs officers at Nogales and directing

him to keep in communication and to cooperate with the United States marshal and other civil officers in protecting public property and interests, and assuring him that all the resources of his own and other military posts in Arizona would be placed at his disposal to insure quiet and protect persons and property in his district of observation.

On the same day, August 13, I telegraphed to the Adjutant-General of the Army the dispatches received and reported the dispositions made to capture the filibusters should they be found in United States territory.

Major Nowlan left Huachuca the evening of the 13th with Captain Hare's troop of the Seventh Cavalry, marched in the direction of Tubac, and at 1.30 p. m. the same day Colonel Sumner dispatched Troop E, Seventh Cavalry, from Grant with 10 Indian scouts for Mendoza in the San Pedro Valley, and later in the day Troop F, Seventh Cavalry, to Dragoon Summit, both to report to Colonel Bacon and to cooperate with other troops in the field. This latter action was taken in view of telegrams from Major Nowlan that settlers south and east of Huachuca were becoming alarmed.

From Colonel Bacon's detailed report it appears that upon his arrival about midnight, August 12, he found the citizens of Nogales in a state of intense excitement and alarm. They were partially armed, and many were doing guard duty. He reassured them and made proper dispositions of his force for the protection of the town. Colonel Bacon found upon investigation that about 4 a. m. that day (August 12) a band of about 45 or 50 Yaqui Indians, believed to be under the influence of religious fanaticism, indifferently armed with rifles, pistols, bows and arrows, had dashed into the heart of Mexican Nogales and captured the Mexican custom-house. The citizens of both towns were aroused. Many on the American side, securing the arms of the local Arizona National Guard company, crossed over the line and joined their Mexican neighbors in expelling their Yaqui assailants. A fight ensued which resulted in the killing of 6 Mexicans and 8 Indians and the capturing of 3 Indians and the wounding of another.

Pillage of money and arms and ammunition was reported to be the cause of the attack, about $20,000 and some arms being at the time deposited in the custom-house. The raiders secured the latter. Whence the raiders came and where they fled could not be accurately ascertained beyond the fact that after being driven from the custom-house they retired with apparently fearless deliberation in a direction a little north of west of the border line. The presence of the United States troops had a most tranquilizing effect, not only upon the American side of the town, but upon the alarmed people across the line. Colonel Bacon states that the Mexican authorities who called upon him the next morning asserted most emphatically that the raiders were organized on our side of the line, that they had recrossed it after their repulse, and were being reenforced to renew the attack. Our own people seemed to concur in this theory. Several American citizens, who were vouched for as being entirely trustworthy, reported to Colonel Bacon that they had that morning seen a large camp of hostile Indians located on the Santa Cruz line about 9 miles northeast from Nogales.

This report coming from so many different sources, Colonel Bacon felt it his duty to go out and capture the reported camp, and accordingly proceeded with the greater part of his command to the locality indicated, the first 4 miles being made by rail, the last 7 by marching over a very rugged country. The camp was found not to exist, and Colonel Bacon returned to Nogales with his command, partly by

marching and partly by rail. Upon his arrival at Nogales he received my telegram of August 12, and later instructions to keep his field headquarters at Nogales and to direct the operations of the troops in the field.

Colonel Bacon kept in daily communication with Marshal Meade at Tucson, and endeavored to comply with his urgent request to arrest raiders or "filibusters," as he called them.

The marshal having telegraphed on the 13th requesting that a patrol be sent in the direction of Tubac to arrest any and all parties engaged in violations of neutrality laws or lending aid to other violators, Colonel Bacon dispatched Captain Dodge with his company, C, Twenty-fourth Infantry, to Tubac, where he captured 3 Yaqui Indians and 1 Mexican. The names of two of these Yaquis correspond with names found on the body of one of the Yaquis killed in the attack on the custom-house. The other Yaqui and the Mexican were captured together, both armed.

These prisoners were brought before the United States commissioner at Nogales, and committed to jail by him on the charge of violating United States neutrality laws.

The United States marshal at Tucson having communicated his opinion in several dispatches that the main body of raiders had assembled in the vicinity of Greaterville, a mining settlement in the Santa Rita Mountains, 20 miles northwest of Crittenden, Colonel Bacon assembled the troops of Bomus, Hare, and Bullock at Crittenden, taking command in person, with a view of making a dash upon Greaterville, surrounding and capturing the raiders. He had been furnished with two deputy marshals by United States Marshal Meade, armed with blank warrants to make arrests. Colonel Bacon sent one of the deputies to Greaterville with instructions to hire the necessary guides at the expense of the United States marshal's office, as authorized by the marshal, gain all information possible as to the location of the raiders, and then to report back.

On the 22d the deputy marshal returned to Crittenden and reported that during that and the previous day he and his guides had searched the town of Greaterville and the surrounding mountains and had failed to find the presence or trace of any Yaqui or other Indians. In the opinion of the United States marshal and Colonel Bacon, in which I concurred, this ended the campaign, and the troops in the field were ordered to their posts, Captain Dodge being left with his company at Nogales until September 1 because of rumors of possible attacks by Indians on that place.

It will be seen, as stated by Colonel Bacon in his report, that every rumor and clew calculated to throw light upon the movements of the raiders were thoroughly investigated and the entire country in a radius of nearly 70 miles east, north, and west of Nogales was completely covered. Had they gone north into Arizona in a body, the troops with their Apache scouts must inevitably have discovered their trail. As is well known, the Yaquis belong in Mexico and are a warlike tribe, having been at war with Mexico for years. A few usually reside on this side of the line, but most of them have now disappeared, frightened, probably, by the activity of our troops. Those engaged in the attack on the Mexican custom-house were undoubtedly followers of the so-called St. Teresa, styled from her birthplace Santa Teresa de Caborda. Her teachings, however, do not appear to be of a political or revolutionary character. Recent press dispatches report widespread disaffection among the peaceable element of the Yaquis, which forms a

large contingent of the working population in the southeastern part of the State of Sonora, Mexico. In all probability the energetic action taken on this side of the border has prevented the use of our territory as a base of operations for the Yaquis and their sympathizers against the Mexican Government, with resulting international complications. In a letter to Colonel Bacon, dated Tucson, August 24, United States Marshal W. K. Meade, writes as follows:

Permit me to thank you for your most timely and efficient work in suppressing the Santa Teresa fanaticism in Arizona. I am of the opinion but for your promptness in placing troops in and near Nogales that Arizona would have been the rallying ground for the filibusters and a much more terrible affair than that of the 12th instant would have followed.

PRACTICE MARCHES AND FIELD MANEUVERS.

Having witnessed excellent results from orders issued by me requiring practice marches and field maneuvers while exercising command elsewhere, I early in the year prepared a system of military instruction for the department, assigning specified duties to each month. All possible latitude was accorded regimental and post commanders, who were authorized to make requisite changes in duties prescribed for certain months to meet climatic conditions at posts so varied in temperature and elevation.

In my Department Circular No. 1 of January 8, 1896, especial attention was required to be given instruction in field reconnoissances and the preparation of maps. I have been more than gratified with the results obtained and at the proficiency attained by the noncommissioned officers and privates of many of the regiments, showing that their officers have given them most valuable instruction. Much of this work has been so creditable that I have forwarded to the Adjutant-General such field maps from all posts.

These field sketches, in the majority of cases prepared by noncommissioned officers and privates, eight or ten detachments being employed on the duty, frequently the result of one morning's work, have been platted by the post engineer and forwarded to my headquarters between the hours of 7.30 in the morning and 3.45 p. m. of the same day. I believe the future value of such instruction in hasty field sketching to troops engaged in actual service will be very great.

ATHLETICS.

In my General Order No. 3 of 1896, prescribing practical instruction, I directed that a half hour three times a week be devoted to gymnastics, and in circular letters suggested that certain standard athletic games be tried by each enlisted man not physically unfit. At many of the posts in my command a great deal of interest has been taken in this work. At two of them, Douglas and Wingate, good gymnasiums were arranged. The first experiments in this direction were so gratifying that in April I ordered a board of officers to meet at department headquarters to formulate a plan for encouragement of athletics and for athletic competition in this department. This board consisted of Capt. Edward E. Hardin, Seventh Infantry; Capt. Curtis B. Hoppin, Second Cavalry, and Second Lieut. George T. Langhorne, Third Cavalry, aid.

I hope that much practical good will result from the athletic competition to be held in Denver on the 2d and 3d of October next between selected teams from each post in this department, and shall make a special report on the subject.

INSPECTION OF POSTS.

FORT APACHE, ARIZ.

Commanded by Lieut. Col. W. H. Powell, Eleventh Infantry; is garrisoned by four companies of the Eleventh Infantry, two troops of the Seventh Cavalry, and a detachment of Indian scouts.

The demands upon this post for detached service investigating collisions or disputes between White Mountain Apaches and cattle herders near reservation boundaries required an increase in the mounted force at this station, and on the 20th of January, 1896, I added Troop H, Seventh Cavalry, Capt. E. S. Godfrey commanding, to the Fort Apache garrison. Troop G, Seventh Cavalry, Lieut C. W. Fenton commanding, as did Lieut. W. C. Rivers, First Cavalry, in charge of White Mountain Apaches at that station, made long and creditable scouts in December last in cooperation with troops from other posts in Arizona when renegade Sierra Madre Apaches from south of the Mexican border were depredating in Arizona south of the Gila.

I found the troops, both cavalry and infantry, when I last inspected that post, in July, 1896, to be in fine condition, well disciplined and instructed.

There are few more difficult posts to command than Fort Apache, Ariz. Encroachments by herders on the White Mountain Indian Reserve are frequent, and a comparatively small garrison has much to do to prevent minor difficulties and collisions from becoming serious and menacing the lives and property of adjacent towns and settlers. The 2,000 Indians surrounding it were until within the past few years openly defiant and not easily controlled. The post is in a wild, rough, mountainous country and about 100 miles from the village of Holbrook, its nearest railroad station. This road is often closed to winter travel by deep snows in the range 24 miles north of the garrison, which is in the heart of the Apache country. I am glad to make an official record of the highly satisfactory manner in which the difficulties of his command, requiring rare tact and judgment, have been handled by the officer in charge of this remote station—Lieut. Col. W. H. Powell, Eleventh Infantry.

FORT BAYARD, N. MEX.

Commanded by Col. J. Ford Kent, Twenty-fourth Infantry, who also commands the Bayard district of observation; is garrisoned by headquarters and four companies Twenty-fourth Infantry, one troop First and one troop Seventh Cavalry.

At my inspection in May last I found the garrison to be in a high state of efficiency, well drilled and instructed.

Although Fort Bayard is north and east of the trail usually pursued by depredating renegade Apaches who cross our Arizona border, I have constantly found it necessary to use its mounted force, sometimes in conjunction with the Fort Grant troops, in extensive field operations during the past year. Capt. John Pitcher, commanding Troop I, First Cavalry; then Lieut. (now Capt.) Herbert J. Slocum, commanding Troop D, Seventh Cavalry; Capt. C. J. Crane, Twenty-fourth Infantry; Lieut. W. F. Clark, Seventh Cavalry, and Lieut. I. C. Jenks, Twenty-fourth Infantry, have frequently during the past year been suddenly called on for detached service commanding cavalry troops ordered in pursuit of depredating Apaches or to assist in protecting deputy United States marshals in serving process on fugitives from justice. Captain Pitcher

is now absent from this post with his troop pursuing violators of our neutrality laws who had recently attacked and attempted to rob a customs station at Palomas, in the State of Chihuahua, Mexico.

Fort Bayard is constructed of adobe; was built in 1866. Many of its buildings are dilapidated and should be reconstructed. A better sewer system is important here, where it will undoubtedly be best to maintain a garrison for some years. A cold-storage system, operated at this post in connection with the ice machine without expense to the United States, is excellent and reflects great credit upon Colonel Kent, who devised it.

FORT DOUGLAS, UTAH.

This post is garrisoned by the Sixteenth Infantry, Col. H. A. Theaker, commanding.

At my inspection during the early part of September, 1896, I found the command in a highly creditable state of efficiency, a most marked improvement being apparent since my inspection of the previous year.

The barracks and officers' quarters are fairly good, although the former are much too small for companies of the present strength. The storehouses and other buildings are generally well adapted to the purposes for which they are intended, though a new quartermaster's storehouse is needed.

The post exchange deserves special mention, being model in its arrangements and operations.

Authority for the expenditure of about $5,000 has been obtained for a much-needed improvement of the sewer system of the post.

FORT DUCHESNE, UTAH.

This post is garrisoned by two troops of the Ninth Cavalry and is commanded by Maj. J. F. Randlett, Ninth Cavalry.

At my inspection in October, 1895, I found the command in a very satisfactory state of efficiency, well drilled and disciplined.

The quarters, barracks, and other buildings were constructed to accommodate a much larger garrison and are in a good state of preservation, except the stables. An allotment of nearly $2,500 has recently been obtained for the improvement of the cavalry stables. The quartermaster stables also need repairs. Water is supplied to the post by hauling it in barrels.

On account of the proximity of the post to the two Ute Indian reservations it will in all probability have to be occupied for many years yet, and a suitable water system should be provided.

The post commander, Major Randlett, is also acting agent for both the Uncompahgre and Uintah Utes, and in both capacities has done most creditable work. He has labored unceasingly for the civilization and material improvement of his Indian charges with most excellent results. His retirement, which occurs at an early date, will be a severe loss to these Indians.

FORT GRANT, ARIZ.

This post is at present garrisoned by the headquarters and six troops of the Seventh Cavalry and one company of the Twenty-fourth Infantry (temporarily) and a detachment of Indian scouts, and is commanded by Col. E. V. Sumner, Seventh Cavalry, who also commands the Grant district of observation.

My last inspection of this post was in May, 1896. The troops of this garrison during the past year have been almost constantly in the field

scouting and pursuing depredating Apaches in a very rough, mountainous country, and have suffered much exposure and hardship.

The results accomplished, as well as my inspection, showed that both officers and men were inured to field service and particularly efficient in this important duty.

The quarters and barracks are in fairly good repair, and will be sufficient for the actual needs of the normal garrison until this important post can be rebuilt and enlarged, which I recommend. The quartermaster storehouse is comparatively new and the best in the department. A new commissary storehouse and a new guardhouse should be constructed here.

An estimate for a much-needed improvement of the water and sewer systems has been forwarded for the action of the Quartermaster-General.

SUBPOST OF SAN CARLOS, ARIZ.

This is a subpost to Fort Grant, and is garrisoned by a troop from Fort Grant, changed monthly, and a detachment of Indian scouts.

The troops are fairly well quartered and as comfortable as could be expected in so hot and isolated a place.

FORT HUACHUCA, ARIZ.

This post is at present garrisoned by three companies of the Twenty-fourth Infantry, one troop of the First Cavalry, one troop of the Seventh Cavalry, and a detachment of Indian scouts, and is commanded by Lieut. Col. John M. Bacon, First Cavalry, who also commands the Huachuca district of observation.

All of the cavalry and most of the infantry have done much hard and creditable field service in the past year, particularly Troop A, First Cavalry, commanded by Capt. P. S. Bomus, First Cavalry, in pursuing depredating Apaches and violators of neutrality laws.

When I inspected the post in December, 1895, it was then garrisoned by four companies of the Twenty-fourth Infantry, commanded by Lieut. Col. D. D. Van Valzah, Twenty-fourth Infantry. The troops were well drilled and efficient, the barracks and quarters ample for the then garrison, and in a good state of repair.

FORT LOGAN, COLO.

This post, 10 miles south of the city of Denver, is garrisoned by the entire Seventh Infantry and two troops of the Second Cavalry, and is commanded by Col. H. C. Merriam, Seventh Infantry.

At my inspection of the post in September, 1896, I found the Seventh Infantry to be in a magnificent state of efficiency, admirably drilled and instructed, and in an excellent state of discipline. For this highly creditable condition of affairs great credit is due the regimental commander, Col. H. C. Merriam.

The cavalry squadron, commanded by Capt. J. L. Fowler, Second Cavalry, was also found to be very well drilled and instructed and highly efficient.

On a former occasion I inspected the barracks and other public buildings at this post and found them to be well constructed and in a good state of repair. The building constructed for a band barrack is entirely too small and can not be used for the purpose.

At present the officers' quarters are inadequate, but a commodious building intended for bachelors' quarters, officers' club, etc., is in process of construction and will soon be completed.

WHIPPLE BARRACKS, ARIZ.

This post, 1 mile north of Prescott, Ariz., is at present garrisoned by headquarters and two companies of the Eleventh Regiment of Infantry, and is commanded by Col. I. D. DeRussy, Eleventh Infantry. I last inspected this post early in July, 1896, and found the troops well drilled and instructed. I never saw a more beautiful military exercise than the gymnastic drill with rifles, accompanied by the regimental band, rendered by this battalion at my last inspection.

The quarters and barracks are sufficient for the officers and men of the present garrison—two companies—but the barracks recently vacated by the two companies of the Eleventh Infantry ordered to the new post near Little Rock, Ark., are very much dilapidated and are not fit for future occupation.

Though the troops of the Whipple garrison are rarely called out by Indian alarms, the presence of a garrison at this point is a matter of serious importance and prevents depredations by Apaches or other tribes in the Verde and Date Creek valleys, where there are not only farming interests entitled to protection, but where there are some of the most valuable and extensive copper and gold mines in the country.

I hope it may be found possible at an early date to rebuild this important post at or in the vicinity of its present site, as there are no other military posts in Arizona west of the great Apache reservations, while Wingate on the north, Grant on the south, and Bayard east of them are well situated to afford proper protection in an emergency.

FORT WINGATE, N. MEX.

This post is at present garrisoned by headquarters, two troops of the Second Cavalry, and a detachment of Indian scouts, and is commanded by Col. G. G. Huntt, Second Cavalry. It is near the Navajo and Moqui reservations.

I last inspected the post in July, 1896. A disastrous fire a few days before had destroyed all the barracks, several sets of officers' quarters, the administration building, post chapel, including library, ordnance storehouse, washrooms, and coal sheds, and a large quantity of public and private property.

At that time four troops of the Second Cavalry garrisoned the post, two of which have since been transferred to Fort Riley, Kans. The remaining two troops are still in tents, but work on a double set of barracks for their accommodation is progressing rapidly under the supervision of Lieut. R. B. Turner, Sixth Infantry, constructing quartermaster.

The two troops (Pearson's and Schofield's) now present saw some hard service in April, May, and June last, having been sent to Fruitland and Nolands's store, New Mexico, under instructions from the War Department, to prevent threatened invasions of the Navajo Indian Reservation by prospectors. Distance marched, 626 miles.

I found the troops well drilled and instructed, the command generally in excellent condition and ready for the field at shortest notice.

I found all the posts properly supplied, due care exercised in the purchase and preservation of public property, and strict economy in public expenditures.

The accompanying detailed statement of expeditions, scouts, and marches performed during the past year by troops in my department shows the extraordinary amount of field service rendered in Arizona and New Mexico by all the troops of the Seventh Cavalry and by

Troops A and I of the First Cavalry. I am glad to commend these several organizations for the prompt and soldierly manner in which they have met the expectations of their commanders and guarded menaced sections of our frontier.

Indian outbreaks on the southern border of Arizona have necessitated frequent demands for great activity by the troops in the Fort Grant district Its commander, Col. Edwin V. Sumner, Seventh Cavalry, has frequently gone in person to threatened points, directing field operations.

On the 19th and 20th of July last I visited and inspected the public buildings at Fort Marcy, Santa Fe, N. Mex., and renewed the recommendation made by my predecessor in command of this department and my own of the 11th of June, 1895, for the reoccupation of that important post, a most appropriate station for the headquarters of a regiment.

PAY OF CIVILIAN CLERKS.

I again invite attention to the comparison made in my last annual report between the pay of civilian clerks in the adjutant-general's office at these headquarters and that of clerks in the supply departments and renew my remarks then made and my recommendations that the matter be brought to the attention of Congress with a view of securing an increase of pay for the adjutant-general's clerks, who are now on a very unequal footing as regards pay compared with clerks in the supply departments. In this connection I request favorable consideration of the recommendations made by the adjutant-general of the department in his accompanying report.

REPORTS OF DEPARTMENT STAFF.

For particulars relating to administration in the various staff departments attention is invited to the reports of the department staff herewith submitted. I take pleasure in attesting the fidelity and efficiency with which all staff officers at these headquarters have performed their duties. Appended are reports of—

Lieut. Col. William J. Volkmar, adjutant-general.

Capt. A. C. Sharpe, Twenty-second Infantry, acting judge-advocate.

Maj. E. B. Atwood, quartermaster, chief quartermaster.

Col. W. H. Bell, assistant commissary-general of subsistence, chief commissary.

Lieut. Col. A. A. Woodhull, deputy surgeon-general, chief surgeon.

Col. J. P. Canby, assistant paymaster-general, chief paymaster.

Capt. W. A. Glassford, Signal Corps, signal officer.

Second Lieut. G. T. Langhorne, Third Cavalry, acting engineer officer.

The report of First Lieut. John S. Mallory, Second Infantry, inspector of small-arms practice, is not included, the necessary reports from troops and companies to prepare it not yet being received. It will be forwarded promptly upon completion.

My personal aids, First Lieut. John S. Mallory, Second Infantry, and Second Lieut. G. T. Langhorne, Third Cavalry, have performed the duties assigned them with industry and intelligence.

Very respectfully,

FRANK WHEATON,
Brigadier-General, Commanding.

The ADJUTANT-GENERAL, UNITED STATES ARMY,
Washington, D. C.

REPORT OF BRIG. GEN. ELWELL S. OTIS.

HEADQUARTERS DEPARTMENT OF THE COLUMBIA,
Vancouver Barracks, Wash., August 25, 1896.

SIR: I have the honor to report that the affairs of this department are, and have been for the past year, in an unusually tranquil condition. The force which was sent to the Nez Perces Indian Reservation, as communicated in my last annual report, returned to its station at Fort Walla Walla on September 14, having successfully performed the duties intrusted to it; and since that date very little detached service of importance has been required of the troops. The recent fishermen's strike on the lower portion of the Columbia River, which threatened to be quite serious in its consequences, was admirably repressed by the States of Washington and Oregon, which successfully employed their national guards for protection and restraint. The border ground of hostile factions of fishermen was Sand Island, situated very near to Fort Canby and along the southern line of the State of Washington. This, with its tide lands, is under United States jurisdiction and has been reserved for military purposes. Upon it it became necessary to place a detachment from the Fort Canby garrison with instructions to warn off all persons who should attempt trespass and to forcibly eject any who should land thereon. The commanding officer of Fort Canby was directed to support this detachment with his available force; and later (because of diminished garrison), to reduce it in numbers, relieve it daily, place it in quick communication with his post, and hold himself in readiness to sustain it should occasion require. The execution of these instructions was of material aid to the State authorities, whose united action held the strikers in subjection, suppressed all hostile demonstration, and in a short time restored the accustomed condition of affairs which enabled the fishing interests to successfully prosecute their business enterprises.

TROOPS—NUMERICAL STRENGTH, GAINS AND LOSSES, PUNISHMENTS, AND HEALTH OF COMMAND.

The mean numerical strength of the department in officers and enlisted men during the year ending June 30, 1895, was 1,675—24 greater than for the previous year, and 44 greater than the average for the last sixteen years. The strength on the 30th of last June was 1,598—77 less than the mean of the year just passed. This loss is mostly due to the reduction of the Fort Canby garrison, its two batteries (B and M, Fifth Artillery) having been sent to the Department of California and Battery H, of that regiment, having been sent from that department to take their places. The latter arrived on June 15, and now constitutes the garrison at that post. No other changes in the department force have taken place, and all troop and company organizations remain stationed as formerly reported, with the exception of Troop G, Fourth Cavalry, which was removed from Fort Sherman to Fort Walla Walla early in the month of October.

The average of the enlisted strength for the past year was 1,473. The records show a loss of 693 and a gain of 607. The gain through enlistment and reenlistment was 514, more than one-half of which was secured within the department. The remainder of the gain was by transfer (71) and from desertion (22).

Ninety-seven per cent of the numerical loss was through discharge, transfer, and desertion, and in ratios as follows: 66.8, 18.1, and 12.1. The loss through discharge was 463. Of that number 45.1 per cent were discharged on application at the end of three years and three months' service, as against a percentage the previous year of 28; 33.4 per cent by reason of expiration of terms of service, as against 40.6 for the previous year; 7.3 per cent through sentence of court-martial, as against 7.1; 4.7 per cent by purchase, as against 5.4, and 3.8 per cent for disability, as against 4.4. One and nine-tenths per cent were discharged without honor and 3.2 per cent by favor. It will be seen, therefore, that a great proportion of this loss was due to the advantage taken of General Orders, No. 80, of 1890, which still has about a year to run, while applicants for purchase are diminishing.

Desertion has contributed 12 per cent of the entire loss, and its percentage of the mean annual strength is 5.3 as against 4.3 for each of the two preceding years. I do not attribute this increased desertion to a growing spirit of demoralization or dissatisfaction with the service among the enlisted men generally, since it has been manifested at only a single post of the department, and one with a moderate garrison. That post unconsidered, department desertions are lighter than ever before. I am unable to discover the reason for it, and the boards of investigation called to ascertain causes fail to furnish satisfactory information. It was unexpected, remains unexplained, and was confined to a period of two months. It has been intimated, however, that the mine discoveries in that section of country, with the attendant excitement, contributed largely to produce results.

In my report of last year I stated that confinements were 20 per cent less than for the previous year, and that there were 21 per cent fewer trials by courts-martial. The accompanying report of the acting judge-advocate shows a decrease over the preceding year of 17 per cent in general court-martial trials, and of 8.6 per cent in those of inferior courts. With a slightly increased garrison the total of periods of confinement is about one-fifth less, but the forfeitures imposed and executed are one-fifth greater. The decrease in number of men tried the last over the previous year is about 2 per cent of mean enlisted strength. Sixty-one per cent of all trials involved offenses of a very light character, such as slight infractions of discipline or brief unauthorized absences.

The health of the command, which was reported last year as very satisfactory, continues to be excellent. A slight increase in number of cases taken on the sick list is observed, but discharges for disability and deaths from natural causes are fewer. The ratio of sick to duty men in this department has been and doubtless continues to be much less than that existing in the entire Army, and for the year 1895 it was little more than one-half, although the ratio at Fort Walla Walla, where fevers prevail, very closely approached it—this being due to conditions belonging to locality in part, but very largely, I think, to an insufficient water supply during the late summer and early fall months.

TROOPS—INSTRUCTION, DISCIPLINE, AND EFFICIENCY.

I have just finished the annual inspection, required by army regulation 193, of all posts and troops of the department. I have carefully

observed individual physique and deportment, and supervised tactical exercises; also examined armament, clothing, methods of caring for organizations, the quality and quantity of the food supply, and facilities for its preparation. The military instruction displayed denotes conscientious teaching by post commanders and their subordinate officers. Officers were as a rule prompt and efficient, with a theoretical and practical knowledge of the duties required of them; and the evidences of the existence of satisfactory discipline were quite apparent in the bearing and conduct of the troops, both when in ranks and in barracks, and whether or not in the performance of duty. The soldier of to-day is better fed and clothed, has better barrack conveniences, and more time to devote to his individual improvement and recreation than ever before. He is doubtless more fully instructed in strictly military duty and is better armed than ever before, and if animated by the right spirit he should show a correspondingly increased efficiency, as I believe he does. At all the posts a general contentment prevailed, in so far as I was able to judge. At all the troops were most generously subsisted, the articles composing the ration being of excellent quality and greatly supplemented through the proceeds of post exchanges. I received no complaints of any nature except from prisoners serving confinement under sentences of courts-martial, who requested a more speedy release than present orders in their cases permitted. All the troops of the department have received the new magazine rifle or carbine, and have had opportunity to test them in the annual target firing. This type of gun has given satisfaction, which increases with use, and the criticisms of last season on its inferior shooting qualities, based upon poor results obtained at target practice, and which were probably mostly due to defective ammunition and erroneous sighting, are no longer indulged in. Considerable of the known distance shooting of the year with the new ammunition, notwithstanding the use of the sights first issued, is excellent. The gun has displayed great strength and durability, can be manipulated with ease and rapidity, and only appears to need strengthening in some of its minor parts, such as the magazine cut-off and cocking appliances (which can be done without difficulty) to complete its effectiveness. Condemnation of its formerly pronounced mistaken large caliber has apparently ceased. Scientific research in this matter, endeavoring to secure as flat trajectory as possible with consequent extreme range, and which therefore was seeking the smallest practical caliber of bore, is tending toward a larger caliber than that formerly urged as best suited for arming troops.

The directed annual announcements in department orders of the periods of the year to be given to both practical and theoretical military instruction have been made at the proper times. Practical instruction, beginning early in the year with the simpler drill exercises, has been progressive, culminating in the fall months with the more important tactical maneuvers, with marches, and field operations as extensive and varied as the numerical strength of troops participating permitted. It has not been possible to concentrate garrisons, hence the smaller ones have been obliged to conduct operations unaided and to feign conditions, circumstances, and obstructions by a very active cooperation of the imagination. The reports of post commanders indicate that these exercises have been attended with beneficial results. During the winter months the excessive rains or snows at most of the posts prevent much out-of-door drill, and indeed do not permit that physical activity and exertion necessary to continue the physical development and military training of the soldier. For this reason the drill hall and

gymnasium combined is deemed an essential requisite of every post. In my report for 1894, when speaking of this necessity, I remarked that—

> A great aid in the practical acquisition of military education would be derived from commodious drill halls, however cheap and inartistic their construction. In this section of country the almost continuous rains and snows make out-of-door drills in certain months of the year impracticable, and it is difficult to give the troops that physical exercise which even health demands. Drill halls and gymnasiums at every post would be considered a necessity if that physical training and that healthy daily occupation which is essential to produce efficient and well-disciplined soldiers were rightly considered.

I renew this expression of opinion and beg to have it considered as a recommendation for authoritative action.

As to the character and extent of theoretical instruction pursued in lyceums and schools, I respectfully call attention to the appended reports of the assistant adjutant-general. However distasteful the lyceum may be to officers who have not acquired habits of systematic study, however unpleasant for all may be the drudgery which in a greater or less degree must attend it, however onerous to many the preparation of the papers or essays which are to be read at its meetings may prove, it should be continued and assisted, since it furnishes a lively incentive to study and research, by which alone officers can now keep pace with the rapid developments in military science and with the constantly increasing demands of their profession. This and the prescribed examinations preceding promotions have exerted a salutary influence over the younger officers of the Army.

STAFF DEPARTMENTS.

They have been efficiently and economically administered by those who have exercised supervisory charge, and subordinate officers have been zealous in the performance of duties. In the departments of the staff which are considered administrative, as distinguished from those of supply, the clerical force receives much less compensation than that performing work in the latter, although its labors are fully as arduous and demand an equally high grade of ability. This inequality of compensation has caused some comment among clerks of the departments receiving the lower rate of pay, as they believe that the services which they render are not rightly estimated; and there appears to be good ground for their belief, especially with regard to those who are required to become acquainted with and to asssist in transacting the complex business of an adjutant-general's office, where a general knowledge of all the line and staff duties of the Army is called for in proficient administration. These clerks have lost the benefits of all service and retirement laws which attended their former enlistments, have been placed on the same footing in all respects with other civilian employees of the Government, and there seems to be no reason why they should not be fully as well paid.

The cost of administering the department the past year is less than during any previous yearly period. The decreased market prices of subsistence stores, and the buying in contiguous markets by the chief and purchasing commissary at these headquarters of a greater portion than formerly of the components of the ration and of articles kept for sale by the subsistence department, has resulted in a considerable saving of money, not only because supplies have been obtained at cheaper rates, but also for the reason that transportation over long railway lines has been rendered unnecessary. Purchases, too, have been made with more frequency and in smaller lots, whereby issues of fresh sup-

plies are always possible and loss by deterioration avoided. The cost of subsistence stores condemned the past year is only $77.82. Liberal sales are made to enlisted men and post exchanges, amounting yearly to about $29,000, and at the more isolated posts such sales are very large.

In the quartermaster's department the results of the year show a decreased expenditure in nearly all of its special appropriations. The total yearly expenditure for 1895 was nearly $40,000 less than for 1894, and for 1896 it was nearly $30,000 less than for the prior year—the reduction in the two years being 26 per cent and the total expenditure for the fiscal year just closed being $192,508. Eighty-eight per cent of this two years' reduction is in the appropriation for regular supplies, and to a considerable extent is due to the reduced cost of forage and fuel and the saving resulting from a more economical use of those articles. Nearly all of the remaining reduction is in the appropriations for incidental expenses and for barracks and quarters. From the latter appropriation there was paid out in 1894 $20,657.13; in 1895, $16,352.53, and in 1896, $12,685.38. The allotment for the present year is $10,487.17—all that these headquarters requested. My late inspections convinced me that these small sums had been very judiciously and economically expended, and the post buildings and grounds never presented a better appearance. As for Forts Sherman and Spokane, no efforts at repair except those needed for the preservation of the buildings and the comfort of the garrisons were attempted, as their abandonment is looked for at an early period.

POSTS AND RESERVATIONS.

During the past year the posts of the department have served the purpose of sheltering troops only. No question of availability of location for detached service has arisen, and I have no suggestions to offer on this subject further than to renew recommendations contained in former reports. Those advocated the concentration of the Forts Sherman and Spokane garrisons at the city of Spokane, the establishment of an artillery post on Puget Sound, and the retention and enlargement of Boise Barracks, which for a number of years was threatened with abandonment. Some of these recommendations have met with favorable decision and initiatory action looking to their fulfillment. I would respectfully urge consideration of the wisdom of my advocacy of the retention of Boise Barracks and its sufficient enlargement to quarter a battalion of infantry. I do not urge this in the belief that there exists any indicated necessity for an increase of garrison for purposes of protection, restraint, or the enforcement of law, but for reasons advanced in previous reports, wherein I attempted to show that troops should be permanently retained in that section of country, and in somewhat larger force than at present, in order to meet emergencies which were likely to arise; that the location now occupied by them offered greater advantages as a military station than any other within that section, and that apart from preparations for emergencies the force should be augmented, as the proper education and training of troops for service demanded an increase of company organizations. Its availability of position when troops are required to move with celerity, the advantages it possesses for economy of supply, for health, for furnishing the needs and conveniences of officers and enlisted men, including educational and social privileges, are its desirable features. During the past few months the post commander has labored to secure more

water for post purposes, using appliances at hand and improvised machinery. He has measurably succeeded. The caving of the lower portion of a well by which he was experimenting and from which he had already obtained a large flow has checked efforts for a time, but they will be resumed very soon. The water has been located and it only remains to pierce to the underlying stream to secure an abundance. As it is, sufficient water has been secured to greatly change the aspect of the post, as trees, shrubbery, and grass are now flourishing where before they could not retain their freshness, nor even to any extent vitality, because of the dry, prolonged heat of summer. Some slight expenditure may attend further experiment, but it will be of small consequence in comparison with results which are reasonably sure to follow. A large amount of work has been performed by the small garrison of this post within the year. A portion of the reservation has been neatly fenced, roads and drives which required considerable grading have been constructed, many trees have been planted, which are constantly watered by means of small acequias, and a number of the post buildings have been repaired. The grounds, which hitherto have not received much attention, have been rendered quite inviting.

The unsatisfactory health of the Fort Walla Walla garrison, concerning which I have already commented, is believed to be largely due to the insufficiency and quality of its water supply. In that belief the post surgeon recommends and the post commander directs the thorough boiling of all drinking water during the warm months of the year. The supply is obtained from springs (doubtless surface springs) situated in marshy land close to the city of Walla Walla, in the immediate vicinity of which dwellings will soon be constructed. It is piped to the post and costs the Government, in rental, $300 yearly. In all excepting the dry months quantity appears to be abundant and no complaint is then heard of its quality; but it is evident if Fort Walla Walla is to be maintained some other source of water supply must be secured. The post possesses advantages as a cavalry station and is now garrisoned by a large and excellent squadron of cavalry.

I respectfully renew my recent recommendations for the improvement of Fort Canby, requesting an extension of its parade ground, without which the efficient practical instruction of its garrison is most difficult. This improvement would contribute largely to the garrison's health and accommodation and to the sightliness and conveniences of the post. I do not understand that the diminution of that garrison, lately effected under War Department directions, was intended to be of permanent continuance, but was consequent upon a desire to advance as much as possible a technical knowledge of heavy artillery among the artillery organizations, which can be satisfactorily accomplished only at stations having modern guns and appliances, none of which Fort Canby as yet possesses. The importance of the post in the line of Pacific coast defense is of course conceded by the authorities, and they doubtless have in contemplation measures looking to an effective garrison both at this point and at Fort Stevens. The loss at Fort Canby of one of its two batteries during the excitement attending the strike of the fishermen placed heavy duty upon its remaining force, and will do so in future should that large turbulent element of the Columbia River population again manifest a similar spirit of discontent and disregard for constituted government.

All discovered claims in conflict with the interests of the Government affecting any portions of the many military reservations of the department have been investigated and trespassers found to be in possession

removed. Last season trespassers on Sand Island and the reported illegal occupancy of a part of the reservation of Scarborough Head compelled department action. The resurvey of the latter became necessary in order to reestablish boundary lines, as former ones could not be traced. It was also thought desirable to ascertain the loss to the reserve by erosion—its southern and western sides being washed by the waters of the Columbia and Bakers Bay.

In November, 1894, I was directed from the Headquarters of the Army to take such measures as in my judgment might be practicable for protecting the interests of the Government in the unoccupied military reservations in and about Puget Sound, and for preserving them unimpaired as sites for defensive works. In my annual report for 1895 I remarked in regard to these reservations as follows:

> Search has developed the fact that some of them are entirely covered by perfected claims which had inception prior to dates of declaration. * * * The acting engineer officer of the department, with a small detachment, is now making a careful examination of their condition as regards boundaries, title, illegal interference, and occupation. It is probable that upon some of the most important ones squatters will be found who have been in possession for many years, and who have made quite extensive improvements. If so, the necessary action will be taken.

The officer above referred to visited all of the reservations, determined their boundaries and extent, ascertained the number and location of occupants, acquainted himself with those of them who had possessory rights as shown by a previous examination of land office records made by his office assistant, and warned off all others (of whom there were quite a large number), giving them directions to remove on or before certain specified dates. Since then two inspections have been made by officers detailed to discover if orders directing removal have been complied with and to give more pronounced warning in cases of failure. The officer who made the last trip, and who returned from that section a few days ago, reports that the squatters found on the preceding visit to be derelict had removed with their property, and that the reservations were clear of trespassers. There still remain upon a few of these reservations, however, a number of residents holding under perfected titles, and large portions of some of them are vested in individuals who acquired their rights under the homestead and donation land laws, or by purchase from those who had so acquired them. Fortunately, the majority of these private holdings are situated upon the less important reserves; but in some instances, especially in two, they extend to land which is quite important for Government to control in order to carry out any perfected scheme of defense. As to these and the remaining reservations of the department, all questions of conflicting rights, either of possession or title, between individuals and Government have been adjusted, except one which has arisen at Boise Barracks and involves the right to use water flowing from certain springs situated some distance above the post. The question has been adjudicated by the United States district court for Idaho and decision in favor of the Government obtained, but I understand that the defeated party has appealed his case and that the appeal is now pending.

ALASKA—NECESSITY FOR TROOPS CONSIDERED.

My inspecting tours of the present season included a trip to southeastern Alaska. Very little official information concerning that territory, which forms a portion of this department, has been obtained at these headquarters since the final withdrawal of troops therefrom in

June, 1877, when its public property was turned over to the Treasury Department and all military control over its affairs terminated. A fair estimate of its white population, if that element which employs its summers within it and returns south to remain during the winter months is counted, would place its numbers between 7,000 and 8,000—about one-half of whom are engaged in mining and the remainder in trade and fishing. Possibly one-quarter of its white inhabitants is on the Yukon River and tributaries. The most reliable data shows its native population to be about 27,000—10,000 Indians and 17,000 Eskimos; and 5,000 of these Indians dwell in the southeastern part of the territory below Mount St. Elias.

Until 1884 the territory was without a civil government. The rather anomalous Congressional act of that year which organized it into a district, which provided for it executive and judicial establishments but withheld all legislative power and representation from its people, which still continues in force without modification except that provision has been made whereby acquisition of land may be secured for business purposes, was adapted to its conditions at the time and has worked more satisfactorily than the former methods of control, when it was in fact an outlying province of the United States without political autonomy of any character. With increase of population and the development of business interests, the people desire a code of laws better suited to their present status than the one now sought to be enforced and which is drawn from those general laws of the United States and of the State of Oregon applicable to their existing conditions, supplemented, in cases in which those general laws do not apply, by the practical employment of such legal maxims as the District judiciary believes that remedial action demands. They have no wish to seek this code through the legislative assembly of a territorial organization, for that would impose individual expense and burdensome taxes, but rather through such Congressional legislation as a permitted representative in Congress might advise and urge as necessary for their welfare. It is possible that an act granting this desired representation without taxation would be no greater departure from the uniform practice of supplying civil government for United States territory than was the law of 1884 which created the District; and doubtless its representative chosen by the people would understand and could more efficiently demonstrate and successfully secure the measures of relief or assistance hoped for than any party, power, or means which under prevailing circumstances is available.

Since the passage of the act of 1891, which to a certain extent gave relief in the matter of individual land title, the objections made to the present code, aside from assertions of its insufficiency for the growing communities and increasing industries of the District, are more particularly addressed to its strictly prohibitory features regarding the timber of the country and the introduction and sale of ardent spirits. Neither of these provisions has been, nor can be, rigidly enforced. As to the first, the people ask that it be at least so far modified as to permit the free use of the forests by the manufacturing enterprises of the district and for domestic purposes. The second is especially difficult of execution. The Army and the Treasury Department endeavored for fifteen years to carry it out, but only measurably succeeded. The judiciary of the district, backed by the civil power of the country, by the customs authorities, and by assistance from the Navy, has failed to apply the needed restraint, although, aided by the more intelligent and best intentioned citizens, its efforts for repression have been

more effective than any which preceded them. The only practicable remedy for the evil is believed to exist in an exchange of prohibition for high license, summarily revocable for forbidden action, when all who avail themselves of the right under the law to trade in liquor will be pecuniarily interested in conducting a strictly legal business and in suppressing illicit traffic.

Under the present and long prevailing conditions, the native population, if it has not retrograded, certainly has not advanced, notwithstanding notable exceptions of marked improvement are in evidence to sustain a contrary opinion; and when under the influence of intoxicants, for which it barters freely every available commodity, it has been quite threatening in its unfriendly demonstrations and difficult to control. Probably the presence of the marine detachment at Sitka prevented an outbreak of the Indians there a short time ago, and occasional manifestation of hostile intention on their part has given some importance to the request of citizens for the permanent establishment of a body of troops in their midst. The civil and educational authorities of the District, however, say that troops are not required in southeastern Alaska either for protection or any other purpose, but forcibly assert that they are quite necessary on the Yukon River near the international boundary line, where mining interests are extensively conducted. They say that the Dominion of Canada is represented in that section by its mounted police, while on our side of the line the United States has no legally organized force to impose restraint or protect its inhabitants. To be sure, the civil jurisdiction established by the act of 1884 is coextensive with the entire Alaskan territory, but the means provided are not adequate to give it that practical extension which recently developed conditions in the Yukon country demand.

In considering such a disposition of troops it is difficult to understand what use could be made of them, unless some special legislation should authorize their employment. The law which created the mounted police of Canada vested it with certain well-defined criminal jurisdiction, with power to punish by imprisonment for specific periods of time. Unaided it can apply all the police regulations necessary to insure the peaceful conduct of a community. But the Army can not exercise authority of such a nature. The act of 1878 makes it unlawful to employ any part of it "as a posse comitatus, or otherwise, for the purpose of executing the laws, except in such cases and under such circumstances as such employment of said force may be expressly authorized by the Constitution or by act of Congress." Troops stationed on the Yukon might repress an Indian outbreak, but that is unlikely to occur, as the natives of that section are too few in numbers, too much scattered, and too poorly equipped to engage in any serious disturbance, even if so inclined. Further than this legitimate occupation for the troops would be wanting. They could not engage in an attempted enforcement of the prohibitory measures of the law of 1868 in respect to firearms, ammunition, and distilled spirits without special authorization, and administration in such matters has been given to the civil government provided for the District. Under existing conditions, then, no beneficial results could be expected from the service of troops in the interior of the Territory, and as the civil authorities do not need their aid in its southern and more populous sections their presence in Alaska is not required. Still I do not understand nor believe that an armed force is not essential for the safety and prosperity of its inhabitants. The Navy and Treasury vessels which ply its waters and the

excellent marine detachment at its capital enable the civil power to hold the natives in check and to signally obstruct lawlessness on the part of its large floating white population.

Very respectfully, your obedient servant,

E. S. OTIS,
Brigadier-General, Commanding.

The ADJUTANT-GENERAL UNITED STATES ARMY.

REPORT OF BRIG. GEN. JAMES W. FORSYTH.

HEADQUARTERS DEPARTMENT OF CALIFORNIA,
San Francisco, Cal., August 18, 1896.

SIR: I have the honor to submit the following report of operations in this department during the past year:

The camp of instruction at Monterey, Cal., was discontinued on August 17, 1895, and the troops assembled there returned to their stations. A special report relative to the instruction imparted at this camp was forwarded to your office on December 31, 1895.

Pursuant to instructions of the Major-General Commanding the Army, dated March 21 last, the lieutenant-colonel and Troops B, C, I, and K, Fourth Cavalry, left the Presidio of San Francisco, Cal., on May 3, en route to the national parks, as follows:

Troops B and K, Lieut. Col. Samuel B. M. Young commanding, to the Yosemite Park, and Troops C and I, Capt. George H. G. Gale commanding, to the Sequoia and General Grant parks, for the purpose of protecting the same from trespass, under instructions received from the Interior Department.

The squadrons arrived at the parks on May 19 and 25, respectively, and have since continued in effective performance of the duties specified.

During the month of June last batteries of the Fifth Artillery changed stations in San Francisco Harbor as follows:

Battery C, from Alcatraz Island to the Presidio of San Francisco.

Battery E, from Alcatraz Island to Fort Mason.

Battery I, from Fort Mason to the Presidio of San Francisco.

Battery K, from the Presidio of San Francisco to Alcatraz Island.

In accordance with instructions of April 2 last from the Headquarters of the Army, Battery H, Fifth Artillery, left the Presidio of San Francisco on June 12 last for Fort Canby, Wash. (Department of the Columbia), and Batteries B and M, Fifth Artillery, arrived at Alcatraz Island and the Presidio of San Francisco, respectively, from Fort Canby on June 19 last.

The First Infantry (except Company H) is now in camp at Santa Cruz, Cal., undergoing a course of instruction in "evolutions of the regiment," and in field exercises by methods similar to those illustrated in the camp of instruction at Monterey last year. It is thought such instruction will prove to be of great benefit to the regiment.

The heavy-artillery practice of the batteries of the Fifth Artilley in the department was conducted with care. Much interest was manifested by officers and men, and great improvement was shown in results obtained.

The Light Artillery Battalion, Fifth Artillery, under command of Maj. Tully McCrea, had a practice march during the months of June

and July to Monterey and return via Santa Cruz. While the battalion was encamped at Monterey it participated in the exercises attending the semicentennial celebration of the American occupation of California, held there on July 7 last, and while encamped at Santa Cruz it held its annual target practice.

Company H, First Infantry, has already been in camp two weeks during target practice, and will make a practice march later in the season.

From the foregoing it will be seen that all the cavalry, light artillery, and infantry serving in the department will have been on marches and in camp during the year.

Instruction in the four arms of the service (cavalry, light artillery, heavy artillery, and infantry) has been conducted systematically pursuant to the provisions of General Orders, No. 2, current series, from these headquarters, issued, in accordance with the provisions of army regulation 230, for the purpose of regulating instruction in the department, and marked improvement in results is reported by the inspector-general of the Pacific district.

A statement presenting the methods and indicating results of the instruction had at the lyceums of the several posts is attached hereto, marked Exhibit A.

The condition in respect to discipline during the year has been excellent.

The report of target practice in small-arms firing, not attached hereto, will be forwarded at the close of the practice season.

For particulars relating to administration in the several staff departments and recommendations by their chiefs on duty at these headquarters attention is requested to their reports herewith transmitted, as follows:

Col. O. D. Greene, adjutant-general.
Maj. Stephen W. Groesbeck, judge-advocate.
Lieut. Col. Amos S. Kimball, chief quartermaster.
Maj. Charles P. Eagan, chief commissary.
Lieut. Col. J. V. D. Middleton, chief surgeon.
Maj. A. E. Bates, chief paymaster.
Maj. Edward Field, Second Artillery, artillery inspector.
First Lieut. J. F. Reynolds Landis, First Cavalry, aid, inspector of small-arms practice, and acting engineer officer.
First Lieut. Frank Greene, signal officer.

I am, sir, very respectfully, your obedient servant,

JAMES W. FORSYTH,
Brigadier-General, Commanding.

The ADJUTANT-GENERAL UNITED STATES ARMY,
Washington, D. C.

REPORT OF BRIG. GEN. Z. R. BLISS.

HEADQUARTERS DEPARTMENT OF TEXAS,
San Antonio, Tex., September 8, 1896.

SIR: I have the honor to submit the following report of this department covering the period since date of my last report, August 22, 1895:

The condition of affairs in the department has been such as to demand no active operations of the troops, and their movements have been limited to changes of stations, practice marches, and attendance at the

encampment of the State Volunteer Guard at Tyler, Tex. There have been no complaints of depredations of any kind committed in any part of the State, no thefts of cattle or other raids along the Rio Grande, and I have never known a more desirable condition of affairs or more cordial relations between the inhabitants of the north and south banks of the river than now exist. This is due in some measure to the presence of troops on both sides of the river, but principally to the improvement in the class of inhabitants and the promptness and justness with which the laws of each country are enforced.

In obedience to instructions from the War Department the companies on the lower Rio Grande were relieved by others and sent to more desirable stations. On account of the extreme heat and other considerations troops should not be kept at Forts Brown, Ringgold, McIntosh, or Eagle Pass for a greater period than two years. There are now but three companies on the lower river that have been there over one year, and under existing instructions they will have a change of station this fall. In making the necessary changes to relieve the troops on the lower river four companies and seven troops changed stations, all but one by marching. These changes are reported in detail in the report of the adjutant-general of the department.

Orders were received from the War Department relieving the troops of the Seventh Cavalry from duty in this department, and they proceeded by rail to the Department of the Colorado in October, 1895. Orders were also received to abandon Fort Hancock on the RioGrande, then garrisoned by one troop of the Seventh Cavalry. The post was abandoned October 24, 1895, and turned over to the Interior Department January 31, 1896.

On March 7, 1896, I left this point with Lieutenant Glasgow, aid-de-camp, and proceeded to Fort McIntosh. The troops and post were inspected. I found the garrison in excellent condition, well drilled and instructed and well supplied. A proper magazine and an oil house are needed at this post. This post is adjoining the city of Laredo, where the Mexican National Railroad crosses the Rio Grande into Mexico.

On March 8 I proceeded to Hebbronville by rail, and thence by spring wagon to Fort Ringgold, arriving March 10. I inspected the post and found it in excellent condition, the troops well drilled and instructed. The quarters for officers and men are very good. The sewer system is now approaching completion. The officers' quarters should have porches or galleries on the second stories. The quarters in the west ends of buildings are exposed to the afternoon sun, rendering them very hot day and night. Galleries could be added to the second stories at a small expense, and they would add immensely to the comfort of the occupants. The thermometer indicates 100° or more in the shade nearly every day for three or four months of the year, and has been reported over 119° three days in succession. In such a temperature every reasonable effort should be made to render the quarters as cool as possible. In my report of 1895 I stated that the river was liable, on its next rise, to cut through into an old bed and leave the post 3 miles from water. The rise came, but the river took such a course as to diminish the danger of its leaving its present channel.

I left Fort Ringgold on March 12 and proceeded by spring wagon to Fort Brown. The wagon road, which in wet weather is almost absolutely impassable, was dry and in excellent condition. The river boat was at Ringgold, but owing to the low stage of water and the

uncertainty of the time of her arrival at Brown I took the land route. The water in the Rio Grande seems to be steadily decreasing in volume. In 1846 General Taylor moved his troops by boat to Camargo, with their supplies, but the river could not be depended on now for any such operations. Thirty years ago boats drawing 6 feet of water ascended readily as far as Roma, above Ringgold; now the boat drawing less than 3 feet of water has great difficulty in getting to Ringgold, and has made made no trip since last March.

I arrived at Fort Brown March 15 and inspected post and troops. The troops are well drilled and instructed and well supplied. The buildings are in good condition, about $4,000 having been expended during the year in repairs. The pipes, settling tanks, pumps, etc., of the water system at this post are nearly worn out, having been in use many years. A new supply is urgently needed. The brush revetment had saved the administration building and promises to protect the bank of the river permanently. This revetment consists of brush mattresses bound together and held in place by wire cables attached to deadmen on the banks. Since my last inspection the river had cut into the bank and taken away the porch of the administration building and cut in several feet toward the lagoon in rear of the officers' quarters. The revetment was then put in and up to this time has protected the bank. Still further use of brush in this manner has been authorized, and it is hoped the land and buildings can be saved. So far this remedy has operated better than any other, though many thousand dollars have in years past been expended in the effort to prevent the cutting of the banks by the river, and many schemes have been tried without success. The commanding officer at Fort Brown reports September 4, 1896:

> The screen has proved a great success in the protection of the bank during the last four floods of the river, and since its completion not an inch of the protected bank has been lost from any cause, while the bank above and below the screen sustained some damage at every rise of the river.

I left Fort Brown on the 18th of March and crossed the river and proceeded to San Miguel, Mexico, on the branch of the Mexican National Railroad that runs from Matamoras to San Miguel. An effort is being made to extend this road to Camargo and thence to Monterey. At San Miguel we left the railroad and crossed the Rio Grande in a small skiff 3 miles from that place, and took the spring wagon which was in waiting for us to Fort Ringgold. The road from Matamoras, Mexico, to San Miguel is narrow gauge, and makes but three round trips a week between the two points. Its traffic is entirely local, as it connects with no other road at present. It originally was intended to run this road to New Laredo, Mexico, opposite Fort McIntosh, but it has never been completed. I returned to San Antonio March 22, 1896.

On June 24 I left headquarters of the department and proceeded to Camp Eagle Pass and inspected that post. The quarters and barracks are in fair condition, the troops well instructed and supplied and satisfied with their station. A new kitchen has recently been authorized, and satisfactory arrangements for water supply for the post have been entered into with the water company of Eagle Pass. The reservation at Camp Eagle Pass was purchased by the United States a few years ago, but old Fort Duncan had been nearly destroyed before the Government regained possession of it. The one set of barracks is in good repair. The old adjutant's office is used as a temporary hospital. This garrison should be increased by one company, preferably of cavalry. This will necessitate a new set of barracks and quarters for the officers. The

post is at the crossing of the Rio Grande by the Mexican International Railroad. There are two good bridges across the river—the railroad and a wagon and foot bridge—and there is a fine ford at this point also. Ciudad Porfirio Diaz, opposite Camp Eagle Pass, is a flourishing Mexican city of about 10,000 inhabitants. It contains the offices, shops, and depots of the Mexican International Railroad, and has quite a colony of American employees of that company. Eagle Pass, Tex., adjoins the post of Eagle Pass. It is a city of several thousand inhabitants and seems in a prosperous condition. It was the principal port for exports and imports during the rebellion, and large quantities of cotton passed through it.

I proceeded to Fort Clark on the 26th of June and inspected that post and found it in excellent condition. A vegetable cellar has been constructed during the year, and the post now seems well supplied with everything necessary to the health and comfort of the command. Rancheros below the post, on Las Moras Creek, complained of the lack of water for cattle and irrigating purposes, and instructions were given to the commanding officer of Fort Clark to put flood gates in the numerous dams on the reservation and to allow as much water as possible to pass to the ranches below. This has been done, and it is believed that there will be no scarcity of water in the future that can be remedied by the authorities at the post. It is reported that there is, or has been, less water in the creek this year than ever before.

I left Fort Clark on the 27th of June and arrived at Fort Bliss on the 28th, and inspected troops and buildings. This post was badly shattered by a hurricane in the spring of last year and many of the buildings damaged; all damages have been repaired and the walls reenforced. A new cavalry stable has been built. An abundant supply of fresh water is obtained from wells at the post. The barracks and quarters are excellent and in good police; the troops are well drilled and instructed. The post is on a mesa and is exposed to high winds and dust storms. It has improved very much in appearance the last year. Trees have been planted around the parade ground and grass is growing about the quarters of the officers. With the free use of irrigation grass can be grown on the parade, and when that is accomplished and the trees grown it will be a handsome and desirable post. There are barracks for four companies at this post, but only three are stationed there at present. Another troop of cavalry should be sent to this post when they can be spared from other stations. This post is opposite the city of Juarez, Mexico, and 5 miles from the city of El Paso, Tex., both cities of importance. El Paso is the junction of the Santa Fe, the Southern Pacific, the Texas Pacific, and the Mexican Central railroads. It is a very important point, as "The Pass" is the only one through the Organ Mountains for about 150 miles that can be used by railroads, and all roads going west from Texas and within 100 or 200 miles of El Paso will go through that pass or the mountains will have to be tunneled. There is also a short road called the Live Oak Railroad that passes north from El Paso through the reservation of Fort Bliss, and this year right of way has been granted across the reservation to still another road running north. On the Mexican side at Juarez a new road has been laid out and work has commenced on it. This road runs from Juarez to Corralitos, and thence through Sonora to the Pacific. It will be built by an American company, but the offices, shops, and so forth, will all be on the Mexican side of the river. This road, the Rio Grande, Sierra Madre and Pacific Railroad, will, when completed, open up the Sierra Madre country, which is noted for its wealth of

silver mines, and will give to the Mexican Government a short and easy road over which to transfer troops, and, in connection with the Mexican Central Railroad, will make the city of Juarez a point of great strategic importance to Mexico. These roads and the five others now running into El Paso, Tex., will make the latter place of increased importance to the United States as a military station.

The Rio Grande for many miles above and below El Paso has been dry this summer, principally due to the great quantity of water taken from it in Colorado. Before the settlement of Colorado and New Mexico the river seldom if ever went dry, but of late years it is of almost annual occurrence, causing great loss to the farmers and grape growers along the valley. To obviate this calamity it is proposed to place a dam across the river 3 or 4 miles above El Paso, and by means of it to store for irrigation purposes the immense amount of water that runs to waste during the spring and winter months. The International Water Boundary Commission and United States and Mexican engineers are now engaged in preparatory work for this dam and it is to be hoped that it will be constructed and prove a satisfactory solution to the water question in the Rio Grande Valley of Texas.

I left El Paso on the 29th and arrived in San Antonio June 30. Total distance traveled in visiting posts—by rail, 1,823 miles; by spring wagon, 318; total, 2,141 miles.

The large and important post of Sam Houston is garrisoned by four troops of the Fifth Cavalry, six companies of the Eighteenth Infantry, and one light battery of the Third Artillery. The post is new and in excellent condition generally, though some of the buildings have settled and cracked from insecure foundations. The troops are well drilled and instructed and the post is well supplied in every respect. The consolidated mess is complete in every particular and seems to give general satisfaction. The contract with the San Antonio Water Works Company to supply the post and department headquarters expired in June and a new plan was adopted of receiving the water according to measurement, which has increased the cost of supply. This will be remedied and new arrangements recommended that will supply the garrison and headquarters of the department with water at about the same cost per man as heretofore. A large quantity of water is needed monthly to preserve the numerous trees and keep alive the grass on the lawns. The contract to furnish water to the post was made ten years ago, when the number of troops and animals was much less than now, and it is believed that terms more advantageous to the Government than the former contract can be made, taking into consideration the increased size of the post.

Plans of a new sewer system are now completed and will be submitted for the action of the proper authorities. This sewer will necessitate a large expenditure of money, but it is absolutely necessary to the health of the command, which for some reason is not as good as at the other posts in the department.

There is no land belonging to the Government that can be used for target practice and maneuvering grounds. A tract was selected about 16 miles from the post for these purposes, but the cost was considered too great. During the last few months about forty different tracts of land have been examined by Lieutenant Read, quartermaster Fifth Cavalry, and Lieutenant Glasgow, aid-de-camp. These tracts are at distances from this post varying from a few miles to 90 miles. Several of the most promising ones have been inspected by a board of

officers appointed for that purpose, and their report will soon be received. It is probable that none can be found to so well fulfill all conditions as the Devine tract, heretofore recommended.

All the posts of the department have been well and regularly supplied with quartermaster and subsistence stores during the year, and the unavoidable losses of provisions and stores have been kept at a minimum.

An officer from each post is now engaged in mapping the country in the vicinity, and their present work will be completed by the end of the current year.

Commendable efforts have been made by the commanders of posts to comply with the requirements of orders in relation to physical culture, and a great deal has been accomplished, but it is believed better results will be obtained when a more systematic course of instruction is formulated. Great interest has been shown by the enlisted men in athletic games and sports, and they have been heartily encouraged by the officers. There are no gymnasiums at any of the posts, but temporary arrangements have been contrived that have answered the purpose so far, though much is needed in this direction. Many expeditions have been made on bicycles belonging to officers and soldiers. The results so far attained are not encouraging for the use of the bicycle as a part of the military equipment in this department. They are very valuable in the vicinity of cities where good roads are found, but the bicycles in use at the different posts in this department are not strong enough to stand the hard usage to which they would be necessarily subjected on the rough country roads that they would be required to travel in service. The natural roads of Texas are perhaps the best in this country, but there are no side paths, and they are at times very muddy and at others extremely dusty, making it almost impossible to travel over them on a wheel; but the worst feature seems to be the thorns that fall in the roads, and which are constantly puncturing the tires. Extracts from the reports of officers on this subject will be appended to this report.

The troops of the command have been promptly and regularly paid, and the new system of payments by check seems to work satisfactorily to all concerned.

The troops of the department have made practice marches or changed station by marching. In addition to this, the light battery of the Third Artillery, two troops of cavalry, and four companies of infantry went to Tyler to take part in the encampment of the Texas State Guard. They were cordially and hospitably received, and the service was undoubtedly of great benefit to both organizations. The aggregate distance traveled by the troops of the department was—by rail, 5,171 miles; by marching, 5,595 miles; average distance marched by each company of infantry, 150.2 miles; by each troop and battery, 299.4 miles. The Southern Pacific transported Captain Augur's troop of the Fifth Cavalry from Fort Sam Houston to Fort Bliss, a distance of 629 miles, and the troops to and from Tyler were carried by the International and Great Northern Railroad Company, all being done promptly and in a satisfactory manner. The railroad service is so complete in this State that all the troops in the department could be concentrated at almost any desired point in a very short time. The only posts not having railroad connections with the general system are Forts Ringgold and Brown.

The post exchanges at the various posts have been in successful operation during the year, and have added greatly to the comfort of the men.

In the lyceums the prescribed course of studies has been pursued, and essays have been written by officers at the posts, with the usual excellent results.

The following staff officers are on duty at these headquarters, and attenion is respectfully invited to their complete and excellent reports hereto attached:

Lieut. Col. Arthur MacArthur, assistant adjutant-general.
Capt. Frank L. Dodds, acting judge-advocate.
Lieut. Col. Gilbert C. Smith, chief quartermaster.
Capt. Edward E. Dravo, chief commissary.
Col. Francis L. Town, chief surgeon.
Maj. Francis S. Dodge, chief paymaster.
Second Lieut. William J. Glasgow, First Cavalry, aid-de-camp, acting engineer officer.
Maj. Clarence E. Dutton, chief ordnance officer.
First Lieut. Samuel Reber, chief signal officer.
First Lieut. John Little, Fourteenth Infantry, aid-de-camp, inspector of small-arms practice.

Attention is respectfully invited to the remarks of the adjutant-general of the department in regard to clerks at department headquarters, which are concurred in and approved. The present laws bear especially hard and apparently unjustly discriminate against this class of men.

Target practice has not yet been completed, but as soon as the report of the inspector of small-arms practice is received it will be forwarded.

Very respectfully, your obedient servant,

Z. R. BLISS,
Brigadier-General, Commanding.

The ADJUTANT-GENERAL UNITED STATES ARMY,
Washington, D. C.

REPORT OF BRIG. GEN. J. J. COPPINGER.

HEADQUARTERS DEPARTMENT OF THE PLATTE,
Omaha, Nebr., August 31, 1896.

SIR: In submitting this my annual report of the affairs of the Department of the Platte I beg to premise that as regards actual military operations the year has not been an eventful one. On August 27, 1895, the date of my last report, the troops constituting the expedition to the Jacksons Hole country, except two troops of the Ninth Cavalry, were still in the field. Under the immediate command of Maj. Adna R. Chaffee, Ninth Cavalry, they were charged, pending the judicial settlement of the question involved, with the task of preventing incursions into the country mentioned which the Fort Hall Agency (Bannock) Indians might undertake and which would be likely to result in a conflict between them and the white settlers. The Indians, however, showed no disposition to leave their reservation. The troops were accordingly returned to their respective stations during the latter part of October. The two troops of cavalry referred to had as early as August 19 marched to Fort Washakie, Wyo. In order that a mounted force might be constantly within a reasonable distance of the scene of the recent disturbances, they were, with the sanction of the War Department, permanently assigned to station at that post on September 9, and on October 15 the company of the Eighth Infantry, which

had been its only garrison, having previously reopened an old trail forming the shortest route to the Hole, was relieved from duty at the post and ordered to join its regiment at Fort D. A. Russell. A detailed account of the movements of the troops under Major Chaffee appears in an exhibit to this report.

Under date of May 25, 1896, the United States Supreme Court decided in the case of the Indian Race Horse, brought before it by appeal from the circuit court for Wyoming, that the right to hunt under certain conditions on the unoccupied lands of the United States in Wyoming which was granted in 1869 to the Bannock and Eastern Band of Shoshone Indians, in a treaty entered into between them and the United States, had lapsed with the admission of Wyoming as a State into the Union. Under this decision a highly valued privilege acquired by treaty was legally terminated without their assent. This would seem to entitle these untutored people to some substantial compensation at the hands of a just and generous Government.

Other changes in the stations of troops to be noted are the following:

Pursuant to War Department orders, Companies B and G, Eighth Infantry, were transferred on September 22 from Fort Niobrara, Nebr., to Fort D. A. Russell, Wyo., and on the following day the companies of the Seventeenth Infantry still in this department (B, F, and H) left that post en route for a station in the Department of the East.

In accordance with telegraphic instructions from the Secretary of War, dated June 18, 1896, the transfer of the companies of the Twenty-second Infantry from their several posts in the Department of Dakota to Fort Crook, Nebr., a new post situated 10 miles south of this city, and that of the Second Infantry from Fort Omaha, Nebr., to the former stations of the Twenty-second Infantry, was effected about the close of the last fiscal year. Never before in its history has the Twenty-second Infantry been thus concentrated.

A detachment of two officers and thirty-five enlisted men of the Second Infantry remains at Fort Omaha engaged in disposing of the movable public property there preparatory to its final abandonment as a military station. No instructions have so far been received as to the disposition to be made of the post or the manner in which the buildings and grounds are to be cared for. The detachment will probably join its regiment early in September.

The troops of this department are well located in respect of any service that may be required of them either within or without the department. All except the garrison of Fort Washakie are at posts within ready access to one or more lines of railway. It is taken for granted that the desirability of concentrating the troops of each of the two cavalry regiments whose headquarters are in this department whenever local conditions shall admit of it is kept in view by the authorities.

All of the troops save those composing the Jacksons Hole expedition engaged during August and September, 1895, in practice marches varying from 107 to 170 miles in length, in connection with which field exercises were performed and arms and equipments subjected to the test of field service. Subsequently a practice march, extending to a point not less than 6 or 7 miles from the post, was made once a week by the troops of all posts during a period of six months, as a rule by battalion (squadron). These weekly marches, on which the full equipment was carried, proved to be an excellent means for keeping both officers and men in condition for field work. Further information concerning them and of the exercises gone through with in that connection will be found in a table submitted by the adjutant-general of the department.

In accordance with instructions already issued the troops at Forts Meade, Robinson, Russell, and Crook have arranged to start on extended practice marches the latter part of this or early next month.

A course of practical instruction, embracing the tactical drills of their arm, field, and battle exercises, target firing, and the drill of detachments in signaling and in the use of Hotchkiss and Gatling guns, has been pursued by the troops at all posts since April 1; and, except when interrupted by the practice marches above mentioned, will be continued until October 31. The various branches of the drill were taken up in their proper sequence and are to be carried on progressively throughout the season, affording to the commander of each unit the requisite facilities for bringing it up to the proper standard. Absenteeism being a serious hindrance to the accomplishment of this end, measures were taken for enforcing a full attendance at drill and exercises of every kind, and to avoid loss of interest and other bad effects incidental to a distribution of military instruction over the entire day, the interval between breakfast and dinner—that is, the full forenoon—was set apart for such instruction. This arrangement, which was initiated last year, has proved eminently satisfactory. For one thing, it has served—afternoons being thus left free for administrative work and recreation—to stimulate athletic games and sports of every kind, interest in which has been further increased by periodical competitions for prizes, participated in by the bulk of the command.

Whenever practicable gymnastic exercises have been held pari passu with other instructions, and will receive special attention during the coming winter. At only two of the posts are there suitable buildings that have been fitted up as gymnasiums. In the lack of such buildings, the men have been exercised outdoors or in their barracks. A properly equipped gymnasium, supplied also with ample bathing facilities, is, however, so obviously necessary for the proper training of the soldier that the provision of one at every permanent post should not be made dependent upon exchange profits and the precarious assistance of the Quartermaster's Department.

During four months from November 1 last lyceums were in operation, and conducted in accordance with the regulations, at all posts, all the officers except those falling under the exemptions being in attendance. Recitations in various subjects related to the military profession were held and a professional paper was prepared and read by each member, which was subsequently discussed. Theoretical instruction intended to fit them for a better discharge of their duties in peace and war was also given noncommissioned officers by the commanders of their respective companies. The results of the instruction in the cases of both officers and noncommissioned officers are reported as, and from my personal observation are believed to have been, satisfactory. Schools for soldiers and for children have been maintained, as is required, in each garrison. Special information is embodied in a subreport touching the subjects taught, methods applied, and progress attained in these schools.

Good order and good discipline have prevailed within this command. Gauged by the number of court-martial trials, usually considered a reliable index, the conduct of the enlisted men has been better during the past year than in any one of the previous ten years of which there is a record at these headquarters. This state of affairs is the more gratifying since all the garrisons have contributed to bring it about. The report of the judge-advocate, to which I ask your special attention, shows, as compared with the average of the preceding three years, a

falling off in the year 1895–96 of 4.18 per cent in the percentage of trials by general court-martial to enlisted strength, as well as a marked decrease in that year from the year previous in the number of such trials for offenses involving drunkenness. The comparative showing in respect of inferior court-martial trials is also highly creditable to the troops. In the matter of unexceptionable conduct and the almost total absence of desertion (on the subject of which a special report has been recently submitted) the palm must be awarded to the Ninth Cavalry, a colored regiment.

I renew my recommendation of last year that our military code be so modified as to provide not only for the better organization of the summary court urged with much force by the Judge-Advocate-General, but also for the enlargement of the jurisdiction and punishing power of the garrison court-martial. There can be no question that the efficacy of punishment is increased by promptness in its administration; and from the nature of the case the methods of the garrison court, made up of four officers, and therefore fairly entitled to a wider range of action than the summary court, for which it is at present only a substitute, are more direct and less dilatory and expensive than those of the higher tribunal. Our garrisons are now for the most part of considerable strength, and it would in my judgment be entirely safe to vest in their commanders, men of rank and experience, and in the garrison courts a larger measure of discretion and power, including that of dishonorably discharging, or discharging without honor, soldiers whose conduct renders them unfit to continue in service.

I have recently finished a tour of inspection of all the posts in the department except Fort Crook, and can say from personal knowledge that the troops are well disciplined and as a rule well instructed. At one post neither the battalion nor the regimental drill was satisfactory to me, but here the proper remedy has been promptly applied. At another post the performance of the troops under a new commander showed marked proficiency as compared with the previous year, especially in the various field exercises, with the great importance of which all commanding officers are now duly impressed. All the troops were found to be prepared for immediate field service.

As the result of the annihilation of what has been termed the "frontier" our Army has reached a stage in its development at which the individual and collective training of the troops must be considered paramount to post and other kinds of work. It has been already intimated that thorough training can best be effected by leaving the companies, as far as practicable, intact. Any draft upon them, whether for fatigue, extra duty, guard, or detached service, constitutes a greater or less obstacle to progress, and so does the joining of uninstructed recruits in the spring and early summer. A guard is of course necessary both for instruction and discipline, but at large posts all its members might well be drawn in turn from one company. Fatigues also are and always will be indispensable, though under existing conditions they interfere less than formerly with military work. Entire organizations rather than mixed details should be employed for this purpose, and this has been done here whenever practicable.

A special service corps, as separate and distinct from the combatant force as the hospital corps, and chiefly made up of disciplined ex-soldiers, for the performance of what is known as "extra duty," would be a great boon to the Army. Not only would it stop the drain from the fighting units, and abolish to a great extent the difference between their paper and actual strength—in war a fruitful source of confusion and disaster—

but it would open up to the man who has entered the Army for life a useful career suitable to a more mature yet still vigorous age, and what is even more important, it would vastly improve and at the same time cheapen the administrative service.

Among the labor which in the interest of thorough training and good discipline may in my judgment be dispensed with at many posts is that involved in the cultivation of post gardens. The ration has been increased of late by an allowance of a pound of vegetables and may be further supplemented by purchases from exchange profits; besides, fresh vegetables can be bought at reasonable prices at most of our military posts. A regulation giving to the department commander power to decide whether and to what extent troops shall be required or permitted to work a garden would seem to be better adapted to present conditions than the one now in force.

From the report of the chief surgeon, an interesting document which I commend to your notice, it appears that during the time which it covers the rate of "admission to sick report" has been higher, and the rate of "daily ineffective" lower, than the mean of each of those rates for the seven years beginning with the year 1890. The increase of the admission rate over the normal is the result, the chief surgeon points out, of the great number of admissions at three of the posts in the department on account of alcoholism and venereal disease, especially the former. Instructions were accordingly issued to the garrisons concerned in March last, when the matter was first brought to my attention, having for their object the expulsion from the service, either by court-martial sentence or in a summary way, of men addicted to the excessive use of liquor ; and it is hoped that the medical statistics for the next year will show that this object has been fully obtained. It is to be noted, however, that the surgeon's figures show that on the whole sickness from all causes has less interfered with military duty and that the judge-advocate's tables warrant the deduction that excessive drinking has been less prejudicial to discipline in the year under consideration than in the antecedent period embraced by the comparison.

The quality of the recruits obtained is reported as good, and as superior, all things considered, to that of the recruits that were gotten under the old system, which did not (in fact under the existing conditions could not) recognize the principle that the men needed for a certain regiment should be enlisted, and from the outset instructed and disciplined, by officers of that command.

Defects apparent or real which field use of them has developed in the arms and equipments in the hands of the troops have been carefully investigated, and the reports of the investigations have been submitted to higher authority. A preponderance of opinion among the officers favors a rear sight with which allowance can be made for drift and wind. While I incline to the belief that a very simple rear sight, such as that of the present service arm, is best adapted for the use of the average soldier when in battle or under excitement, I would regard it desirable that a few guns having rear sights supplied with a wind gauge be issued to each company and placed in the hands of the expert shots, who could be utilized, when occasion offers, as sharpshooters. It will be remembered that soldiers of this class, when concealed in the branches of high trees or placed at similar points of vantage, did effective work during our late war.

I concur in the recommendation of the acting chief ordnance officer that sufficient provision be made at every post for the proper storage of ordnance supplies.

Since January 1, 1896, the cavalry serving in this department has been supplied from Kentucky with about 89 remount horses. Although these animals have not yet been tested by active service conditions, they are looked upon with favor, and it is generally conceded that they are superior to the untractable, vicious, and treacherous broncho, a type of horse which experience has demonstrated to be unfit for cavalry purposes. Sixty-two additional remount horses are required and have been estimated for.

The payment of the troops has been effected throughout the year with regularity and dispatch. Their supplies, both as regards quality and quantity, have been all that could be desired.

The condition of the buildings at the several posts, as well as the character and adequacy of the accommodations they provide, were among the matters inquired into during my recent inspection tour. I found that the buildings at Forts Washakie and Robinson were in fair repair and sufficient in capacity for the comfort and needs of the garrisons. At Fort Meade the barracks are in a more or less advanced state of decay, though sufficiently roomy. With a full complement of officers at the post, the quarters for them are, however, inadequate and crowding results. This post should be rebuilt or extensively overhauled. At Fort Niobrara the officers' quarters are satisfactory as to condition and number, but with the larger companies we now have five of the barracks are overcrowded and additions to them ought to be at once provided. Estimates have been handed in with this object in view. A special appropriation of $40,000 has been made for constructing much needed additions to the eight barracks at Fort D. A. Russell. When completed the requirements of this post as regards barrack accommodation will have been fully met. Twenty-one of the thirty-four sets of officers' quarters there consist of more or less dilapidated frame buildings, ill arranged and deficient in modern conveniences. They should be promptly replaced by new ones, now that the maintenance of the post as a military station appears to have been decided upon. Fort Crook, a new post occupied for the first time by troops on June 28 last, whose buildings in many respects afford extraordinary comfort to both officers and men, is yet deficient in structures which have always been regarded as essential, if not absolutely indispensable. No provision has been made there, a regimental post, for quartering a band, for stabling mounted officers' horses, for the storage of ordnance supplies, mineral oil, or ice, and the officers' quarters are insufficient in number for a full garrison.

The exchange system has continued to work well at every post. At Fort Robinson the authorities of the county embracing the military reservation, jurisdiction over which has been ceded to the Federal Government, caused the arrest on April 1 last of the officer in charge of the exchange and of an attendant for selling beer in the exchange rooms without having paid for and obtained the license required by the law of the State of Nebraska. Fortunately the question of the exchange's amenability to this law was promptly passed upon by the United States circuit court for the district of Nebraska—the judge-advocate at these headquarters ably presenting the side of the exchange—and decided in the negative; the immediate result being the liberation of the arrested officials, in whose behalf a writ of habeas corpus had been sued out.

Among the changes in the conduct of the exchange which, since the new exchange regulations have been in operation, experience has shown to be desirable are the following: 1. To prevent its being done perfunctorily and devolved upon a subordinate, the taking of stock by the

exchange council should be required but once a quarter instead of monthly. 2. It would be preferable, in view of the well-known tendency of company commanders to so operate the institution that it will yield a large profit, to organize the council with the officer of the line next in rank to the post commander, a company commander, and the exchange officer as members. At posts where there are several field officers one of them would thus be utilized for this important service. Such a constitution of the exchange council would, I think, serve to prevent the exchange from degenerating into a mere drinking place. 3. The absence of an explicit rule upon the basis of which profits are to be distributed is apt to produce friction. The old rule, which made the number subsisted at the mess of each participating organization such a basis, should be restored.

Herewith inclosed are the reports of the heads of the several staff departments at these headquarters covering the fiscal year last past.

Very respectfully,

J. J. COPPINGER,
Brigadier-General, Commanding.

The ADJUTANT-GENERAL UNITED STATES ARMY,
Washington, D. C.

REPORT OF THE COMMANDANT OF THE CAVALRY AND LIGHT ARTILLERY SCHOOL.

CAVALRY AND LIGHT ARTILLERY SCHOOL,
Fort Riley, Kans., September 1, 1896.

SIR: Pursuant to the requirements of paragraph 10, regulations of this school, I have the honor to submit, for the information of the Major-General Commanding the Army, the following report of the progress and wants of this school.

The school year commences January 10 and ends December 20. The time for submitting the annual report having been changed from December 20 to September 1, the report of the operations of the school will be confined to the time taken up between January 10 and August 31, 1896.

The progress and wants of the school from September 1 to December 20, 1895, will be found in the annual report submitted December 20, 1895.

Attention is respectfully invited to that report, particularly to the operations of the command during the fall and winter months.

Commencing January 10, 1896, progress up to date has been made in accordance with the scheme for the course of instruction adopted by the school staff for this year, practically the same as published in Appendixes A and B, report of December 20, 1895.

The instruction has been carried on daily, Saturdays and Sundays excepted, and has been very thorough.

For more information in detail I refer to the reports submitted by the surgeon and directors of the subschools, hereto appended and marked A, B, etc. The recommendations therein made are concurred in by me.

During the month of August two troops of the First Cavalry (C, Hein's, and G, Wainwright's) changed station to Fort Sheridan, Ill., being relieved by two troops of the Second Cavalry (G, Sibley's, and H, Robinson's) from Fort Wingate, N. Mex.

Paragraph 29 of the school regulations requires the written order of the commandant for the disbursement of the funds appropriated for the school. This paragraph, so far, has been a dead letter, as no funds have ever been appropriated. I earnestly request that an appropriation of $1,500 be asked from Congress for the purchase of a printing and binding plant, professional books for the school library, and for other material needed.

I recommend that this post be furnished with an electrical plant for lighting the barracks, quarters, and streets. It is believed that this method of lighting the post would be cheaper than the one now in vogue, and it would beyond doubt be far more satisfactory.

The last Congress appropriated $75,000 for construction of buildings at this post. The War Department has authorized the expenditure of this sum as follows:

For construction of—

One set of barracks in artillery subpost.

Two double sets of captains' quarters in artillery subpost.

Five stable-guard buildings in rear of cavalry stables.

One quartermaster's workshop.

One quartermaster's stable, corral, and wagon shed.

One chapel and schoolroom.

These are buildings much needed, and will tend greatly toward the convenience and comfort of the garrison.

In order, however, to complete the post as originally contemplated (12 troops of cavalry and 5 batteries of light artillery) there should be erected in the main post a barrack for the band, a stable for headquarters and band horses, 4 stables for troop horses, 6 sets of cavalry lieutenants' quarters, a veterinary hospital, and paddock.

In the subpost will be required 2 sets of barracks, 4 double sets of lieutenants' quarters, and 3 gun sheds.

The necessity and importance of these buildings have been so often urged that a repetition of the same here is considered unnecessary.

I particularly invite attention and renew the recommendations made in my last annual report, dated December 20, 1895. The work of the school would be materially enhanced were the recommendations made therein favorably acted upon.

The present method of making payments to the command at this post and school works very smoothly, and so far has been entirely satisfactory.

The following changes have occurred in the staff of the commanding officer since last annual report:

LOSS.

Capt. W. H. Miller, assistant quartermaster, relieved from duty at Fort Riley, Kans., per Special Orders, No. 118, current series, Adjutant-General's Office.

Capt. T. U. Raymond, assistant surgeon, United States Army, relieved from duty at Fort Riley, Kans., per Special Orders, No. 122, current series, Adjutant-General's Office.

First Lieut. W. W. Quinton, assistant surgeon, relieved from duty at Fort Riley, Kans., per Special Orders, No. 35, current series, Adjutant-General's Office.

GAIN.

Capt. G. Ruhlen, assistant quartermaster, assigned to duty at Fort Riley, Kans., per Special Orders, No. 118, current series, Adjutant-General's Office.

Capt. A. B. Heyl, assistant surgeon, United States Army, assigned to duty at Fort Riley, Kans., per Special Orders, No. 122, current series, Adjutant-General's Office.

In conclusion I am pleased to report that all officers and soldiers have exhibited the greatest interest and zeal in the performance of all duties and drills pertaining to the course of instruction followed.

Very respectfully, your obedient servant,

A. K. ARNOLD,
Colonel First Cavalry, Commandant.

The ADJUTANT-GENERAL UNITED STATES ARMY,
Washington, D. C.

REPORT OF THE COMMANDANT OF THE UNITED STATES INFANTRY AND CAVALRY SCHOOL.

UNITED STATES INFANTRY AND CAVALRY SCHOOL,
Fort Leavenworth, Kans., August 1, 1896.

SIR: I have the honor to submit the following report of the operations of the United States Infantry and Cavalry School for the first school year commencing September 1, 1895, and ending May 31, 1896:

The student class comprised the following-named officers:

Second Lieuts. William M. Crofton, First Infantry; Peter E. Marquart, Second Infantry; Paul A. Wolf, Third Infantry; Guy H. B. Smith, Fourth Infantry; John F. Madden, Fifth Infantry; Frank D. Webster, Sixth Infantry; John R. M. Taylor, Seventh Infantry; First Lieuts. Edgar Hubert, Eighth Infantry; John P. Finley, Ninth Infantry; Second Lieuts. John F. Stephens, Tenth Infantry; Herbert O. Williams, Eleventh Infantry; Willis Uline, Twelfth Infantry; First Lieut. William N. Hughes, Thirteenth Infantry; Second Lieuts. James R. Lindsay, Fourteenth Infantry; George McD. Weeks, Fifteenth Infantry; George D. Guyer, Sixteenth Infantry; First Lieuts. James T. Kerr, Seventeenth Infantry; John C. Gregg, Eighteenth Infantry; Second Lieuts. Joseph Frazier, Nineteenth Infantry; Robert W. Mearns, Twentieth Infantry; William M. Morrow, Twenty-first Infantry; Orrin R. Wolfe, Twenty-second Infantry; Thomas F. Schley, Twenty-third Infantry; Harrison J. Price, Twenty-fourth Infantry; Vernon A. Caldwell, Twenty-fifth Infantry; Edward Anderson, First Cavalry; Cornelius C. Smith, Second Cavalry; George P. White, Third Cavalry; James H. Reeves, Fourth Cavalry; Powell Clayton, jr., Fifth Cavalry; First Lieut. John M. Stotsenburg, Sixth Cavalry; Second Lieuts. Frank Tompkins, Seventh Cavalry; George W. Kirkpatrick, Eighth Cavalry; First Lieuts. Charles J. Stevens, Ninth Cavalry; William H. Smith, Tenth Cavalry.

At the examination in January, 1896, the following-named officers were found deficient, and were recommended to be relieved from further attendance at the school:

Second Lieut. W. M. Crofton, First Infantry, in military art; Second Lieut. C. C. Smith, Second Cavalry, in engineering.

By instructions from the Major-General Commanding the Army the above-named officers were retained at the school and required to make good their deficiency before the beginning of the next school year.

At the examination in June, 1896, Second Lieut. C. C. Smith, Second Cavalry, was again found deficient in military art and in engineering and recommended to be relieved from further attendance at the school.

REPORTS OF CHIEFS OF DEPARTMENT.

The course pursued in theoretical and practical work during the term is fully described in reports of chiefs of department, to which attention is invited. In the printing of these reports I have caused certain parts to be omitted in order to lessen their length. The omitted parts enumerate assistant instructors, give names of officers delivering the lectures, and give criticisms on practical exercises in the field and solution of problems, all of which, while necessary for the records of the staff, are not essential to the annual report of the commandant.

Special attention is invited to the report of the instructor in the department of military art and to that of the instructor in the department of engineering, both of which show how practical work in the field has been increased. It is hoped in the future to still further increase this practical work and to determine by experience what more of the theory can be profitably omitted.

In the department of law the interest of the student has been stimulated by the introduction of its practical feature in citing for solution supposable cases in international questions which might require immediate action by an officer. Attention is therefore invited to the report of the instructor.

I am indebted to Capt. H. C. Taylor, president of the United States Naval War College, at Newport, R. I., for suggestions as to development along this line, which he made by letter, inclosing similar problems offered for solution by officers of the Navy taking the course at the college.

CHANGES IN SCHOOL REGULATIONS.

From the experience of the school year just closed it may be safely asserted that the abolition of the system of marking for daily recitations has proved to be a wise measure. The following remarks of the instructor in the department of engineering cover the subject so thoroughly that they are given here rather than embodied in the printed copy of his report:

The experience in this department has been almost entirely beneficial, for while we realize the fact that some students have made occasional careless recitations which the spur of the daily mark might have obviated, still, on the other hand, the immense advantage to the student of having the instructor's mind free to impart instruction, answer questions, and make suggestions more than outweighs the disadvantage referred to.

From an instructor's as well as a student's standpoint I can say confidently that absolute fairness in marking oral recitations is impossible. One instructor will place a higher value on certain points of a demonstration than another; then, again, one student will talk more fluently than another and deceive an instructor by avoiding points on which he is weak, while the further fact that one man may draw an easy subject to recite upon and another a difficult one cannot be avoided.

Under the marking system my experience was that the student, especially if striving for honors, felt himself to be on the defensive while the instructor acted as inquisitor. Now there is more freedom for both; the student does not fear losing his place in the class by a possible accident, and the instructor does not have to divert his own mind from the matter under discussion to think of "tenths." In this connection it is pertinent to state that in the examination just concluded, and which covered the subjects of map construction, map reading, and military topography in general more thoroughly than any previous one since the organization of this school, there was but one man who got less than 83 per cent, while in the corresponding examination two years ago there were fourteen with a lower percentage than 83, or, to put the statement in another way, the examination just closed showed a general average of 92 per cent, while the class before, in the corresponding examination, attained an average of 86 per cent and the class before that 88 per cent. The reason for this remarkable advance in the general average of the examination is not obvious, the average ability of the present and the two previous classes being

about the same, so that the reason must be due to different methods of instruction. The new text-book being fuller and more comprehensive, probably accounts for most of the advance, but it is believed that part of the gain may justly be attributed to the freedom on the part of the instructor to give his entire attention to instructing, instead of having his mind diverted from that object in his endeavor to give the student a just mark on his recitation.

Whether this conclusion is fully justified or not I am satisfied that the doing away with the daily marking system has on the whole been a distinctive advance to this school.

The instructor in the department of military art remarks upon this point as follows:

In the recitations during the past year the new regulation abolishing the recitation marks was carried into effect with excellent results. It was formerly practicable for an officer to pass an indifferent examination and still take a respectable standing in class rank by virtue of a high aggregate of recitation marks. This is now impossible, as the result depends entirely upon the knowledge of the subject retained by the officer at the end of the term of instruction. It was feared that the abolition of recitation marks might materially affect the quality of the recitations, but such does not seem to be the case. The recitations during the past year were on an average fully equal to those of the preceding classes, and the examinations were on the whole the most satisfactory ever held at the school.

CONSOLIDATION OF DEPARTMENTS.

It is very desirable that the department of cavalry and the department of infantry shall be developed pari passu with the department of military art and the department of engineering. To do this requires the services of officers who are studious, progressive, and energetic. It is not intended as a reflection upon instructors when it is stated that this object has not yet been accomplished. The work was necessarily to be developed gradually. When the school was started, clear ideas as to its scope had not been evolved. Consequently, in the primitive efforts to do something everyone reached for that which was obvious, and in those days the departments of cavalry and infantry seemed to have decided advantage, inasmuch as they had something tangible. So barrack-square drills, ceremonies, duty as officer of the day and officer of the guard, and recorder of boards of survey, etc., absorbed much of the time of officers of the student class and all of the attention of the instructors in these two departments. It is evident that such a course was not consistent with the object sought in establishing the school. While it is desirable to maintain proficiency in these things, it should be and presumably is required of all young officers while serving with their regiments before coming to the school. In other words, they come here with the expectation of learning something more than this in the departments of cavalry and infantry. If this expectation is not to be realized, the name of the school ought to be changed. It is hoped, however, that satisfactory progress can be attained through the efforts of zealous chiefs of department.

The task is a difficult one; so difficult that the questions naturally arise, why maintain the two departments of infantry and cavalry as separate and distinct departments? Why not consolidate them with the department of military art?

The present course in the department of infantry embraces (1) infantry drill regulations, which, under paragraph 185 of said regulations, should be taught to the subaltern by his captain prior to arrival at this school as a student officer; (2) lectures upon foreign infantry drill regulations; (3) "infantry fire, and its use in battle." These are not in themselves suggestive of the necessity for the maintenance of a separate department. The same remark is applicable to the course in

the department of cavalry. The department of artillery has had no representative since the light battery was removed.

As a matter of fact, the practical course in the handling of companies and battalions of infantry and the squadron of cavalry and every phase of minor tactics in the field goes on now in the department of military art, and anything which might be attempted in that line by either the department of cavalry or the department of infantry must necessarily be a mere repetition.

The consolidated department, embracing the department of military art, the department of infantry, the department of cavalry, and the department of artillery, could have some distinctive title, such as "the tactical department," with one chief as senior instructor, and such assistant instructors as experience would determine to be necessary.

One objection has heretofore caused me to hesitate in recommending such a step. The school staff should have, as it does at present, a sufficient number of members to avoid tie votes upon important questions and to impose dignity in its sessions. However, in spite of such consolidation, these objects could be attained by making the senior assistant instructor in each branch of the tactical department a member of the school staff ex officio.

It is not essential that the chief of the tactical department or that either assistant should be a field officer, although this would be desirable where rank is combined with requisite qualifications, which embrace more than familiarity with drill.

INCREASE IN NUMBER OF STUDENTS.

It has been recommended several times that one class of officers be graduated every year by having two classes simultaneously under instruction. The main obstacle reported has been the lack of quarters. This will continue to be strictly true, no matter what may be the expenditure of the Government in erecting additional quarters, so long as married officers are to be sent to the school for instruction.

If none but bachelor officers were sent as students the accommodations now existing would, with a little crowding, admit of the detail of two officers from each regiment, provided that marriage while at the school would insure the student's immediate return to his regiment.

The incentive for effort by the student should be pride in his profession, impelling him to acquire all that he can. Unfortunately other stimulus is needed. This may be found by causing the diploma to exempt a graduate from examination upon any subject covered in the school course when he is brought before a board prior to promotion. Greater proficiency in attaining the diploma being required, there would be greater effort on the part of the student.

INSTRUCTION IN THE THREE ARMS.

To properly conduct operations in minor tactics a light battery is greatly needed at the school. The battery which was formerly available was removed on account of lack of quarters. This deficiency could be supplied by using the present hospital as a barrack. It is not suited to its present use. It is a perfect labyrinth and, being insufficient, the medical department is contemplating more additions which can never make it what a modern hospital should be. By erecting a new hospital the old building will answer for the light battery.

ANNUAL APPROPRIATION.

Attention is invited to the report of the secretary showing the necessity for an increase in the amount appropriated for the use of the school.

Very respectfully, your obedient servant,

H. S. HAWKINS,
Colonel Twentieth Infantry, Commandant.

The ADJUTANT-GENERAL UNITED STATES ARMY,
Washington, D. C.

REPORT OF THE COMMANDANT OF THE UNITED STATES ARTILLERY SCHOOL.

UNITED STATES ARTILLERY SCHOOL,
Fort Monroe, Va., August 31, 1896.

SIR: I have the honor to submit the following report of the United States Artillery School for the year ending August 31, 1896:

The period covered by this report embraces courses of study in steam and mechanism, electricity and mines, chemistry and explosives, and military science. The nature and scope of these studies as well as the details and methods of instruction have been already described. Three months were given to steam and mechanism, four months to the two departments of electricity and mines and chemistry and explosives, instruction being given simultaneously in both departments, and four months to military science.

STEAM AND MECHANISM.

The value of the course in steam and mechanism is yearly made more evident by the increased interest taken in it and by the results accomplished. Modern guns and carriages are complicated machines, and with the hydraulic, pneumatic, and steam plant sometimes used to operate them, systematic instruction in the principles of mechanism is essential to a proper understanding of them. While the course is limited to the wants of artillery officers, in the opinion of the instructor the time allotted to it should be somewhat increased and the subject should come in the first school year.

ELECTRICITY AND MINES.

The purpose of the course in electricity and mines is not only to make officers familiar with the principles and laws of electricity, but to enable them to acquire, experimentally, a working knowledge of such subjects and apparatus as they may be required to use in the operations of a modern sea-coast fortress. The importance of this subject is constantly increasing, and more time, it is believed, can be advantageously assigned to it.

CHEMISTRY AND EXPLOSIVES.

Instruction in the department of chemistry and explosives covered about the same ground as in former years. Interest in the subject was manifested by the voluntary work done by students outside of the allotted time.

MILITARY SCIENCE.

In the department of military science instruction was given under the usual heads of minor tactics, grand tactics, strategy, and logistics. The last week of the course was given to the practical solution of problems in minor tactics in the field. The instructor and class, provided with bicycles and good maps, and all being sufficiently expert in the use of the bicycle to make 30 or 35 miles a day without fatigue, were assembled on the ground and the problem was stated. The students were then sent in various directions to obtain the information necessary for its solution, after which they assembled at a designated point, where, from the reports made, the solution of the problem was discussed. The advent of the bicycle and its general use by officers have made this interesting and profitable method of instruction in the principles of minor tactics entirely practicable.

LABORATORIES.

The laboratories of the several departments of the school and their equipment have been improved year by year and afford substantial advantages for practical and experimental work. The experiments mentioned in my last annual report as being conducted jointly by Lieutenant Squier, Third Artillery, now in charge of the department of electricity and mines, and Professor Crehore, of Dartmouth College, with a view to developing a new instrument for measuring the velocities of projectiles by the use of polarized light, have been entirely successful, and an instrument based on this principle has been constructed under their supervision which promises to be valuable, not only for measuring velocities of projectiles in the bore of the piece as well as at other parts of the trajectory, but for the general purposes of science.

First Lieut. George L. Anderson, Fourth Artillery, who has been in charge of the department of electricity and mines since 1890, and through whose zeal and interest it was brought to a high state of efficiency, was relieved from duty at the school by Special Orders, No. 260, Adjutant-General's Office, 1895. Lieut. George O. Squier, Third Artillery, was assigned as instructor in that department November 5, 1895, and had charge of the instruction of the present graduating class.

ENLISTED MEN'S DIVISION.

The enlisted men's division of the school continues to be the efficient means of instructing the noncommissioned officers and more intelligent private soldiers of the post, in the technical parts of their duties. This instruction not only enables men to perform such duties more intelligently, but increases their interest in them. With the better class of men now entering the service, no difficulty is found by them in understanding the principles requisite to an intelligent performance of their duties as noncommissioned officers and gunners.

Of the 50 members of the school in attendance at the close of this session, 12 were proficient on the entire two years' course and were given diplomas; 21 were proficient on the first year's course, and 17 will be permitted to take the first year's course over again.

LIBRARY.

There have been added to the library since my last report, by purchase and otherwise, 391 volumes. The work of card indexing commenced several years ago by Captain Caziarc, librarian, has made

steady progress, upward of 15,000 cards having been added during the past year. The library now numbers about 11,500 volumes, and is contained in a small frame building which affords insufficient room for its accommodation and very inadequate protection for such valuable property. The need of a new fireproof or slow-burning building, in a safe locality, is now imperative.

BINDERY AND PRINTING PRESS.

The bindery and printing press have been efficiently and economically administered and, as heretofore, contribute materially to the wants of all departments of the school.

ARTILLERY PRACTICAL EXERCISES.

Practical artillery instruction during the year embraced marching maneuvers, the service of field and machine guns, the 8-inch B. L. R. gun, the 12-inch B. L. R. mortar, the 8-inch M. L. R. gun, the 15-inch S. B. gun, and the entire schedule of mechanical maneuvers; also target practice with all these pieces. Besides the foregoing exercises, the practical work of unloading from the cars the new guns and mortars and their carriages recently received, and moving them to their emplacements and mounting them, is now in progress. This work is in charge of Lieutenant Duvall, Fifth Artillery, and Lieutenant Parkhurst, Fourth Artillery, and is being successfully accomplished with such makeshifts as are at hand. The post is very well provided with material for handling the old guns and carriages, but the receipt of the new ones makes more evident than ever the inadequate equipment of the post for this and future work. With the present unsuitable material much time is consumed and the labor of many men employed to do that which with suitable means could be done speedily and with but few men.

Two cranes, one at the railroad depot and one at the wharf, each capable of raising 30,000 pounds, should be furnished without delay for unloading ordnance material; for transporting it, convenient sections of railway tracks and suitable trucks should be provided.

Much interest was taken in the target practice, especially with the new guns, and the record shows constant improvement from year to year. With the 8-inch M. L. R. the record for the past three years shows mean absolute deviations as follows: 1894, 62.4 yards; 1895, 39.8 yards; 1896, 36 yards.

Some quite remarkable scores were made with the 8-inch B. L. R. gun. The record of Battery F, First Artillery, shows in a score of three shots at 6,000 yards a mean absolute deviation of 6.66 yards, with three hits in the 20-foot vertical target; that of Battery E, Fourth Artillery, in a score of three shots at 6,000 yards, shows a mean absolute deviation of 6.49 yards, with one hit in the vertical target. The gun and carriage behaved well in this practice, as did also the 12-inch B. L. R. mortar. The latter was fired at 6,000, 7,000, and 8,000 yards. In the mortar firing it was found that the vernier for laying off azimuths is not suited to accurate and quick work; the same may be said of the graduations on the index circle. The position of the vernier is unfortunate in being directly under the shot truck in loading position, where it is impossible to protect it from the truck as it is brought up to this position. This difficulty would be obviated and the laying off of azimuths on the index circle as now put down with its zero to the south simplified by placing the vernier on the front part of the carriage.

A Lewis depression range finder was received at the post several months ago and a site has been selected for it, but as yet no emplacement has been prepared on which to mount it. It is important that this should be done at an early day in order that I may introduce into the drills of the school some of the elements of the problem of fire control and direction as a first step toward the preparation of drill regulations for that system.

DISCIPLINE.

The discipline of the school is believed to be excellent. Professional zeal, devotion to duty, and obedience to military requirements animate both officers and enlisted men. There has been no serious infraction of discipline, and the enlisted strength of the command is kept constantly near its maximum chiefly by enlistments made at the post. Outdoor sports and athletics of all kinds are encouraged and participated in by the men, and due attention is given to their systematic physical training.

SANITARY CONDITION.

The new sewer system, extending to all buildings on the post, having been completed, its sanitary condition is now entirely satisfactory. There has been but little sickness in the command during the year and no deaths. The drainage is not and can not be made satisfactory except at large expense, but though the water may occasion some inconvenience by standing in pools, and even flooding the parade after long and heavy rains, as the soil is sandy it quickly soaks off when the storm has abated, leaving no injurious effects.

REMARKS.

As the curriculum of the school is at present arranged, each instructor has but one course of study and gives instruction in that once every two years. In my opinion they would be much more in touch with their work, and in other respects it would be a great advantage, if each instructor were given two courses, instruction to be given in one course the first year and in the other the second year. A more definite and detailed statement of this plan will be submitted later for the consideration of the Major-General Commanding the Army.

The special reports with respect to the graduating class, required by paragraph 23, Artillery School Regulations, have been already submitted.

Very respectfully, your obedient servant,

ROYAL T. FRANK,
Colonel First Artillery, Commandant.

The ADJUTANT-GENERAL UNITED STATES ARMY,
Washington, D. C.

REPORT OF THE ADJUTANT-GENERAL.

ANNUAL REPORT

OF THE

ADJUTANT-GENERAL TO THE SECRETARY OF WAR.

WAR DEPARTMENT,
ADJUTANT-GENERAL'S OFFICE,
Washington, October 10, 1896.

Hon. DANIEL S. LAMONT,
Secretary of War.

SIR: I have the honor to submit my annual report for the year ended September 1, 1896.

ADJUTANT-GENERAL'S DEPARTMENT.

By the retirement of Colonel Wood the Department has now come to the reduced organization prescribed by law. All of its officers and those of the line on duty with the Division of Military Information in the Adjutant-General's Office have performed their important and delicate duties with marked ability and efficiency.

THE DIVISION OF MILITARY INFORMATION.

Upon the retirement of Lieutenant-General Schofield in September, 1895, Col. Thomas M. Vincent, Assistant Adjutant-General, on duty as Assistant Adjutant-General, Headquarters of the Army, was transferred to the Adjutant-General's Office and assigned to the charge of the division. One officer has been assigned to duty in the division, and two have been relieved.

Lieut. Col. William Ludlow, Corps of Engineers, whose services were needed with his corps, has been relieved from duty as military attaché in London, and his place has not yet been filled.

At his own request, after four years' service, Capt. R. K. Evans, Twelfth Infantry, military attaché in Berlin, has been relieved from duty in that city. His successor has not yet been designated.

There is employment for one or two additional military attachés in countries in which the United States of America takes a special interest.

In the month of March, "The Organized Militia of the United States in 1895," pamphlet No. 7 of the Military Information Division series, was issued. This is the third publication of the kind. Like reports were issued for the years 1893 and 1894. The results of the work done during the past year by army officers on duty with the governors of States and at the various encampments of the State troops are here condensed and presented in convenient shape, together with other facts relating to the militia. The report contains a summary of the condition of the State forces and of the progress made by them during the year 1895.

No. 8 of the Military Information Division series, "Notes on Organization, Armament, and Military Progress," appeared early in May. A small pamphlet under the same title appeared in August, 1894, as Military Information Division pamphlet No. 4. The general scheme of classification adopted in the earlier edition was retained, but the work was revised, made more complete, and brought down to date. The first part is devoted to the organization of the arms and services of European and American armies; the second part to notes on small arms, and the third part to notes on equipment. The demand for this volume has been very great.

No. 9 of the Military Information Division series was issued about the middle of July, under the title of "The Military Schools of Europe, and other Papers selected for Publication." It was followed in August by No. 10, "Sources of Information on Military Professional Subjects; a Classification List of Books and Publications." This work is practically a catalogue of official and semiofficial military and statistical publications on the shelves of the Military Information Division, complete up to April 15, 1896. It contains over 3,500 titles. and a single title sometimes represents a work of several volumes.

No. 11, "Notes on the War between China and Japan; The European Autumn Manœuvres of 1896; Orders, Instructions, &c.," was received from the printer October 8. The volume was so long in the hands of the printer that most of the maneuvers were completed before its receipt.

All these publications were distributed to the Army as far as the limited editions would allow. The law limits the editions to 1,000 copies each.

Besides the publications of the division, a number of other Government publications have been distributed to the Army, including 125 copies of the special consular reports entitled "The Highways of Commerce," and 50 copies of the navy chart called "The Submarine Cables of the World." A number of Government publications and miscellaneous documents, such as the Official Army Register, Reports of the Chief of Ordnance, Official Records of the Rebellion, text-books of the service schools, etc., have been sent to the military attachés for purposes of exchange.

The total number of volumes distributed, including the publications of this division, amount to about 6,000.

Several attempts have been made to obtain the official staff maps of various foreign countries by exchange for our own Government charts and maps. As there are no detailed War Department maps of the territory of the United States, it was proposed to send in exchange for these foreign staff maps the maps issued by the United States Land Office and the United States Geological Survey. The number of sets that could be obtained of these was, however, so limited that only the staff maps of Germany and Belgium could be procured in this way. The additions to the map section have therefore been made largely by purchase. There have been received in all during the past year about 300 maps (1,000 sheets) of foreign countries. There are now on file 1,684 maps (3,690 sheets), including 184 outline military maps of the United States. In addition there are nearly 1,000 atlas sheets issued by the United States Geological Survey.

A large number of foreign publications have been added to the files of the division during the year. The aim in this connection has been not to attempt to accumulate a complete military library, but to confine the collection as far as possible to the military and statistical publications of foreign countries, and to such treatises as have received official

approbation. In collecting such books, the services of the average book importer are of little value, as many of the works desired are not for sale, and are consequently not found in publishers' price lists or advertisements. Such works can be procured only through the military attachés, generally by exchange.

In addition to the books above mentioned, a large number of reports, manuscript documents, etc., have been received from the military attachés, and in many cases the information thus obtained has proved to be of special military interest and of more than ordinary value. The classifying and indexing of the information obtained from these books and documents is entirely in the hands of the officers on duty in the division, the clerical force being fully occupied with other matters, and the work has been very laborious. About 15,000 index cards, it is estimated, have been added to the files during the year.

A great amount of work has been done during the year in answering calls for military information. Whenever time could be spared from more pressing duties these calls were answered at length. The large amount of editing and translating done during the year has, however, prevented some of these requests from receiving the consideration that they might otherwise have obtained.

The appropriation for contingencies of the Military Information Division is barely sufficient for the necessary expenses of collecting information, maps, etc., but it is not proposed at present, however, to recommend any increase of the sum heretofore granted.

The work of making a military reconnoissance map of the United States was commenced at a number of points during the past year. The completion of this labor will require several years. It is intended to prosecute the work thus commenced until it is finished. If the plan proposed be carried out the work will be completed with little or no expense to the Government beyond that of the salaries of the army officers employed on this duty.

The number of army officers regularly employed at the State headquarters is this year 37, an increase of 4 over the details of last year.

In addition to these, 28 officers were detailed on temporary duty with State troops to visit encampments. This does not include the officers belonging to troops, batteries, and companies which have encamped with the militia.

Besides those visiting militia encampments, quite a large number of officers on regular leaves of absence or absent by permission from their duties at colleges have availed themselves of opportunities offered to see larger bodies of troops assembled than is usual in the regular service, and in many instances these officers have performed duty as instructors as though regularly detailed.

Effort has been made during the past six months to secure more exact information than has ever before been collected in regard to the armament and equipment of the militia and the quantity of supplies which would be necessary to enable the State troops to take the field for sixty days.

A militia bill submitted by the War Department is now before Congress. Its enactment as prepared is recommended.

THE RECRUITING SERVICE.

During the past year the recruiting service has been conducted with good results under the system established October 1, 1894, according to which all recruits are forwarded to regiments and posts with the least delay. Regular assignments are made every ten days, and special

assignments from day to day as applications are received from recruiting stations and rendezvous, and accumulations of recruits at any of these places are carefully avoided. In August, 1894, there were 1,516 recruits at the depots, now styled "rendezvous". The largest number at the four rendezvous at any one time during the fiscal year ended June 30, 1896, was 209, the smallest number was 19, and the average number was 105, or 26 to each rendezvous.

During the past fiscal year, 4,882 recruits were forwarded to regiments—2,935 directly from recruiting stations and 1,947 from rendezvous. All of these were sent to their stations under charge of some member of their respective detachments, and the expense of guards or escorts has thus been avoided. From these 4,882 men, six desertions only occurred en route. It is not certain that these were intentional desertions, for they may have been cases of men accidentally left at way stations without means to follow the detachments.

The effort to increase the number of enlistments at and in the vicinity of military posts and to thus effect a saving in transportation and in the number and expense of city stations has been continued with success, as will appear from the following:

Enlistments during fiscal year 1896.

At stations	4,636
At military posts	3,862
Percentage of post enlistments to whole number	45

Recruiting for the line of the Army is carried on without intermission at every garrisoned post, subpost, and camp at which there is a commissioned officer, and the free use of the large recruiting poster as a means of reaching desirable classes is enjoined upon all recruiting officers. These posters have heretofore been furnished as handbills; a number, mounted on cloth, with rollers, will be provided at an early day for display in post-offices, railway stations, and other public localities.

The number of vacancies in the Army July 31, 1896, was 637. Of these 607 were in the line and 30 in the staff departments. Many of these vacancies have since been filled. The average number of vacancies during the year ended July 31, 1896, was 541; the greatest number was 926, and the smallest number was 180. When the Army was lowest in strength, the vacancies averaged only between 2 and 3 to each of its 364 organized companies, and the general average for the year has been less than 2 to a company.

The policy of the Department is to assign available recruits to regiments each ten days. As the losses during a month can not be definitely known until some time after its close, the ranks of the Army can not be kept absolutely filled with recruits. Any attempt to do so might overrun its authorized strength. Accordingly, when the Army closely approaches its maximum strength, or when the regiments of any arm of the service are nearly full, it becomes necessary to place restrictions on recruiting, and this has been done from time to time as occasion required during the past year.

In October, 1895, there were in operation 27 general recruiting stations in cities, with 24 officers in charge. Four of these stations have been closed during the past year, viz: Brooklyn, N. Y., December 31, 1895; Minneapolis, Minn., and one of the two stations in Chicago, January 31, 1896, and New Haven, Conn., February 28, 1896. The station at Lynchburg, Va., is about to be discontinued, and there will then be

22 general recruiting stations in cities, with 22 officers in charge. These 22 stations are located as follows:

One each in Boston, Mass.; New York City, Albany, and Buffalo, N. Y.; Philadelphia, Harrisburg, and Pittsburg, Pa.; Cincinnati and Cleveland, Ohio; Indianapolis and Evansville, Ind.; Detroit, Mich.; Chicago, Ill.; Milwaukee, Wis.; St. Paul, Minn.; St. Louis, Mo.; Louisville, Ky.; Nashville, Tenn.; Richmond, Va.; Baltimore, Md.; San Francisco, Cal., and Seattle, Wash. The officer for the station at San Francisco is detailed by the commanding general Department of California, and the one at Seattle by the commanding general Department of the Columbia, from regiments serving in their respective commands.

Officers of the general recruiting detail at city stations make enlistments for their own regiments, when it can be done with economy in transportation, to fill actual vacancies reported by their regimental commanders.

Since October, 1893, there has been a total reduction of 14 in the number of general recruiting stations located in cities.

Special recruiting is carried on for five regiments and for the light artillery battalion by officers at the following-named stations: Providence, R. I.; Syracuse, N. Y.; Jersey City, N. J.; Portland, Oreg.; Dallas, Tex., and Wheeling, W. Va., with substation at Parkersburg, W. Va. Enlistments for the general service are also made at these stations. The substation at Parkersburg and the station at Syracuse were opened in April and July, 1896, respectively. Four special recruiting stations have recently been closed, viz, Cumberland, Md.; Springfield, Ill.; Grand Rapids, Mich., and Des Moines, Iowa. There were two other special recruiting parties at temporary stations during portions of the past year, but they have been withdrawn, and several applications to send out special regimental recruiting parties have been refused, as it was found that the regiments concerned could be provided with recruits through post enlistments, supplemented by assignments from general recruiting stations and rendezvous.

The reduction since October, 1893, in the number of special recruiting stations is 9.

GENERAL RESULTS.

The total number of enlistments and reenlistments in the Army during the fiscal year ended June 30, 1896, for the legal limit of 25,000 men, was 8,498, classified as follows:

For the general recruiting service		6,200
For the special recruiting service		656
For the Department recruiting service and the Battalion of Engineers (prior to December 1, 1895)		609
		7,465
For regiments, detachments, etc. (prior to December 1, 1895)		817
For staff departments		216
Total		8,498

Of the 8,498 accepted applicants, 6,328 were native born and 2,170 of foreign birth; 7,766 were white, 663 colored, and 69 Indians. The enlistments numbered 5,608, and the reenlistments 2,890.

Excluding reenlistments, the percentage of native born among the accepted applicants for original enlistment was 82⅔, and the balance were naturalized citizens.

Reports show that the recruiting officers making the 7,465 enlistments embraced in the first three items of the foregoing list rejected 41,775 applicants, or about 85 per cent of the number seeking enlistment, as lacking in physical, mental, or moral qualifications; 2,628 were rejected as aliens, and 2,074 for illiteracy.

While the aim has been to maintain at all times a rate of enlistment commensurate with the current losses, every care has been taken to prevent undesirable men from entering the Army, and efforts to this end have been almost entirely successful.

MILITARY COLLEGES.

A statement is presented herewith, tabulated from the reports of officers on duty as professors of military science and tactics at universities and colleges for the past year.

The average number of students at the several institutions during the scholastic year was 3,401 less than during the preceding one, due perhaps to prevailing monetary depression. The number of those capable of military duty was, however, 3,009 more, and the number required to be enrolled as military students has increased 2,761. At all the institutions save one the military pupils have been uniformed. The number of students attending artillery drills was 1,376, and the number of those attending infantry drills was 9,760. The aptitude and interest of these students under military instruction is generally satisfactory.

While the several universities and colleges having military professors during the past year reported an aggregate capacity to educate 51,455 male students, the total average number actually present was 32,237—less than 65 per cent. One institution, having capacity to educate 400 pupils, had only an average present of 79, while two others, with a capacity of 200 each, had only an average attendance of 67 at one and 60 at the other. At one institution having a military professor, with an average attendance of 3,600 students, nearly two-thirds of the number reported as capable of military duty, none were required by the authorities to be enrolled as military students, and 43 only received military instruction, of whom 9 only were uniformed. At another but 30 of the 300 students present were required to be enrolled, and 6 only were uniformed.

At one college with over 500 pupils capable of military duty the authorities required the entire number to be enrolled as military students and to be uniformed. All received military instruction, and their aptitude and interest is reported as excellent. In this case the efforts of the military professor have been supported by very great interest on the part of the faculty and fostered by the excellent discipline of the institution.

The law authorizing details should be amended. I recommend that hereafter no details be made to any institution that can not guarantee an enrollment of at least 150 military students, and that military professors at institutions having a less number in their military departments be withdrawn and returned to their regiments.

The officer who, with the consent of the War Department, volunteered his services as military instructor at the Omaha high school reports that the Omaha board of education having decided upon compulsory enrollment of all male students in the high school, a greater enrollment was made than had been anticipated, and that the liberal policy pursued in the matter of permanent excuses from drill has prevented hardship upon deserving boys and complaint from the few parents entertaining conscientious scruples about military drill.

The average enrollment was 260, an increase of 74 over that of the preceding year; that of uniformed cadets was 211, with an average attendance of 187; and increased interest, the effect of the two years' previous training, was taken by the older cadets.

In addition to the battalion of four companies, another company was attached to it and formed of boys not able to purchase uniforms, its officers being selected from the members of the uniformed companies. A stronger esprit de corps has pervaded the battalion and its general tone has improved.

A fife and drum corps of 15 pieces was organized March 1, 1896, and the services of the leader of the Second United States Infantry band were secured by the board of education for a course of instruction. Rapid progress was made, but a good instructor in fife and drum music should be obtained to insure continued improvement.

The favorable comments of the citizens of Omaha on the High School cadets has stimulated the pride of the latter and created quite a spirit of emulation among the younger boys.

I concur in the recommendation of the military instructor that more substantial assistance be extended to the boys in the way of arms and equipments. The material benefit derived by the cadets is shown by the high standing in military matters taken at once by those of them who have entered a military college. There is conceived no better opportunity of disseminating military knowledge among those whose minds are at the most receptive stage than by encouraging in every possible way military instruction in the public high schools of the country.

THE MILITARY ACADEMY.

The number of cadets at the Academy September 1, 1896, was 331 and one foreign student received at the institution by special authority of Congress. This is the largest number of cadets that has ever belonged to the Military Academy at one time. It is still 40 below the legal number, 371. There will be, no doubt, many more vacancies from various causes before the end of the academic year. Experience has demonstrated the impossibility of keeping the number of cadets up to the maximum. I therefore renew the recommendation that the President be authorized to make ten appointments at large each year and that each Senator be empowered to nominate one cadet at large from the State he in part represents, in order to utilize to its full extent the capacity of the National Military School.

A bill is now pending before Congress, favorably reported by both military committees, to give the master of the sword, who is also instructor in gymnastics and swimming, the rank and pay of a first lieutenant of infantry.

It is recommended that the senior assistant instructors in the departments of practical engineering and of ordnance and gunnery at the Military Academy receive the pay of captain, mounted, as now authorized for the senior assistants in the other departments, and that the adjutant of the Military Academy also be given the pay of captain, mounted.

Congress at its last session repealed so much of section 1309 of the Revised Statutes as provided that the chaplain at the Academy should also be professor of history, geography, and ethics, and authorized one assistant professor for that department. The chaplain is now unhampered in his ministerial work by the duties of a professor.

The discipline and moral tone of the cadets are excellent.

Attention is called to the pressing need existing for reconstructing the library building, as the library has entirely outgrown its present limits.

The recommendation is renewed that the organization and pay of the Military Academy band be restored to that existing prior to the reduction in 1877.

The health of the command during the past year has been far from satisfactory, due, as reported after expert examination as to the probable cause, to imperfect filtering arrangements for the water supply. An appropriation for permanent filter beds is absolutely needed, and it is recommended that the attention of Congress be called to this subject.

GOVERNMENT HOSPITAL FOR THE INSANE.

The following is a list of persons committed to the Government Hospital for the Insane, under the orders of the Secretary of War, from September 1, 1895, to September 1, 1896:

Officers of the United States Army	1
Officers of the United States Army (retired)	1
Enlisted men of the United States Army	18
Late soldiers of the United States Army	2
Total	22

During the past year 2 officers and 12 enlisted men have been discharged from that institution, and 14 enlisted men, including 1 retired, have died.

ARMY BANDS.

In my last report I called attention to the necessity for a proper support by the United States of its regimental bands. A bill to this end introduced in the interest of citizen musicians in their desire to prohibit competition of military bands, rather than in that of the military service, is now before Congress. Its provisions are incomplete, and need careful revision.

INTERNATIONAL COURTESIES.

The Regulations of the Army require that, in accordance with international usage, military commanders at seaports shall exchange visits with all foreign commanders of war vessels arriving at their stations. In the words of the Regulations, this "is international in character, and opens the way to official and social courtesies." These courtesies are expected as a matter of course the world over. Other nations pay for their share in the expense of them, but our Government makes no appropriation for the purpose. If the courtesies are observed, the American expense falls upon the American officer; if the courtesies are not observed, the United States Government is brought into contempt. More than one officer of high rank, seeking to do the expected in this regard, has, in a series of years, sacrificed his little property in the interest of his Government and gone a pauper to his grave.

The two principal seaports where a remedy should be supplied are New York and San Francisco. I recommend that an appropriation of $1,500 for New York and a like amount for San Francisco be asked for, for international courtesies, to be held in the custody of the Secretary of War, to be expended only with his sanction and on his order, and to be turned back into the Treasury when not required.

PAY OF NONCOMMISSIONED OFFICERS.

A bill to regulate the pay of noncommissioned officers of the Army, as recommended in my last report, was introduced during the last session of Congress and was favorably reported by the respective military committees of its two branches, with an amendment reducing somewhat the rate of compensation proposed. The report of the Military Committee of the Senate, concurred in by the Military Committee of the House, set forth—

> that the needs of the Army call for this increase of pay, and that the amount to be expended will secure a very much higher state of efficiency, and besides, being a necessity for the service, will, in the end, by reason of the better condition of affairs in attracting to the service intelligent young men and preventing desertion, prove an economical measure.

The bill is still pending. Though the rates of compensation suggested have been somewhat reduced, I recommend that the attention of Congress at its approaching session be called to this subject, and that favorable action be asked for, in order that at least a beginning of betterment may be attained.

GUNNERS.

In order to encourage excellence in gunnery, three grades of competition have been established for the enlisted men of the artillery arm of the Army, viz, the battery, the regimental, and the general artillery competition. The object of the battery competition is to determine the classification of gunners in each battery, on a maximum of 100, in the order of their relative merit after preliminary instruction.

Upon the termination of each battery contest, the regimental board classifies the competitors into gunners of the first, second, or third class, according as they gain over 90, 80 to 90, or 70 to 80 per cent of the maximum figure of merit.

The qualifications required embrace the following subjects:

	Minimum qualifications.	Maximum figure of merit.
1	Use of angle-measuring instruments	15
2	Use of plotting board	15
3	Service of the piece, including service of all B. L. siege pieces, of the 8-inch C. R., the 10-inch and 15-inch S. B. guns, and all B. L. seacoast pieces that have been available for instruction during the year (or such of them as the examining board may designate), including nomenclature, weights, charges, projectiles, and preparation of fuses and ammunition	15
4	Judging distance to stationary objects	2.5
5	Judging distance to moving objects	2.5
6	Judging speed of vessels	2.5
7	Judging velocity of wind	2.5
8	Laying guns, including allowances for wind, drift, and speed of target	20
9	Use of range tables	15
10	Cordage, blocks and tackle, including their use in such mechanical maneuvers as may have been executed during the year, which maneuvers will include all that the available facilities have permitted. No time limit to be required under this head	10
	Total	100

As these requirements are such as can not always be sustained or even met by the veteran artillerymen, many of them, upon expiration of their terms of service, drift, by reenlistment, into infantry regiments.

In consideration of the demand upon the intellectual powers and

technical knowledge of these enlisted men, the several boards assembled during the past year unanimously recommended that noncommissioned officers and gunners of the first class be given higher pay, and that gunners who have qualified in two examinations shall not be required to compete further.

The matter of increase of pay to noncommissioned officers is already before Congress. As the cost of every round of heavy artillery ammunition is now very great, proper economy requires trained gunners. I therefore recommend that the pay of gunners of the first class be increased $2 per month above that of their respective grades.

TELEGRAPHIC COMMUNICATION.

The storm which visited this city on the 29th of September extended in violence no further north than Baltimore, yet it so completely prostrated all telegraph wires that Washington was, for the time being, isolated from the rest of the world, and telegraphic communication was only completely restored on the 5th of October. In times of great excitement, evil-minded persons may easily cause like interruption of communication from the seat of government, and the necessity of laying wires under ground from this city is thus made apparent.

CHRONOLOGICAL LIST OF BATTLES.

In the absence of any publication on the subject, the work of compiling a chronological list of the battles in which troops of the permanent establishment have participated from the organization of the Army in 1789, together with statistics of losses, names of all officers wounded or killed in action, etc., was undertaken in this office, as time permitted, some years ago, and was completed in 1894, to include that year. Data have since been prepared which bring this compilation to date.

I recommend that Congress be asked to authorize the printing of an edition of 5,000 copies of this publication for official use, for distribution to the Army, and for State and other libraries.

CLERICAL DUTY IN THE ARMY.

The act of July 29, 1896, provided for the enlistment and classification of a small force of men for clerical duty and messenger service at the Headquarters of the Army and the several department headquarters. While substituting fixed rates of compensation in lieu of the pay and allowances of a soldier, lower than those paid to other clerks, it specifically made the provisions of law relative to the retirement of enlisted men applicable to the "general-service clerks and messengers." These men had other allowances, such as medical attendance and the right to purchase from the supply and quartermaster departments.

The law of August 6, 1894, in abolishing this force and transferring the whole corps of clerks and messengers to the civil list, subject to civil-service rules, overlooked these privileges, and thus in point of fact reduced their salaries, which were by no means too large under the former law. They are forced to live in the cities where military headquarters are located, and they constitute a small but industrious and faithful class, deserving of consideration. The proper classification of these men and the assimilation of their salaries to those fixed by law for other clerks in the military service is a matter of equity, and I ask that the attention of Congress be called to this subject.

THE ADJUTANT-GENERAL'S OFFICE.

The legal organization of this office remains the same as at the date of my last report, and its entire clerical force has been actively employed on work pertaining to the Army.

The number of reports furnished, on calls, to the Pension Office, the Auditors for the War and Navy Departments, the Comptroller of the Treasury, the General Land Office, and the several bureaus of the War Department, on pension and kindred claims, is exhibited in the following table, which shows that no calls remained unanswered September 1, 1896:

Bureaus.	On hand Sept. 1, 1895.	Calls received.	Reports furnished.	On hand Sept. 1, 1896.
Commissioner of Pensions	.....	4,719	4,719	.....
Auditor for the War Department	.....	4,400	4,400	.....
Auditor for the Navy Department	.....	12	12	.....
Comptroller of the Treasury	.....	1	1	.....
General Land Office	.....	10	10	.....
Quartermaster-General	.....	41	41	.....
Commissary-General	.....	11	11	.....
Paymaster-General	.....	52	52	.....
Surgeon-General	.....	179	179	.....
Miscellaneous	.....	768	768	.....
Total	.....	10,193	10,193	.....

A new system of records was commenced in the several bureaus of the War Department January 1, 1890. This system substituted record cards for record books.

The record cards first prescribed were of letter size, about 9 by 11½ inches. By War Department orders dated May 15, 1894, a smaller card, 8 inches long by 3¼ inches wide, was adopted in order to minimize the blank space remaining on the old record card or its attached slip after record of final action. There are thus in the Adjutant-General's Office three sets or kinds of records, viz, books, large quarto cards, and the present cards. These three sets should be reduced to two by transcribing records from the quarto cards to cards of the present size.

There would be, then, record books for the period extending from the creation of the War Department to 1890 and record cards since that date. This would eliminate the experimental card stage, facilitate business, and economize space. The records from 1890 to 1894 are stored in 173 file boxes, 12¾ by 11⅝ by 3⅝ inches, each one of which contains 400 cards. An average record on the quarto card requires two sheets. On the present card such record requires two slips if typewritten or three when written by hand. The 1890–1894 records represent about 39,600 cases and the 173 file boxes occupy a shelf space equal to 52.63 cubic feet. If transcribed they would be contained in about 87 file boxes of the present dimensions and represent 21.18 cubic feet, or less than one-half the space they now occupy. The present crowded condition of the file rooms renders it important that this consolidation be made as soon as possible.

Each record card since 1891 should bear notations of all former records in the case borne on the quarto cards or in the books, to facilitate intelligent action to date. Much time is now consumed in searching old files as cases arise and in making such notations. Coincident with the adoption of a new system of records and with a volume of business fully equal to that of preceding years, the clerical force of the office was

materially reduced by Congressional action, and since then the abolition of the superintendency of the general recruiting service has, of necessity, devolved upon this office the work performed by the clerical force heretofore allowed to the superintendent; so that, in view of the pressing needs of the service, and in the interest of business methods, as it clearly seems to me, I recommend that a temporary force of ten clerks be added to the present force of this office for the period of two years.

While the current business of this office has been promptly and satisfactorily dispatched, it has been a matter of impossibility to complete the incidental but important work of perfecting the records. A great mass of papers, many of them of importance, have been received during the past year from other bureaus and offices, and all should be briefed and indexed. The old record books, prior to 1861, should now be properly indexed; the quarto cards merged into the present record cards; a systematic examination of the old records and files be made with a view to the full notations required to supply all existing links and render unnecessary the tedious examination of voluminous records for previous papers. This is of special importance in what is known as "personal files"—that is, in those referring to and making part of the military records of officers of the Army.

Then there is the imperative necessity for the constant consolidation of index cards to prevent undue accumulation on the alphabetical index file. As under the rule, the briefers "prepare such additional index and cross-reference cards as may be necessary to index the communication thoroughly," such cards quickly accumulate, and, if not consolidated, cumber the file, seriously impair the practical value of the "index file," and demand constantly increasing shelf space. Consolidations are now made at such times when the daily mail is light enough to justify the temporary transfer of one or more clerks from their regular work to this service. This method is slow and inadequate.

I take pleasure in recording my appreciation of the general intelligence, zeal, efficiency, and devotion to duty of clerks and messengers in this office. In the performance of their duties they have labored under great inconvenience from crowded rooms and limited air space. The 12 clerks in the principal working room of the Mail and Record Division have each but 39 square feet of floor space including the passageways between the desks. In this division the average floor space is 54¼ square feet. In the Corresponding and Examining Division the average floor space is 70 square feet, and in some rooms it is reduced as low as 44¾ square feet.

Respectfully submitted.

GEO. D. RUGGLES,
Adjutant-General.

Universities and colleges.	Number of pupils the institution can educate at one time.	Average number of pupils—						Military instruction (hours per week).		Arms (United States property) at institution.			Attendance at—		Students.		Discipline of the institution.	Interest manifested by the faculty.
		Present.	Over 15 years of age.	Capable of military duty.	Required enrolled as military students.	That received military instruction.	Uniformed.	Practical.	Theoretical.	Fieldpieces.	Cadet rifles.	Condition.	Artillery drills.	Infantry drills.	Aptitude.	Interest.		
Alabama Agricultural and Mechanical College, Auburn.	300	237	234	237	223	223	233	3	2	2	210	Fair	16	151	Very good	Fair	Good	Fair.
University of Alabama, Tuscaloosa County.	250	135	135	133	135	137	135	3	1	....	150	Good	10	95	Good	Very little	Poor	Small.
Searcy College, Searcy, Ark.	200	77	58	60	55	55	55	7½	⅓	2	100	Good	16	45	Good	Very good	Passable	Fair.
Arkansas Industrial University, Fayetteville.	1,000	270	254	262	262	262	262	3	4	....	275	Good	....	233	Excellent	Excellent	Excellent	Very satisfactory.
Mount Tamalpais Military College, San Rafael, Cal.	150	76	60	60	76	76	73	4	1	2	80	Good	73	73	Very good	Very good	Excellent	Very good.
University of California, Berkeley.	800	738	738	602	524	524	469	2	1	2	525	Good	13	224	Excellent	Fair	Civil	Good; some strong.
Agricultural College of Colorado, Fort Collins.	250	109	109	120	119	119	118	3½	....	2	150	Good	18	104	Good	Satisfactory	Good	Satisfactory.
Sheffield Scientific School of Yale University, New Haven, Conn.	(1)	2,352	2,352	2,352	205	205	None	3	1	....	80	New	....	87	Excellent	Good	Good	Good.
Delaware College, Newark	150	56	56	54	41	46	46	[2]29	....	2	75	Good	15	40	Good	Good	Not stated	Average.
Florida Agricultural College, Lake City.	300	110	95	109	109	131	130	4	1	2	130	Good	17	98	Excellent	Excellent	Excellent	Good.
East Florida Seminary, Gainesville.	150	43	24	43	43	43	43	3	....	....	100	Serviceable.	....	28	Good	Fair	Excellent	Great.
North Georgia Agricultural College, Dahlonega.	300	87	82	86	86	86	86	5	....	2	148	Serviceable.	12	65	Good	Fair	Fair	Encouraging.
Gordon Institute, Barnesville, Ga.	250	180	105	100	(3)	91	91	11½	4 7/12	....	100	Very good	79	81	Great	Great	Excellent	Great.
Middle Georgia Military and Agricultural College, Milledgeville.	500	250	38	60	60	60	60	6	2	2	98	Good	20	50	Good	Good	Fair	Fair.
University of Idaho, Moscow	200	92	89	89	92	100	85	4	1	2	100	Good	17	85	Good	Excellent	Good	Good.
Knox College, Galesburg, Ill.	500	212	212	210	70	109	109	3	....	2	90	Good	22	60	Good	Excellent	Mild	Good.
Northern Illinois Normal School, Dixon.	750	300	300	250	30	73	6	2	1	2	100	Poor	47	47	Fair	Fair	Poor	Slight.

[1] Not known.

[2] For quarter.

[3] Voluntary.

Universities and colleges.	Number of pupils the institution can educate at one time.	Average number of pupils—						Military instruction (hours per week).		Arms (United States property) at institution.			Attendance at—		Students.		Discipline of the institution.	Interest manifested by the faculty.
		Present.	Over 15 years of age.	Capable of military duty.	Required enrolled as military students.	That received military instruction.	Uniformed.	Practical.	Theoretical.	Fieldpieces.	Cadet rifles.	Condition.	Artillery drills.	Infantry drills.	Aptitude.	Interest.		
University of Illinois, Champaign.	150	672	672	264	264	264	264	4	3	2	300	Good	18	205	Very good	Good	Excellent	Great.
Western Military Academy, Upper Alton, Ill.	150	55	41	41	55	55	55	3½	2	2	65	Good	18	45	Very good	Very good	Good	Good.
De Pauw University, Greencastle, Ind.	1,000	300	300	250	110	97	97	9	2	2	150	Excellent	15	73	Excellent	Excellent	Good	Good.
Purdue University, Lafayette, Ind.	700	475	475	425	171	175	175	7	1	2	174	Good	19	142	Good	Medium	Excellent	Same as in other departments.
Vincennes University, Vincennes, Ind.	150	50	40	36	36	36	35	2	1	....	60	Good	....	26	Excellent	Good	Good	Good.
Howe School, Lima, Ind	150	66	54	66	66	66	66	8	....	....	....	....	....	66	Good	Good	Good	Good.
Cornell College, Mount Vernon, Iowa.	.....	204	202	152	152	152	136	3	4	2	250	Very good	18	97	Very good	Good	Excellent	Very good.
Iowa State Normal School, Cedar Falls.	500	217	217	204	198	198	188	3	....	2	225	Good	18	188	Good	Good	Good	All that could be desired.
Iowa State University, Iowa City.	400	258	258	236	176	195	176	3	....	2	200	Good	16	130	Very good	Very satisfactory.	Excellent	Highly satisfactory.
Iowa Wesleyan University, Mount Pleasant.	500	97	96	88	77	77	46	3	....	1	100	Fair	8	73	Good	Good	Good	Good.
Baker University, Baldwin, Kans.	300	196	196	193	74	112	64	3	....	....	87	Good	....	66	Fair	Poor	Fair	Fair, improving.
Kansas Agricultural College, Manhattan.	400	330	330	310	295	193	193	5	2	2	200	Good	....	174	Good	Good	Good	Not much, with few exceptions.
Agricultural and Mechanical College of Kentucky, Lexington.	500	200	196	200	200	210	198	5	....	2	150	Serviceable.	22	155	Good	Little	Good	Very good.
Georgetown College, Georgetown, Ky.	300	210	175	180	101	108	26	3	....	....	150	Good	....	70	Excellent	Fair	Fair	Good.
Central University of Kentucky, Richmond.	500	400	350	240	198	195	129	11	4	2	200	Good	19	175	Fair	Fair	Poor	Satisfactory.
Louisiana State University, Baton Rouge.	200	145	145	143	145	139	143	5	2	2	150	Good	....	125	Good	Good	Good	Fair.

Maine State College, Orono	250	204	204	219	219	220	220	3	6		220	Good		149	Good	Good	Good	Same as in other departments.
St. John's College, Annapolis, Md.	200	133	115	129	129	129	128	5	1		128	Good		116	Good	Active	Collegiate	Excellent.
Maryland Agricultural College, Prince George County.	150	102	96	100	102	103	100	14	4	2	150	Fair	20	88	Excellent	Very great	Fair	All favor and assist.
Massachusetts Agricultural College, Amherst.	250	95	95	93	95	94	94	3	1	2	147	Good		89	Excellent	Excellent	Excellent	Great.
Massachusetts Institute of Technology, Boston.	1,200	1,000	1,000	900	250	250	240	2	1		260	Good		230	Very good	Considerable.	Good for a university	Slight.
Harvard University, Cambridge, Mass.		3,600	3,600	2,111		43	9	1	3		68	New		7	Excellent	Slight	Good for a university	Slight.
Michigan Military Academy, Orchard Lake.	175	121	118	121	121	121	121	8	4	5	96	Fair to good.	36	121	Excellent	Good	Excellent	Small.
Michigan Agricultural College, Ingham County.	500	185	185	165	165	160	155	3		2	150	Good, except field pieces.		115	Good	Good	Good	Good.
Shattuck School, Faribault, Minn	190	156	146	156	156	156	156	5		2	175	Good	21	144	Good	Good	Good	Fair.
University of Minneapolis, Minn	2,500	1,800	1,790	264	264	264	263	3		2	300	Good	17	208	Very good	Excellent	Not military	Very good.
Agricultural Mechanical College of Mississippi, Oktibbeha Co.	350	228	228	235	235	233	235	4	5	2	250	Serviceable.	18	45	Good	Good	Excellent	Good.
St. Louis University, Missouri	500	300	185	90	169	169	169	5	1/4		150	Very good		136	Very good	Satisfactory	Excellent	Entirely satisfactory.
Wentworth Military Academy, Lexington, Mo.	150	75	65	80	80	91	91	5	3½				12	73	Fair	Good	Fair	Great.
University of Missouri, Columbia	1,500	527	527	509	509	136	136	3 in all.		2	150	Good		110	Good	Not very good.	Fair	Not much, as a rule.
Washington University, St. Louis, Mo.	700	542	330	375	159	166	159	4			258	Good		142	Good	Fair to good	Fair	Fair to good.
Missouri Military Academy, Mexico, Mo.	150	64	56	56	56	56	56	4 5/12	2 11/12	2	115	18 damaged.	16	47	Good	Good	Good	Good.
Doane College, Crete, Nebr	200	60	58	58	58	58	58	3	3	1	80	Good	8	50	Good	Excellent	Good	Very great.
University of Nebraska, Lincoln	2,000	670	670	670	388	276	275	3	5	2	400	Excellent	30	231	Very good	Very good	Very good	Very good.
State University, Reno, Nev	300	114	114	114	114	114	114	4	1	2	99	Good	18	84	Fair	Good	Fair	Deep.
New Hampshire College of Agriculture and the Mechanical Arts, Durham.	200	67	67	64	55	57	57	2	1		65	Good		47	Good	Fair	Civil	Good.
Rutgers College, New Brunswick, N. J.	300	182	182	169	119	121	121	2	2		150	Good		118	Good	Poor in drill but good in theoretical work.	Good	Fair.
Seton Hall College, South Orange, N. J.	150	98	82	95	88	90	88	4	3/4	2	125	Good	14	79	Good	Satisfactory	Fair	Little.
Cornell University, Ithaca, N. Y.	2,000	1,410	1,410	1,370	313	313	313	3	5	2	400	Very good	14	256	Excellent	Good and growing.	Very good	Very favorable.
Peekskill Military Academy, Peekskill, N. Y.	150	88	75	91	88	88	85	6		2	125	Good	9	76	Good	Fair	Good	Good.
Riverview Military Academy, Poughkeepsie, N. Y.	200	118	83	110	110	110	118	4	1	2	150	Good		92	Good	Good	Good	Excellent.
College of St. Francis Xavier, New York City, N. Y.	800	600	400	400	287	302	287	4			230	Good	17	139	Good	Fair	Good	Good.
St. John's College, Fordham, N. Y.	650	186	152	152	183	183	183	3	1	2	225	Excellent		120	Good	Good	Excellent	Very satisfactory.

Universities and colleges.	Number of pupils the institution can educate at one time.	Average number of pupils—						Military instruction (hours per week).		Arms (United States property) at institution.			Attendance at—		Students.		Discipline of the institution.	Interest manifested by the faculty.
		Present.	Over 15 years of age.	Capable of military duty.	Required enrolled as military students.	That received military instruction.	Uniformed.	Practical.	Theoretical.	Fieldpieces.	Cadet rifles.	Condition.	Artillery drills.	Infantry drills.	Aptitude.	Interest.		
St. John's Military School, Manlius, N. Y.	110	94	23	94	90	94	94	5	2	2	105	Good, except 5 rifles.	14	92	Good	Good	Very good	Same as in other branches.
Clinton Liberal Institute, Fort Plain, N. Y.	125	60	55	60	60	60	60	6	¾	2	105	Very good	15	49	Good	Very good	Good	By president; good.
De La Salle Institute, New York City, N. Y.	250	210	167	135	193	198	198	3 in all		2	150	Excellent.	....	170	Good	Good	Good	Earnest.
Bingham School, Asheville, N. C.	150	70	64	76	72	72	76	2	2	2	150	Good	18	57	Good	Good	Good	Very good.
Davis Military School, Winston, N. C.	150	100	91	105	106	103	106	7½	3¾	....	115	Very good	....	66	Fair	Poor	Fair	Fair.
University of North Dakota, Grand Forks, N. D.	400	79	79	82	59	59	55	4	2	....	90	Good	....	51	Good	Fair	Good	Fair.
University of South Dakota, Vermilion.	250	96	92	90	60	60	56	4	1	2	111	Fair	17	43	Fair	Satisfactory	Very good	Favorable.
South Dakota Agricultural College, Brookings.	250	150	150	150	55	80	70	3	1	2	150	Good	9	68	Fair	Moderate	Fair	President alone shows interest.
Mount Union College, Alliance, Ohio.	150	130	130	130	None.	68	17	2 5/12	....	2	120	Bad	16	33	Very good	As in 1 to 3.	Not strict	None lately.
Ohio Normal University, Ada	1,500	1,175	1,134	590	None.	227	180	5	2	2	200	Much worn	27	200	Good	Good	Good	Very great.
Ohio State University, Columbus	1,500	710	710	710	387	223	387	5	....	2	250	Very good.	8	200	Good	Fair	Only fair	Increasing.
Ohio Wesleyan University, Delaware.	750	495	495	997	.....	119	77	3	....	2	300	Fair	21	77	Good	Good	Good	Fair.
Ohio Military Institute, College Hill, Hamilton County.	150	32	24	32	32	32	32	5	....	2	87	Good	....	32	Good	Good	Good	Good.
Wilberforce University, Wilberforce, Ohio.	175	95	93	91	84	84	44	2	1	2	100	Good	25	71	Good	Excellent	Very good	Fair.
Agricultural College of Oregon, Corvallis.	400	156	156	150	144	147	141	3¾	....	....	100	Good	....	136	Good	Good	Fair	Fair.
Bishop Scott Academy, Portland, Oreg.	300	85	25	85	90	90	90	6	1	2	150	Good	....	68	Good	Good	Good	Good.
Allegheny College, Meadville, Pa.	400	180	180	175	101	111	74	3	2	2	147	Good	22	93	Very fair	Very fair	Very mild	Good.

Franklin and Marshall College, Lancaster, Pa.	150	150	150	148	.....	138	55	3	2	....	75	Good	....	34	Very good ..	Very good ..	Very good ..	Very good.
Pennsylvania Military College, Chester.	150	98	93	99	99	99	99	6	2½	2	145	Good	....	94	Decided	Very great..	Excellent...	Very great.
Pennsylvania State College, Center County.	500	240	240	235	230	230	219	5	1	2	150	Fair	26	211	Good	Great.....	Good	Great.
Grove City College, Grove City, Pa.	500	240	240	227	227	217	75	4	1	2	150	Very good		202	Very good ..	Very good ..	Excellent...	All that could desired.
Girard College, Philadelphia, Pa.	1,600	1,502	114	550	550	550	540	2½	3⅝	....	500	Very good	72	438	Excellent...	Excellent...	Excellent...	Great.
Rhode Island College of Agriculture and Mechanical Arts, Kingston.	150	52	52	50	50	52	50	3½	1	2	60	Good	19	47	Good	Considerable.	Good	Great.
Memphis Institute, Memphis, Tenn.	150	40	16	18	25	40	16	5	....	....	60	Good to new.	....	20	Small	Not much...	Poor.....	The principal is interested.
University of Tennessee, Knoxville.	500	200	200	198	116	116	116	6	1	2	150	Good	19	98	Good	Good	Good	Good.
Agricultural and Mechanical College of Texas, College Station.	218	201	201	206	206	206	206	3	....	2	230	Good	8	134	Very good ..	Very good ..	Excellent...	Very fair.
Baylor University, Waco, Tex...	300	261	225	224	94	104	94	3	2	2	150	Good	14	60	Good	Good	Fair	Fair.
Austin College, Sherman, Tex...	200	84	79	84	88	88	88	2⅔	....	....	100	Good	....	67	Good	Satisfactory	Good	Satisfactory.
Agricultural College of Utah, Logan.	800	140	140	152	72	80	32	4	½	2	140	Good	....	74	Fair	Good	Good	Good.
University of Vermont, Burlington.	300	160	160	174	164	164	164	2	1	2	140	Fair	20	120	Good	Fair	Not conducive to discipline.	Not very encouraging.
Norwich University, Northfield, Vt.	100	57	57	57	57	58	58	5	1	....	63	Good	19	51	Excellent...	Excellent...	Excellent...	Excellent.
Vermont Academy, Saxtons River.	150	74	71	70	65	65	65	3⅓	....	....	75	Fair	12	57	Good	Good	Good	Very great.
Virginia Agricultural and Mechanical College, Polytechnic Institute, Blackburg.	350	289	245	240	240	240	240	6½	....	2	150	Good	40	178	Very good ..	Very good ..	Good	Satisfactory.
Virginia Military Institute, Lexington.	265	182	182	187	187	187	187	9	6	....	200	Excellent	30	182	Excellent...	Excellent...	Very good ..	Excellent.
Danville Military Institute, Danville, Va.	100	54	40	58	58	58	56	4	1	2	60	Good	21	49	Good	Satisfactory	Good	Satisfactory.
West Virginia University, Morgantown.	500	310	296	275	111	117	117	3	1	....	127	20 new; others worn.	27	96	Good	Good	Fair	Fair.
University of Washington, Seattle.	500	125	125	115	(3)	97	95	2	1	....	150	Good	....	88	Good	Good	Good	Very great.
Washington Agricultural College and School of Science, Pullman.	250	90	90	95	90	90	87	4	....	1	100	Good	10	65	Good	Good	Fair	Improving all the time.
Lawrence University, Appleton, Wis.	250	115	115	112	78	78	68	3	....	....	100	Good	....	68	Good	Good	Good	Marked.
University of Wisconsin, Madison.	(4)	1,300	1,300	1,300	386	243	243	2	1	2	395	Good	9	222	Good	Good	Good	Satisfactory.
University of Wyoming, Laramie.	150	33	33	25	25	32	28	4	....	2	60	Fair	27	26	Good	Good	Good	Good.

[1] 40 service rifles; 60 rifles borrowed from the State.

[2] In all.

[3] Not stated.

[4] Not limited.

Universities and colleges.	Number of pupils the institution can educate at one time.	Average number of pupils—						Military instruction (hours per week).		Arms (United States property) at institution.			Attendance at—		Students.		Discipline of the institution.	Interest manifested by the faculty.
		Present.	Over 15 years of age.	Capable of military duty.	Required enrolled as military students.	That received military instruction.	Uniformed.	Practical.	Theoretical.	Fieldpieces.	Cadet rifles.	Condition.	Artillery drills.	Infantry drills.	Aptitude.	Interest.		
Brown University, Providence, R. I.	1,000	700	700	650	161	161	161	3	1	2	260	Excellent.	15	150	Excellent...	Good	Good from college standpoint.	Constantly increasing.
South Carolina Military Academy, Charleston.	200	108	108	108	108	107	108	7	5	2	150	Serviceable.	....	91	Excellent...	Excellent...	Excellent...	Satisfactory.
Clemson Agricultural College, Oconee County, S. C.	320	284	284	282	282	288	288	3¾	1	2	500	Good	....	230	Fair	Fairly good.	Very good ..	Majority interested.
Cumberland University, Lebanon, Tenn.	625	229	200	190	72	57	7	2	½	....	100	Notstated.	....	44	Good	Good	None except warning and expulsion.	Good.

REPORT OF THE INSPECTOR-GENERAL.

REPORT

OF THE

INSPECTOR-GENERAL OF THE ARMY.

WAR DEPARTMENT,
INSPECTOR-GENERAL'S OFFICE,
Washington, D. C., October 1, 1896.

SIR: I have the honor to submit the following report of the operations of this Department during the past year:

The service of the inspection districts established under the provisions of General Orders, No. 18, Headquarters of the Army, 1895, has now been in operation sufficiently long to place it beyond the experimental stage and to admit a fair judgment of its merits. The severe tests to which it has been subjected during the past year, and the results attained, should dispel any doubts that may still be entertained by the most conservative as to its efficiency and economy; the high character and ability of the officers, and the thoroughness and impartiality with which they have performed their duties, are a sufficient guaranty that their best efforts will be directed toward a continued successful operation and further development of whatever may be the adopted system; everything that was definitely assigned to them this year has received faithful and thorough attention.

Detailed reports of inspection of the military establishment, including posts, depots, armories, and arsenals, of the accounts of disbursing officers, of national cemeteries, and of military departments of civil institutions of learning have been made from time to time and brought to the attention of the proper authorities, whose interest and orders in the premises have given so much of its effectiveness to the work. The criticisms of the inspectors and the defects disclosed have, as a rule, received prompt remedial action wherever possible; and the reports indicate that the discipline, instruction, and efficiency of our Army receive untiring attention from all of every rank, and are maintained in an enviable state of excellence; and there can be no question as to whatever further improvement and progress may be necessary to keep our little Army well up in the advanced demands of the times.

DISBURSEMENTS.

A summary of the reports of inspections of the accounts of disbursing officers of the Army, and others required by law, under the supervision of the Secretary of War, for the fiscal year ending June 30, 1896, shows the following:

Balances taken up		$5,001,312.93
Receipts from Treasury	$48,550,860.44	
Receipts from sales and other sources	2,410,685.16	
		50,961,545.60
Transfers from other officers		16,135,510.00
Total to be accounted for		72,098,368.53

Disbursements	$51,230,004.10	
Deposited to credit Treasurer of the United States	889,626.98	
	52,119,631.08	
Transferred to other officers	14,918,508.60	
		$67,038,139.68
Balance to be accounted for		5,060,228.85
Balance distributed as follows:		
United States Treasury	$3,542,787.62	
United States depositories	1,439,305.60	
Cash on hand	78,135.63	
		5,060,228.85

Of the $78,135.63 reported as cash on hand, the sum of $60,654.88, consisting of $58,300 in State bonds and $2,354.88 cash in safe-deposit vault, was held by one of the officers of the National Home for Disabled Volunteer Soldiers, and $413.78 by the Treasurer of the United States Soldiers' Home, leaving only the sum of $17,066.97 cash in the hands of the disbursing officers of the Army at the close of the fiscal year. It is submitted that it is habitually better Army administration to keep the balance on hand, both cash and on deposit, thus close down to a minimum in amount and a minimum in the time kept, either on hand or in transit to the debtor.

In one instance various sums, ultimately aggregating over $100,000, were held for various periods without being receipted for or placed on deposit, and then a portion of the funds were returned through a local bank not a Government depository.

The method of sending such considerable sums, or indeed any public money, to the individual instead of direct to the Government depositary has long ago been abandoned elsewhere, and the official language prescribing the present method is: "Public funds will in general be transferred as follows: The officer making the transfer will draw his check directing the depositary to place a stated amount to the official credit of the officer named therein. The check will be sent to the depositary and not to the officer in whose favor it is drawn." (A. R., 594.)

The disbursements during the fiscal years 1895 and 1896 may be grouped as follows:

	1895.	1896.
Army disbursements	$28,632,335.86	$26,594,408.37
River and harbor disbursements	21,455,330.44	18,275,977.87
Other civil disbursements	7,473,534.38	6,359,617.86
Total	57,561,200.68	51,230,004.10

The above statement shows a decrease of $6,331,196.58 from the amount inspected during the preceding year, arising as follows:

Decreased disbursements:		
Adjutant-General's Department		$158.03
Judge-Advocate-General's Department		150.67
Quartermaster-General's Department		458,674.18
Subsistence Department		518,358.45
Medical Department		92,375.25
Pay Department		910,707.64
Engineer Department		3,179,352.57
Recruiting officers		53,655.88
Miscellaneous		3,422,482.04
		8,635,914.71
Increased disbursements:		
Ordnance Department	$80,204.52	
National Home for Disabled Volunteer Soldiers	2,224,513.61	
		2,304,718.13
Net decrease		6,331,196.58

The relation during the past four fiscal years between the total amount involved and the disbursements, transfers, deposits in the Treasury, and balances on hand may be stated as follows:

	1893.	1894.	1895.	1896.
Disbursements	0.727	0.760	0.756	0.710
Transfers between officers	.191	.163	.158	.207
Deposits in general Treasury	.025	.015	.018	.013
Balances on hand	.057	.062	.068	.070

This shows a general lack of improvement this year from the showing made last year, and especially is it noticeable in the matter of transfers between officers. Last year an improvement of about 1 per cent was shown in transfers, as compared with 1894, but this year the amount of transfers, as compared with the total amount involved, increased nearly 5 per cent.

The average monthly disbursements of officers of the Army for the year was $3,739,198.85, and their final balances represented 114 per cent of this average, as against 103 per cent in 1895 and 89 per cent in 1894.

The following table shows the variation of these percentages in the principal disbursing departments during five fiscal years, and it can be seen where the idle deposits and cash are kept within the most reasonable bounds:

Departments.	Percentages.				
	1892.	1893.	1894.	1895.	1896.
Engineer	104	82	75	83	116
Ordnance	124	105	115	139	113
Quartermaster	53	120	135	179	170
Subsistence	99	39	73	119	89
Medical	102	186	83	131	205
Pay	48	90	66	83	77

The proportion of balances kept in personal possession by disbursing officers of the Army was about 0.003 of the total amount, while for the two preceding years it approximated 0.007, showing a very marked improvement in this respect.

The total number of inspections made, including statements made under Army Regulations 877 of 1895, verified by the inspector, was as follows:

Accounts.	1893.		1894.		1895.		1896.	
	Officers.	Inspections.	Officers.	Inspections.	Officers.	Inspections.	ers.	In pections.
General staff officers'	236	639	233	604	235	588	211	546
Post staff officers'	223	764	219	811	205	536	178	292
Other line officers'	2	6	37	48	10	12	22	33
Soldiers' Home	1	1	5	5	8	8	10	10
Disbursing clerk, War Department					1	1		
Total	462	1,410	494	1,468	459	1,145	421	881

Average number of inspections.

	1893.	1894.	1895.	1896.
For each staff officer	2.70	2.6	2.5	2.1
For each post officer	3.41	3.7	2.6	1.6

Of the 881 inspections, involving $72,098,368.53, it appears from the following tabulation that 757 inspections (including 212 accounts of post officers), involving $68,679,406.83, were made by officers of this Department, and 16 inspections (including 1 account of a staff officer), involving $39,340.15, were made by other officers:

Department.	Officers inspected.	Inspections.	Amount involved.
Adjutant-General	11	23	$3,708.38
Quartermaster-General:			
Staff	52	140	11,837,881.20
Post	86	132	688,584.50
Subsistence Department:			
Staff	23	62	1,736,089.52
Post	92	160	611,463.43
Medical Department	4	11	415,108.12
Pay Department	26	73	19,506,536.88
Engineer Department	71	192	21,830,598.67
Ordnance Department	24	45	4,338,664.17
Recruiting officers	7	7	14,075.92
National Home for Disabled Volunteer Soldiers	9	9	10,412,801.36
Miscellaneous	16	27	702,856.38
Total	421	881	72,098,368.53

Department.	By officers of the Inspector-General's Department.		By other officers.		Under Army Regulations 877.	
	No.	Amount.	No.	Amount.	No.	Amount.
Adjutant-General	22	$3,253.53	.....	.....	1	$454.85
Quartermaster-General:						
Staff	136	11,811,684.42	.....	.....	4	26,196.78
Post	100	478,825.57	6	$16,597.90	26	193,161.03
Subsistence:						
Staff	56	1,605,860.67	.....	.....	6	130,228.85
Post	112	451,444.36	9	22,708.65	39	137,310.42
Medical	11	415,108.12	.....	.....	.....	.....
Pay	72	19,506,531.99	.....	.....	1	4.89
Engineer	175	19,754,680.57	.....	.....	17	2,075,918.10
Ordnance	38	3,532,969.73	.....	.....	7	805,694.44
Recruiting	1	11,991.49	1	33 60	5	2,050.83
National Home for Disabled Volunteer Soldiers	9	10,412,801.36	.....	.....	.....	.....
Miscellaneous	25	694,255.02	.....	.....	2	8,601.36
Total	757	68,679,406.83	16	39,340.15	108	3,379,621.55
Per cent of total involved	.....	.952+	.....	.002—	.....	.046+

How best to guard against having money scattered in useless petty sums and lying idle, in amounts aggregating thousands of dollars, and to avoid an unnecessary number of entries and needless handlings of the same sum and reporting it over and over again before it reaches the creditor, has received some, and deserves more, attention. It is easy to point out how much more direct, simple, and expeditious the remittances are managed, and how much more immediate the control and less the temptations, in some departments than others. The improvement that has been effected indicates periods of most careful administration, which will doubtless have permanent effects.

NATIONAL HOMES FOR DISABLED SOLDIERS.

The character, purpose, and excellence of such an institution deserves to be clearly understood and appreciated by all who have an interest in such matters. The Inspector-General personally made an inspection during the year of the several Branch Homes, and the accountant of the department examined their financial and shop accounts and joined in the examination of the general treasurer's, as required by the act of August 18, 1894; and under date of February 29, 1896, a detailed report of this inspection was submitted to the Secretary of War, who transmitted it to Congress March 5, 1896, where it was printed as House Doc. No. 288. This report shows very gratifying results and no deca dence anywhere. A comparison of the barracks at the newly constructed branches, like Marion and Leavenworth, with the older ones gives a strong impression of the greater attention now given to the comforts, necessities, and due decorum of human life. That a fair ration of sunlight and unvitiated air should be classed among the first necessities of healthful or invigorating life, seemed sometimes to be disregarded in former times; and some of the ill effects still hang on, especially in some of the old places given to scores of men to sleep in, where even the artificial means of changing the air as rapidly as required by the laws of health were utterly inadequate or not provided at all.

It is worthy of note that for several years, without in any way decreasing the comforts or conveniences of the old soldiers, but, on the contrary, with every change tending toward their watchful care and better supplies, a constantly increasing population of the Home has been supported out of constantly decreasing appropriations for maintenance and a large surplus turned back into the Treasury; in one calculation the reduction per capita this year, as compared with last, being $12.63. It is believed that still further reductions and savings might be effected if the post and special funds should be subjected to the same supervisory inspection and examination that is now exercised over the vouchers of the regular appropriations for the support of the Home. Much might also be expected from a more satisfactory system of property accountability than now exists, if such accountability should be subjected to the usual supervisory action by a Government Department. The money appropriated by the Congress for the purchase of such property is affected by the watchful care thus assured in its use and protection.

How far the Government has any interest or supervisory powers in either the money it appropriates or the property it purchases, or has protection by legal bond or otherwise for either careless or criminal losses, is hardly worth while to discuss here if it can be agreed on all sides that the business of the Home should be conducted throughout under the laws and regulations controlling public business. This appears clearly now and for some years past, say from the time Mr. Randall was chairman of the House Committee on Appropriations, to be the adopted policy of Congress; and it seems demonstrated that there is no injury to anyone nor any great difficulty in having the usual public laws and regulations and supervision control these matters as far as they relate to these appropriations of public funds by Congress. The public character of the institution is one source of its power and effectiveness; and if the public laws regulating the disbursement and deposit of funds appropriated by Congress are accepted as habitually the best

rule for such money, perhaps it is good enough for this; or if not the best, ought they not to be made so by proper legislative enactment and Treasury regulation? The interests appear to be too great to permit an unusual or indifferent system of control and expenditure.

During the fiscal year 1896 the accounts of the Home, with the exception of those of the general treasurer, have been received monthly, and generally with promptness and regularity. This has been found to greatly facilitate the expeditious handling of the accounts in this office, and much time has thus been gained in forwarding them to the accounting officers of the Treasury. It is believed that it would be a further advantage if the general treasurer should also submit his accounts monthly.

For the last three quarters of the fiscal year, by order of the Secretary of War, statements of the results of the examination of the accounts of the Home by this office have been furnished the general treasurer, in order that he might make such explanations in the cases of excepted vouchers as to him might seem fit and proper, before the accounts should be forwarded to the Auditor for the War Department. Where the general treasurer acted promptly, this was found advantageous, as many of the explanations submitted by him were accepted as satisfactory.

It is noted that the number of defects and irregularities found in the vouchers has steadily decreased, showing that the fundamental principles upon which the disbursements must be conducted are gradually being firmly established and clearly recognized, and that the officers of the Home are capable and willing to apply the law and regulations as established. The progress made may have taken more time than at first anticipated, but in great part it is apparently permanent, and the majority of the defects and irregularities now noted may be said to consist in the charging of the cost of certain articles or the payment of certain services to appropriations to which they do not properly pertain. In many cases this seems to be due to a mere want of elasticity or excess of details in the schedules furnished the Branch treasurers, and a fair proportion of them would be cleared away by recognizing that the purpose to which the article purchased is to be applied should determine the appropriation to which the cost should be charged.

There has been no muster of the resident members by this Department like that made by the National Home of the State Homes; but an effort was made to see every well member both in the dormitory and at table, and appareled in both the full dress and fatigue suit, and visit the sick in hospital. They seem to be generally contented; the absence of complaints, or any just cause for them, is at least noticeable if not phenomenal, and the faithful effort to do all that seemed possible, economically and intelligently, for the comfort and care of the members is clearly evident on all sides. The intent of the controlling authority seems to be clearly indicated by the various acts of Congress in relation to these Homes, under which each individual has definite public duties to perform, and it should be not only permissible but wise to have all others act harmoniously therewith; so by concert of action the best results can be attained. The reports of this department have been submitted by you to Congress and printed and used by it, and have doubtless received such attention elsewhere as the best interests of the public service suggest; so neither a description of their prominent characteristics nor what seems to be needed at the Homes is required in any great detail here.

The following is a summary of the receipts and disbursements for the fiscal year ending June 30, 1896:

STATEMENT A.—*Receipts and disbursements.*

	1893 and prior.	1894.	1895.	1896.	Total.
Balance on hand June 30, 1895	$945.51	$19,489.25	$391,226.62	.....	$411,661.38
Received from Treasury	.....	.....	140,778.17	$2,379,946.00	2,520,724.17
Posthumous fund, act August 18, 1895	.....	.....	.....	43,674.74	43,674.74
Sales, etc	.....	.....	4,918.03	58,561.47	63,479.50
Transfers and disallowances	.....	7,294.29	7,770.03	1,015.57	16,079.89
Total	945.51	26,783.54	544,692.85	2,483,197.78	3,055,619.68
Accounted for as follows:					
Disbursements	.....	17.50	314,367.03	2,205,229.46	2,519,613.99
Deposited in Treasury as surplus	945.51	19,511.02	155,139.06	.....	175,595.59
Transfers and allowances	.....	33.00	9,482.02	2,193.76	11,708.78
Total	945.51	19,561.52	478,988.11	2,207,423.22	2,706,918.36
Balance on hand June 30, 1896	.....	7,222.02	65,704.74	275,774.56	348,701.32
Total	945.51	26,783.54	544,692.85	2,483,197.78	3,055,619.68
State aid funds.					
Balance on hand June 30, 1895	.....	.....	3,610.31	.....	3,610.31
Received from Treasury	.....	.....	142,500.00	625,000.00	767,500.00
Total	.....	.....	146,110.31	625,000.00	771,110.31
Disbursements	.....	.....	146,110.31	571,906.84	718,017.15
Balance on hand June 30, 1896	.....	.....	.....	53,093.16	53,093.16
Total	.....	.....	146,110.31	625,000.00	771,110,31

STATEMENT B.—*Appropriations.*

The appropriation accounts for the various fiscal years may be summarized as follows:

NATIONAL HOME FOR DISABLED VOLUNTEER SOLDIERS.

	1893 and prior.	1894.	1895.	1896.	Total.
Balance in Treasury July 1, 1895	.....	$150,489.04	$199,912.12	.....	$350,401.16
Amount of appropriations	$172.40	1,309.10	.....	$2,514,846.00	2,516,327.50
Unexpended balance deposited by general treasurer	*a* 947.81	*b* 22,008.60	155,139.06	.....	178,094.47
Total	1,120.21	173,806.74	355,051.18	2,514,846.00	3,044,823.03
Remitted to disbursing officers	.....	.....	140,778.17	2,379,946.00	2,520,724.17
Paid on Treasury statements	172.40	42.93	295.84	.....	511.17
Covered into surplus fund	946.81	172,336.42	.....	.....	173,283.23
Total	1,119.21	172,379.35	141,074.01	2,379,946.00	2,694,518.57
Balance in Treasury June 30, 1896	1.00	1,427.39	213,977.17	134,900.00	350,304.56
Total	1,120.21	173,806.74	355,051.18	2,514,846.00	3,044,823.13

a Includes $1 repaid by Gen. W. B. Franklin to settle his accounts.
b Includes $118.29 repaid by Gen. W. B. Franklin to settle his accounts.

STATE AID FUNDS.

	1894.	1895.	1896.	Total.
Balance in Treasury July 1, 1895	.....	$142,500.00	.....	$142,500.00
Amount of appropriations	.....	18,799.74	$775,000.00	793,799.74
Unexpended balance deposited	$199.53	.....	.....	199.53
Total	199.53	161,299.74	775,000.00	936,499.27
Remitted to disbursing officers	.....	142,500.00	625,000.00	767,500.00
Balance in Treasury June 30, 1896	199.53	18,799.74	150,000.00	168,999.27
Total	199.53	161,299.74	775,000.00	936,499.27

There was received during the past fiscal year from the effects of deceased members, or "posthumous fund," the sum of $43,674.74, and paid out on the same account the sum of $22,841.63, leaving a balance of $20,833.11 to be added to the appropriation for "current expenses" at the Branch Homes, as follows:

Branch.	Amount received.	Amount expended.	Balance to current expenses.
Central	$22,248.76	$12,318.87	$9,929.89
Northwestern	5,619.67	2,204.54	3,415.13
Southern	5,289.22	1,885.97	3,403.25
Eastern	3,308.78	3,258.05	50 73
Western	3,551.65	1,860.30	1,691.35
Pacific	2,265.26	747.60	1,517.66
Marion	1,391.40	566.30	825.10
Total	43,674.74	22,841.63	20,833.11

Since the passage of the act of August 18, 1894, requiring the transfer of posthumous funds to the appropriation for current expenses, the transactions have been as follows:

	Received.	Disbursed on posthumous account.	Balance to current expenses.
Amount transferred, 1894	[a] $152,232.63	.....	[b] $123,058.74
Amount for fiscal year 1895	46,954.98	$22,143.56	24,811.42
Amount for fiscal year 1896	43,674.74	22,841.63	20,833.11
Total	242,862.35	44,985.19	168,703.27

[a] $29,173.89 of this was covered into the Treasury. [b] 1895.

Apparently the operations under this provision of law are in line with army precedents and have been found advantageous in keeping the accounts, and economical in the use of public funds, without prejudice to the interests of the heirs of deceased members, to whom the Government is always responsible; and some legal action seemed to be needed. Doubtless other suggestions were considered, and the one adopted may not appear objectionable in practice, even if it does not appear to be the best that was offered.

The following is a brief statement of the appropriations, the net disbursements and unexpended balances relating to the several fiscal years involved, to include July 31, 1896:

	1893.	1894.	1895.	1896.
Appropriated	$2,618,013.67	$2,379,872.99	$2,324,473.00	$2,514,846.00
Posthumous fund—				
1894	.....	.....	152,232.63	.....
1895	.....	.....	24,811.42	.....
1896	.....	.....	.....	20,833.11
Total	2,618,013.67	2,379,872.99	2,501,517.05	2,535,679.11
Net disbursements[a]	2,505,224.98	2,198,887.16	2,243,091.37	2,311,215.71
Balance unexpended	112,788.69	180,985.83	258,425.68	224,463 40
Total	2,618,013.67	2,379,872.99	2,501,517.05	2,535,679.11
In United States Treasury	.....	8,649.41	255,315.83	163,830.00
Covered into Treasury on surplus warrants	112,788.69	172,336.42	.....	.....
In hands of treasurers, National Home for Disabled Volunteer Soldiers	.....	.....	3,109.85	60,633.40
Total unexpended	112,788.69	180,985.83	258,425.68	224,463.40

[a] Disbursements, less proceeds of sales and repayments.

The following tabulation shows the amount appropriated for maintenance of members and for special constructions for the fiscal years involved:

Fiscal year.	Average membership.	Appropriation.	For special constructions.	For maintenance.
1893	14,661	$2,618,913.67	$207,540.00	$2,411,373.67
1894	15,601	2,379,872.99	1,309.10	2,378,563.89
1895	16,480	2,324,473.00	94,100.00	a2,230,373.00
1896	17,451	2,514,846.00	173,500.00	2,341,346.00
1897	.....	2,483,478.75	161,814.75	2,321,664.00
Total	64,193	12,321,584.41	638,263.85	11,683,320.56

a Exclusive of $123,058.74 appropriated from posthumous fund.

The latest report received, September 10, 1896, shows the actual number present on that date to have been 18,419, a net gain of 1,280 within twelve months.

SOLDIERS' HOME.

Under date of November 26, 1895, a report was submitted, in accordance with the requirements of law, of the inspection of the Soldiers' Home in the District of Columbia. The usual tabular statements, giving in detail the transactions on account of the Home and other information concerning it, accompanied the report.

The usual efficient management of the institution continued, and the condition of the buildings, grounds, etc., was generally excellent. A steady improvement in all matters connected with this Home has been noted for years. Disabled soldiers are habitually pedestrians, and need dry, comfortable walks rather than driveways, but the latter seem still to dominate, though a better grade than any yet established between the principal building and gate most used by carriages might still be possible. Electric cars now reach the Home at nearly opposite sides, and pedestrians and bicycles throng the grounds more than ever. A bypath for the latter would afford some needed relief to the roads.

The average number of members present during the year ending September 30, 1895, was 678.25, the lowest in four years; and the average number absent was 330, the same as for the preceding year. There were 126 vacant beds reported in the barracks, an increase of 73 over the previous inspection. The average floor space was 148 square feet, and average air space 1,635 cubic feet, per man—more than twice the averages found at the volunteer homes, which might possibly approach the same ration of sun and air if the principle of outdoor relief could be adopted to a proportionate extent, by extending the savings from one year's appropriations to this relief for the most deserving resident members during the next winter. The volunteer homes are now closed to all ordinary applicants, but this would open them during the hard winter months to several thousand disabled and deserving soldiers.

The balance of the permanent fund on hand September 30, 1894, was	$2,574,036.79	
Credit settlements	188,006.04	
Total		2,762,042.83
Withdrawn for current expenses		72,000.00
Balance September 30, 1895		2,690,042.83

The total expense of maintaining members at the Home during the year was $127,514.63, or an average per member of $188.01, reducing

the cost per capita, as compared with the two preceding years, $9.88 and $9.44, respectively. This was done, it is claimed, without lowering either the quantity or quality of the supplies.

The average daily number of men on outdoor relief was 323.25, to whom was paid an average per annum of $82.53, aggregating $26,677 for the whole number for the year.

The total annual cost was $154,191.63 for maintaining the 1,001 members, including those on outdoor relief, or an average of $154.19 per man.

The amount paid for services averaged $81.83 per member, an increase of $2.39 per member over last year, and the ratio of employees to average membership was about 40.7 per cent, an increase of about 3.7 per cent over last year. While the average population of the Home had decreased since last year 55.5, the employees had increased by 6 in number.

On October 15, 1895, some 515 of the members present were pensioners, who had to their credit $46,626.04. It is believed that inducements extended to them in the way of offering a small rate of interest on their savings would have a good effect, and separating this fund idly from the permanent fund is unnecessary.

The annual average expense of maintaining a man on outdoor relief is more than $100 less than maintaining him at the Home; and under the principle of "the greatest good to the greatest number," this practice might be worthy of the attention of the National Home for Disabled Volunteer Soldiers, as allowed by law.

The books in the treasurer's office are neatly and properly kept, but the habit of keeping cash balances on hand seems dangerous and undesirable, and where the depository is so easy of access it is also unnecessary. It is understood that two separate sets of accounts are kept, one as is usual with public accounts which are submitted for inspection, the other in some special manner not recognized elsewhere in the authorized system of accounting for public moneys.

INSPECTIONS UNDER PARAGRAPHS 867 AND 868, ARMY REGULATIONS.

The inspections under Army Regulations 867 and 868, embracing the quartermaster and commissary depots, armories, arsenals, public works, and national cemeteries, have been made as prescribed. The reports indicate that the administration of the affairs of the several establishments has been highly satisfactory and the officials in charge have been very generally commended for their zeal and efficiency. In such an extensive and varied business it is universally recognized how alert must be the supervision and close the personal attention to insure wise and economical purchases and well-directed service, timely delivery, prompt handling, good stores, and no needless purchases nor injury from storage. The prevailing excellence of administration is indicated generally in the reports.

Quartermaster depots.

Of course uniform business methods control the administration of the affairs of the several depots, especially where the work is of the same general character. At Philadelphia, Pa., where a comprehensive system of manufacturing is carried on and the disbursements during the year amounted to almost a million dollars, the amount required to pay the employees was a little in excess of 9 per cent of the disbursements. At other depots, where the total expenditures are much less, the ratio of expenses to disbursements is greater.

The following table shows the average rate of compensation per month prevailing at the depots:

Employees.	Washington.	Philadelphia.	New York City.	Jeffersonville.	St. Louis.	San Francisco.
Clerks	$138.85	$117.18	$126.38	$119.44	$110.61	$128.33
Copyists	75.00	77.77	75.00	60.00	.....	.....
Inspectors	125.00	115.00	85.00	116.66	150.00	116.66
Messengers	62.50	70.00	60.00	50.00	45.00	75.00
Engineers	60.00	100.00	100.00	75.00	.....	.....
Packers	60.00	57.86	63.75	47.30	51.80	66.25
Watchmen	50.00	65.00	70.00	40.83	52.50	60.00
Teamsters	48.50	58.00	.....	41.66	45.00	62.50
Laborers	30.00	53.57	58.00	40.00	45.00	35.00
Carpenters	.....	72.50	85.00	70.00	.....	82.50
Warehousemen	.....	133.33	.....	45.00	.....	133.33
Firemen	.....	60.00	.....	50.00	.....	.....
Trimmers	.....	70.00	.....	75.00	.....	100.00
Markers	.....	65.00	.....	40.00	.....	.....

At Jeffersonville, Ind., an urgent plea is made for one additional clerk and three more packers.

The public works near Little Rock, Ark., were inspected last May, and the report indicates a very satisfactory state of affairs there. Eighteen buildings were reported to be nearing completion and about ready for occupancy by troops.

Subsistence depots.

These have been thoroughly inspected during the year, and the number of civilian employees remains about as reported last year.

Medical supply depots.

The operation of these establishments appears to be giving very general satisfaction. The officers in charge seem to possess the necessary executive ability, and are reported as displaying excellent judgment in the performance of their varied duties. The locations of depots are said to be desirable and convenient. At St. Louis, Mo., the building occupied has been used for the purpose since December, 1880.

A saving in labor, amounting to $2,140 per annum, has been reported at San Francisco, Cal., and the work of packing is said to be completed in less than one-third of the time formerly required.

The act of June 11, 1896, authorized the purchase of army medical supplies by the National Home for disabled Volunteer Soldiers, but its medical officials do not seem to be aware of the cost or quality of these stores so as to decide as to the wisdom of procuring them. The Quartermaster's Department appears to have effected sales to this institution when it was to their mutual benefit or the good of the public service. Would it not be well to take similar action in regard to medical stores?

Sale of stores.

In regard to the sale of stores, it seems only right that all Bureaus of the War Department be treated fairly alike, and the general law on this subject passed in 1825 has been found to answer for seventy years, and gives to the Secretary of War the fullest powers, and has in it the essential quality of insuring the disinterested judgment of officers not connected with the Bureau responsible for the property it is desired to eliminate, in the wisest manner, from the public service. This law has been carefully regarded, and deserves consideration again in connection with recent enactments. It is as follows:

AN ACT to authorize the sale of unserviceable ordnance, arms, and military stores.

That the President of the United States be, and he is hereby, authorized to cause to be sold any ordnance, arms, ammunition, or other military stores, or subsistence, or

medical supplies, which, upon proper inspection or survey, shall appear to be damaged or otherwise unsuitable for the public service, whenever, in his opinion, the sale of such unserviceable stores will be advantageous to the public service.

SEC. 2. That the inspection or survey of the unserviceable stores shall be made by an inspector-general, or such other officer or officers as the Secretary of War may appoint for that purpose; and the sales shall be made under such rules and regulations as may be prescribed by the Secretary of War.

Approved, March 3, 1825.

The Army and Navy General Hospital.

This institution was established in 1886 at Hot Springs, Ark., and was first opened for the reception of patients January 17, 1887. It is equipped with every facility for hydrotherapy, massage and electrical treatment, and treatment by the Swedish movements, and has recently been fitted up with a complete bacteriological and pathological laboratory. The inspector reports it in excellent condition.

Arsenals and armories.

The arsenals have all been inspected during the past year. There are fourteen of these establishments. Seven are located in the North Atlantic and two in the South Atlantic States; three in the Mississippi Valley, one in Texas, and one on the Pacific Coast. Nine are maintained for the purpose of repair, storage, and distribution, and at the others an extensive system of manufactures is carried on. Of the latter, one is in the Mississippi Valley, two in Massachusetts, and one each in New York and Pennsylvania. The reports indicate that the officers in charge display excellent judgment in the administration of affairs, and that they give the duties to which they have been assigned their careful personal supervision.

The number of enlisted men on duty at the arsenals foots up 400, and ranges from 11 at Fort Monroe, Va., to 62 at West Troy, N. Y. There are none at Governors Island, New York, and San Antonio, Tex. All belong to the Ordnance Department except a few members of the hospital corps and several commissary sergeants. They are generally reported properly instructed, competent, and efficient.

The books and records were reported properly kept and up to date. The buildings, with a few exceptions, appear to be satisfactory. One of the new set of quarters at Springfield, Mass., is reported in an unfinished condition for lack of sufficient funds. The necessity of more floor space for the machinery at Frankford Arsenal has been repeatedly brought to attention.

The total number of civil employees reported is 1,849, all but 60 of whom are credited to the manufacturing arsenals. The pay appears to be reasonable and just for a thoroughly competent corps of artisans of a superior grade of intelligence.

The following extract from the report of inspection of Springfield Arsenal, Massachusetts, made by Col. R. P. Hughes, inspector-general, North Atlantic district, indicates the future possibilities in the way of determining the amount of money, men, and machinery required to turn out a fixed number of the new rifles in a single day:

Although it is only about a year since the manufacture of the new rifle for the Army was undertaken, I find that possibilities have been sufficiently determined to enable the administration to put over 50 per cent of the force on piecework. Of course this means a much larger per cent of those to whom it is possible to assign work by the piece. In looking over the record for the past month I find that less than one-third of the workmen who are employed on piecework have had any of their work rejected, and that the total value of rejected or condemned work foots up a trifle over $100 for the whole pay roll. When the newness of many of the tools is taken into consideration, the result must be accepted as very satisfactory. The data

are being carefully collected to determine just prices for additional workmen, and in due time the cost of manufacturing the Army rifle will be determined with approximate fairness and exactness.

Colonel Mordecai has devoted much personal attention to the arranging and grouping of the machines of the various shops in order to economize energy and time as well as floor space. He is also making a careful study of the capabilities of the machines and how many competent men the Government would require to turn out any designated number of rifles daily. With the number of men and machines he has now in operation, his effort is to work each separate factor of the whole complex establishment up to the capacity of doing its share of the work demanded in turning out 120 completed rifles per day. His data show that the number of machines now in default of this requirement is very small, and due efforts are being made to so improve these few as to bring them up to the desired standard.

Powder depots. These are two in number, and are located at St. Louis, Mo., and near Dover, N. J. Both were found in a fairly satisfactory condition.

Proving Ground. At date of inspection the garrison of the Sandy Hook Proving Ground consisted of 5 commissioned officers and 53 enlisted men of the Ordnance Department. There was also a civilian force of draftsmen, mechanics, and laborers, numbering 55, with salaries ranging from $1 per day to $1,500 per annum, and footing up a total of $1,367.74 per month. The inspector reports the station is dependent upon the hospital steward for medical advice and strongly urges that the strength of the garrison and its isolated location warrant the detail of a medical officer.

Recruit rendezvous. There seems to be practical unanimity in the opinion that the abolishment of the old recruiting depots has been of great benefit to the service. The company is the home and place of training for all soldiers, and few captains can prefer that a part of their own proper duties shall be done elsewhere than under their own direction, where the soldier can be as well set up, cared for, and instructed as he can be by some outsider less interested in him individually. The company commanders of no other army can perform this duty better than ours. It is only needed that recruits be received at well-established dates in numbers best suited for training and assimilation in the company and regiment. The ratio of native to foreign born recruits is about as 7 to 1, or about 84 and 16 per cent, respectively.

National cemeteries. Ten national cemeteries have been inspected during the year, as follows, viz: Elmira, N. Y.; Philadelphia, Pa.; Loudon Park, Md.; Camp Nelson, Lebanon, Lexington, and Mill Springs, Ky.; Jefferson Barracks, Mo.; Fort Leavenworth, Kans.; and Keokuk, Iowa. Each of the above is in charge of a superintendent, except Lexington, Ky., where one man is employed to raise and lower the flag at a compensation of $60 per year, and Woodlawn, N. Y., where the necessary duties are performed by the superintendent of the Woodlawn Cemetery, adjoining the national cemetery, for $100 per year; both these cemeteries are well cared for. The salaries of superintendents range from $65 to $75 per month. The maximum estimated cost of maintaining a cemetery for one year is reported as $2,280.39, and the minimum $945; the general average is found to be $1,332.40. The buildings are reported in a satisfactory condition, with a few exceptions where minor repairs are needed, and the same may be said of the inclosures. The cemetery at Fort Leavenworth, Kans., is reported to be about filled, and the inspector recommends the purchase of an additional plot of ground. In the report of inspection of the national cemetery at Lexington, Ky., the inspector states that

he has been "informed that the Confederate dead still lie in the trenches where they were buried after the battles of Perryville and Mill Springs, uncared for. To make the cemetery national in the true sense I strongly and earnestly recommend that these bodies be moved and reinterred beside those against whom they fought, in the nearest national cemetery, and the care of the Government extended to all alike."

Under the law, deceased honorably discharged soldiers are allowed burial in these national cemeteries, but most of them are located in the South, and at the Hampton Home for Disabled Volunteer Soldiers a new plot of ground was bought when the old became full. Would it not be well to establish such cemeteries near all these Homes, which would insure the best care for the dead? Both are national institutions; the duty of the Home is to care for the living and the cemetery for the dead; and neither need assume the duties of the other.

TRANSPORTATION OF OFFICERS.

The Comptroller of the Treasury in a decision dated May 14, 1896, holds that an officer had no right to claim reimbursement for full fare over the 50 per cent land-grant roads. This places the officers in a dilemma and the question at once presents itself, how can an officer traveling under orders without troops avoid unnecessary complications while conforming to the more economical method of travel the Comptroller desires to insure. A blank transportation request or travel requisition has been suggested similar to that now issued for travel over the free and bond-aided Pacific railroads, to be used like a telegraph blank and the cost of the transportation furnished on these requests to be paid by the Pay Department out of the appropriation under its control for the payment of mileage to officers. Evidently the transportation is furnished by the department that pays for it, and the Pay Department is now charged with the disbursement of the appropriation from which the cost of such transportation is paid; and the Secretary of War is charged with the duty of preventing a deficiency in this appropriation. It may seem advisable that the office having charge of its disbursement should have early and complete knowledge of all charges against it, and it or any other department can direct or supervise such requisitions for mileage in kind or for reimbursement as readily as it would any other requisitions, say for money or property.

Since advance mileage can not be paid to an officer traveling on public duty, but he is compelled to advance the entire cost from his private funds and await reimbursement, often at an expense to himself, is it not possible, as a measure of partial relief, to furnish him requests for transportation to be used over the required lines of travel between the points named without reference to the character of the road? The annoyances and extravagance of the old disjointed way of furnishing transportation have been referred to in reports to this office. It practically prohibits round-trip tickets, and the decision of the Comptroller it is hoped will lead to something more practical as well as more economical.

As this class of travel is wholly met by the Pay Department it hardly seems affected by the limitations imposed upon the Quartermaster's Department in its appropriation act, nor should these limitations be unnecessarily interpreted so as to increase the cost of travel. Probably no legislation is needed, but the matter can be simplified and improved as a simple matter of departmental administration.

MILITARY COLLEGES.

Some need seems to be felt by officers upon this duty for information as to what is being done at other institutions, and the improvements already effected at one place incite to higher efforts and better success at others, and it may be well to give details that are needed by those most interested in the work. Careful studies from experience, and from the data so collected showing the experience of others also doing similar work, have been made and published by those directly engaged in the college work.

During the fiscal year just closed there were 106 educational institutions at which instruction in military science and tactics was given—an increase of two over the number reported at the close of the previous year. At one of the institutions—the Marmaduke Military Institute, at Sweet Springs, Mo.—a disastrous fire unfortunately necessitated closing the school early in March, and the military professor was subsequently transferred to another institution which had not heretofore been favored with an Army detail. At no time in the history of these colleges have there been such opportunities for disseminating and fostering military knowledge as were presented during the past year, and it is hoped that a still higher success may yet be reached.

Inspections.

About the only obstacle this year to a complete inspection by officers of this Department of all institutions having an Army detail was the desire of all concerned to have the inspections made as near as possible to the close of the scholastic year, which seems to offer the most fitting opportunity of presenting the year's work in its best phase. Of course, where the commencement exercises occur so close to each other, the service of special inspectors must be called into requisition, and this is too apt, amid the great changes constantly occurring in the service, to deprive the officer of the opportunity to study the effects of his recommendations and the current of improvement by a reinspection next year, and give undue uncertainty to his work. Of the 106 colleges under discussion, 62 were visited by officers of this Department and 42 by officers specially detailed for the purpose, and the inspection of two was omitted, as one institution had closed its doors on account of the conflagration previously mentioned, and the military department was to be permanently discontinued at the other. Seventeen were inspected this year by the same officers who visited them last year. Originally only 20 of these details were authorized by law.

The officers deserve praise for the skill and thoroughness with which they performed this onerous and delicate duty. All but one or two had profited by prior experience in the duty, and showed good judgment in its performance. The success and efficiency of the military departments are largely influenced by well conducted, careful, and discriminating inspections, and the necessity of detailing experienced officers for this duty seems apparent. Some institutions have suggested two inspections during the college year, so the improvements effected and success attained during each year may be clearly recognized and recorded. Major Sanger reports:

> The annual inspection of the colleges is of the utmost importance, and, whenever practicable, should be conducted by the inspectors general or by officers familiar with the subject. The president of the college should invariably accompany the inspector and remain with him at least during the review and inspection under arms, and the inspector should point out to him personally such defects as may be observed, suggesting at the same time the necessary remedies. * * * The presence of the

president gives character to the inspection, as well as the impression that he is personally interested in the result.

In the effort to interest the State authorities in the military departments of colleges within State limits, I have upon several occasions invited the adjutant-general and inspector-general of the State to accompany me. The result has been altogether favorable to the college. * * * This can not fail to put the military professor, the cadets, and college authorities more upon their mettle, and will make them far more mindful of their obligations and far more sensible to criticism than they now are. It will bring these institutions, as well as the cadets, under the direct observation of the State military authorities, who can not fail to be interested in their welfare or fail to promote it.

The following table exhibits the names of the officers who made the inspections of the past year, and the number inspected by each:

Regular inspectors.	Schools.	Students.	Special inspectors.	Schools.	Students.
Gen. J. C. Breckinridge	1	95	Lieut. Col. E. M. Coates	1	81
Col. G. H. Burton	3	626	Maj. G. S. Carpenter	2	164
Lieut. Col. H. W. Lawton	3	369	Maj. C. W. Miner	5	506
Lieut. Col. P. D. Vroom	15	1,592	Maj. C. F. Robe	3	318
Maj. J. P. Sanger	10	1,622	Capt. C. S. Roberts	2	440
Maj. E. A. Garlington	16	1,779	Capt. H. R. Brinkerhoff	4	948
Maj. Francis Moore	14	1,463	Capt. J. Fornance	21	2,533
Total	62	7,546	Capt. G. K. Hunter	2	371
			Capt. W. C. Buttler	1	53
			Lieut. A. R. Paxton	1	51
			Total	42	5,465

A copy of the inspection report of each college has been sent to the president of the institution as required by General Orders No. 93, Headquarters of the Army, 1893. Other copies, when asked for, have usually to be declined, since they are not printed.

Military professors.

The full number of officers from the active list authorized by the act of November 3, 1893, about enough to officer two regiments, has remained on duty at colleges as professors of military science and tactics. From the retired list, which is not restricted by law, there has been an increase of 2, making a total of 6 retired and 100 active officers on this duty at the close of the year. Of the latter, the cavalry is represented by 23, the artillery by 12, and the infantry by 65 officers. The Fifth and Sixth regiments of cavalry, the Second Regiment of artillery, and the Fifteenth Regiment of infantry were not represented in these details. With respect to rank, 29 of the military professors are captains, of whom 12 belong to the cavalry and 17 to the infantry arm of the service, and 71 are lieutenants. At the close of the preceding year there were but 6 cavalry and 11 infantry captains on this duty.

At all but six institutions the military professors are members of the faculty in full standing, and they are generally well supported by the college authorities, though in some cases more earnestly favorable sentiments might materially benefit this without detracting from the efficiency of the other departments of study. Evidently the best results can only be obtained when all work in harmony; and asking that military professors and students be placed on an equal footing in every respect with others in the same institution seems a modest enough request. Under the provisions of General Orders No. 93 of 1893, military professors may, for their own benefit and that of the military service, also perform other duties than those pertaining to military science and tactics and receive compensation for such services. The reports show that at 56 schools, or about 53 per cent, they performed

other duties than those prescribed by the War Department, and at 49 they received compensation ranging from $150 to $1,400 per annum. Mathematics seems to be the favored branch. At 21 institutions the military professors were provided with quarters. And generally the efforts of the military instructors and the aid given them by the college authorities toward making the military feature what it deserves to be are praiseworthy.

The past year witnessed 32 changes in the college details, and 74 officers continued on this duty. These tours are authorized for four years, so that among the 100 officers detailed from the active list there should be an average annual change of 25 under ordinary conditions. The new officer frequently finds an inadequate organization to help, or no records to guide him, and is left to his own devices. Major Sanger reports:

A noticeable defect is the utter lack of uniformity in the records kept by the different professors of military science and tactics, as well as the manner of keeping them. Beyond the quarterly reports to the Adjutant-General required by the Army Regulations, the annual report to the Inspector-General, and the orders and correspondence of the War Department, some of the officers keep no records and are required to keep none. Others have an elaborate system of bookkeeping, such as is found at posts, which is carried on usually by their own pens in the most laborious fashion, and occasionally through the assistance of the cadet staff.

In some cases such essentials as rosters and morning reports are unknown, and in very few instances are the records kept which would naturally result from the situation, and even when they are they have but little or no continuity, the particular system in vogue beginning and ending with the officer in charge at the time. There is no reason apparent to me why a set of forms adapted to all institutions should not be used, and constituting, with the War Department orders and correspondence, the permanent records of the military department to be regularly turned over, receipted for, and to be accounted for to the Inspector-General by each new detail in a special report. I have occasionally been informed after looking over the badly kept, scanty, incomplete, and diversified records, in answer to my inquiry, that the officer's predecessor did not turn over any records, and that these he had devised for himself. The records of the military department should be uniform and continuous, and the officer should be held strictly accountable that they are so, and that they are neatly and accurately kept.

The new officer should not be obliged to grope in the dark when a system of complete records will aid him in determining and curing existing defects without losing time in experiments. The extra labor involved will add but little to the limited hours of instruction now required. By having the new detail generally report early in June, time for adequate preparation and opportunity to consult his predecessor and associates will be given prior to actual operations. The beginning of school terms, fall and spring, usually are the next most favorable time for beginning this duty.

Students.

During the past year there were matriculated in the 106 colleges having an Army detail 40,560 male students, or an average of 383 per school. For the previous year the average was 372. About 93 per cent of the matriculates are reported over 14 years of age. The total enrollment in the military departments reached 19,435, or an average of 183 per school, against 19,564 for the preceding year, with an average of 188, the decrease in the military departments being confined to less than half of the institutions. Major Moore, who inspected 14 colleges in the western part of the United States, reports that—

Numbers of them [students] endeavor to work their way through, expecting employment at the institution or the town in which it is situated. The result is that many do not get employment and necessarily drop out, with hopes of returning at some future time. Then, again, the sons of farmers, who constitute the majority of the students, are frequently taken out early in the season to work on the farm, and return later. This works badly for the whole institution, but the effect is particularly felt by the military department.

Notwithstanding such drawbacks, about 17,500 students, or over 90 per cent of those enrolled in the military departments, have received military instruction. Of this number, 16.7 per cent have been under such instruction for a period of six months or less, 24.4 per cent more than six months and less than one year, 29.5 per cent between one and two years, 18.8 per cent between two and three years, and 10.6 per cent over three years. All should feel some impress from the association and instruction who have been a year or more in such a college course; but the greatest benefit from the legislation establishing tactics in the agricultural colleges and authorizing military professors at other institutions must be hoped for among the bright minds who have for over two years given attention to this military training, which is so closely related to the national defense. It is an ally of patriotism, and should aid in the culture of character and in every effective effort to do one's whole duty, whether in public or private station.

Forty-eight per cent of all male matriculants were enrolled in the military departments; in some institutions practically all were enrolled, and there is every indication that the efforts and aims of the Government in fostering military instruction and fairly distributing it throughout the national borders are not in vain. The reports show that the graduates of 25 schools are represented in the commissioned force of the Army and of 39 in the National Guard. This is an increase over the figures given last year. In a country where both the declaration and proper preparation for defensive war are so controlled by public opinion and by the chosen representatives of the people, the wide distribution of correct knowledge of what war requires and to what it leads is of the first importance in order that whatever course is followed it shall not be ignorantly adopted, nor with foolhardiness, nor allow any national enemy to catch us unawares. That "knowledge is power" is never truer than amid times of danger and threatenings of war.

College military organizations.

The cadets are usually organized into battalions and companies of infantry, though three institutions have regiments, each consisting of two three-company battalions. At 92 schools there are battalions, each consisting of from two to five companies, and at 11 the force is too small for battalion formations, and they have but a single company each. At some institutions the number and age of the students and character of the instruction have made it hardly worth while to have an officer; an intelligent noncommissioned officer would answer their requirements equally well. Altogether there are 302 companies, which is an increase of 10 over the number reported the previous year. In addition there are 28 artillery, 1 cavalry, 16 signal, 4 saber, and 2 cycle detachments, 5 recruit squads, and 3 companies of small boys, though many of these formations are part of the regular organization and have no independent existence. At 55 schools, bands or drum corps have been organized, which are maintained either wholly or partly by the college, or by subscriptions and the proceeds of entertainments. Nothing has a greater tendency to awaken dormant enthusiasm and arouse martial spirit than national or familiar airs by a well-conducted band. At 68 institutions the cadet soldiery carry the national colors, at 4 they carry them in combination with the State flag, at 8 with the college flag, and at 7 with either regimental, battalion, or corps flag. At 5 institutions a regimental, battalion, school, or company flag is carried, but no national, and at 14 no flag of any kind is carried. The national flag is also displayed at 76 institutions from a flagstaff on the college campus or one

of the academic buildings. There seems to be no uniform rule for its display. At the greater number of schools it flies daily from morning till evening, or during fair weather only. At some it is hoisted only on national and State holidays or on gala days and other special occasions, and at others it is flown on drill days, or during drills and ceremonies only.

Diversity is also noted in the methods of appointment of cadet officers and noncommissioned officers. Perhaps the best plan adopted is to have the appointing power vested either in the commandant or military professor, or in the president of the college, and may or may not require confirmation by the faculty; and where the president makes the appointments, he usually does so on the recommendation of the military professor. Officers are principally selected from the higher classes, and noncommissioned officers from the next lower, due weight being given to military proficiency, class standing, discipline, soldierly bearing, aptitude, and kindred qualifications. At some colleges appointments are made upon competitive examinations, conducted by a board of cadet officers, presided over by the professor of military science and tactics. Wherever the college authorities and senior class heartily approve and sustain military organization, instruction, and discipline, of course its success is assured.

Discipline.

The reports show that there has been some gain during the year in favor of military discipline. But few serious breaches of discipline occurred, and the cadets generally observe more respect and courtesy to their superiors than the other students where the military professor is in charge of the discipline generally and the cadets are under military restraint at all times. Major Sanger remarks:

> The discipline of the cadets in those institutions, as compared with all others, is very good, and is manifest not only in the bearing and official courtesy of the cadets, but in their drill and the care of their arms. Whatever the system may be, however, it is the concurrent testimony of all college professors who are not blinded by prejudice, that the bearing of those cadets who stand well in the military department is more deferential and attentive at all times than that of the students in general, and more especially than those who do not receive military instruction.
>
> The principal difficulties in the enforcement of discipline where it does not prevail generally results from one of two conditions. If the officer is a suitable one lack of discipline may be attributed to want of interest, improper interference, or insufficient support by the president and faculty of the college. On the other hand, when the fitness of the officer is unknown and it can be shown that the college authorities are generally in favor of military instruction, more especially the president, it may be assumed without hesitation that the officer is entirely unsuited for the detail. Where there happens to be a conjunction of either the evil or the good conditions, you have the greatest demoralization or the best attainable results. Under ordinary circumstances, and especially in the State military schools and agricultural colleges, if the officer has tact, experience, and firmness a good discipline will always prevail.
>
> It should be laid down in the instructions to officers ordered to college duty that if for any cause they are unable to maintain good discipline among the cadets it is their duty to state the reasons explicitly to the college government, and failing to secure an immediate remedy to communicate the facts to the War Department.
>
> Many defects would be remedied to a great extent were greater responsibility thrown on the cadets. As a rule there is no division of companies into squads, and except the captains the company officers and noncommissioned officers exercise no supervision over the cadets save at drill. This necessarily increases the difficulties of the military professor, his staff, and the captains, and one of the main supports to discipline is wanting.
>
> Much carelessness has been noted in the matter of saluting on the part of cadets, which, it is believed, results from a feeling that a salute is not an act of courtesy, but of servility, and therefore to be avoided. All these things, which lie at the bottom of military discipline, are entirely feasible in the colleges, and should be exacted, if the body of college cadets is to be properly educated.

At 34 institutions the cadets are required to march to meals, church, chapel, recitations, and other studies. These marching formations seem to some persons only practicable where students live in barracks. They promote good conduct and disciplined appearance, and the example set by these 34 schools could to advantage be emulated by some 30 others.

Uniform.

Military uniforms have not come into universal use without good reason, but are an aid to discipline and soldierly instruction, and wherever attempted deserve successful attention. Even in this simple matter there is a great deal of room for proper care to be successful. Cleanliness is essential when dressed in uniform. Black cravats look best with uniforms, but uniformity instead of variegated and whimsical hues becomes essential. The cost seems to be the greatest obstacle, though the reports generally show that it is sometimes less expensive or will wear better than tailor-made civilian dress. It is certainly more suitable for drilling in, and as a simple fatigue uniform can be had for a minimum outlay, it should be insisted on whenever practical for all military organizations. At over 30 per cent of the institutions the uniform is required to be worn at all times, or at least on school days. At the others, in the language of one of the inspectors, "theoretically the cadets are not supposed to wear their uniform except at drill, but, as a matter of fact, they wear them when they please."

The kind of uniform, whether cadet gray or blue, whether full dress or fatigue, or both, is far less important than the manner and time of wearing it. Colonel Burton says:

> I am not satisfied in my mind that the Government gets good results from colleges or schools where the uniform is not habitually worn. The contrast between the purely military school with its daily formation in military dress and the university or college where the civilian dress obtains except for two hours a week is very striking. The military bearing and appearance, the moral tone, high standard, and apparent discipline of the purely military school is very encouraging when compared in all these respects to the purely civil colleges.

College arms and equipments.

Under the regulations prescribed by the Secretary of War by virtue of section 1225, Revised Statutes, and amendments thereof, colleges may be supplied with 2 muzzle-loading wrought-iron rifled guns, caliber 3 inches, with 2 carriages and limbers, and the necessary implements, or in lieu thereof 2 3.2-inch breech-loading steel field guns, with their carriages and implements; with cadet rifles, caliber .45, and accouterments, not in excess of the students actually receiving military instruction; with swords for officers and noncommissioned officers; with a limited number of cavalry sabers when actually required, and with a fixed amount of blank cartridges for field pieces and of ammunition for small-arms target practice, or their equivalent value in target supplies or reloading material and tools. The reports show that 73 colleges have been supplied with field pieces, all but 1 with cadet rifles, and 51 with swords or sabers, the issues as reported amounting to 146 field pieces, 16,845 rifles, and 1,316 swords or sabers. In addition, there are reported 2 Gatling guns, 25 carbines, and 10 revolvers. Of this number, 7 3 inch muzzle-loading rifles, 160 cadet rifles, and 7 swords are in unserviceable condition. This is an increase over the number reported last year. The small arms issued seem to be considerably below the number of cadets under military instruction, though this deficiency seems met by the number of rifles furnished by the State or owned by the college. Signal equipments have been issued to 42 schools, consisting of 24 heliographs, a supply of practice kits, and a few field glasses, all in serviceable condition except about 14 staffs.

The field pieces are generally protected from the weather and housed, at all but 1 school, either in the armory, gymnasium, gun shed, or barn, when not in use. There is no armorer at 64 institutions; and at the other 42 institutions which have an armorer, one of the cadets or the janitor or an old soldier acts in that capacity generally.

The armorers at 13 institutions have seen military service and have proven very acceptable for this duty. The care of and accountability for the arms and accouterments issued to cadets leave much to be desired. Major Sanger reports on this subject:

> In respect to issues, I have found much carelessness. In place of following the simple Army rule of charging rifles, etc., to cadets by their numbers, and keeping this record in a book with the cadet's receipt, the issues are frequently made without any record whatever, and damages are not discovered until the cadets responsible for them have left the college; even if they have not left, the responsibility can rarely be determined unless witnessed by some officer or noncommissioned officer who considers it his duty to make report, which, under the prevailing system of administering the companies and battalions, is not often.

Military course.

While orders prescribe that the military course of instruction shall be both practical and theoretical, and occupy at least two hours for the former and one hour for the latter per week, no conditions seem to be imposed as to what classes or number of students must take the course. The law merely stipulates that the institution must have a capacity to educate at the same time not less than 150 male students before an army officer may be detailed to act as superintendent or military professor thereof, and in some cases the command of the military professor seems hardly to be commensurate with his rank or pay, nor justify his detail. There are 40 schools whose enrollment of male students for the year was less than 150, and 54 at which less than that number were enrolled in the military department, and there were 66 schools at which the average in the military department was less than 150 students. Of the last named, 21 averaged between 100 and 150, 38 between 50 and 100, and 7 had less than 50 in their military departments. It seems evident that the number of students to be benefited by the military course should form an important factor in granting details, though the character and equipment of the school, facilities for military work, and support of the college authorities deserve full consideration, quality being of as much importance as quantity. It has been suggested by Colonel Vroom and others, whose opinions are entitled to weight, that before an application for an Army detail is acted upon, the institution making it be visited by an inspector for personal observation, so as to aid in selecting the best from the many applicants. Such localities could be readily visited during one of the regular tours without much expense or loss of time. Where only half the classes take the military course at a college with less than the established limit of male students, an unfavorable situation is established.

With the exception of 11 institutions, the military course is generally prescribed and catalogued or published, but a great difference is noted in the amount and nature of the instruction given; and the results accomplished or military proficiency attained vary, even at schools of the same class, under nearly equal facilities and surroundings. This condition may find its explanation in the variable number of hours granted the military department, the efficiency of the military professor, the support given him by the faculty, or the encouragement held out to the students. The course of instruction and the minimum number of hours to be devoted thereto, as prescribed by orders, apply alike to all institutions, without regard to their character, scope, and purpose. At

many institutions commendable zeal is shown in accomplishing all that could be desired; at others the minimum demands seem to find indifferent response, and military professors, as well as inspectors, are of the opinion that the time allotted the military department at many colleges is insufficient to accomplish what the Government may reasonably expect. At 56 institutions proficiency in the military department is necessary for a diploma, and there are 63 institutions at which medals, prizes, and other inducements were offered during the year for excellence in military work. Adding to this the publication in the Army Register of the names of three honor graduates from each college, there would seem to be considerable impetus to good work if coupled everywhere with the warmest support of the entire faculty.

Theoretical instruction.

At institutions collecting the most intelligent youths throughout the country, from Harvard and Yale to the University of California, and upon a subject having direct reference to the effective defense of our country, it is evident that correct knowledge and efficient instruction are of the first importance. Here at least the important truth could be fully accepted that for war the mental is to the physical as three is to one. But nothing, perhaps, needs developing more at our institutions where army officers are detailed than instruction in those essential elements and fundamental principles of the military art which every intelligent man can master and it is well for every patriot and citizen to possess. The rigid quality of military discipline is well understood, and it is hardly to be acquired at a literary institution, though it may be illustrated by an occasional hour at drill; but knowledge of the science of war is as easily attained and as important as any other.

The lack of uniformity in this branch of military science is emphasized by the variety of text-books used, and the college classes required to take it, and the number of hours devoted to this course. There are nearly thirty different books made the basis of theoretical instruction, supplemented in some cases by pamphlets, essays, lectures, and the signal code. The principal books in use are: Infantry, Cavalry, and Artillery Drill Regulations; Army Regulations; Manual of Guard Duty; Small Arms Firing Regulations; Pettit's Elements of Military Science; Califf's Military Science; Wagner's Security and Information; Winthrop's Military Law; Wheeler's Field Fortification; Mercur's Elements of the Art of War; Beach's Field Engineering; Wagner's Minor Tactics; Ordway's Cycle Regulations; Vogdes's Notes on Minor Tactics; Hamilton's Military Science; Metcalf's Ordnance and Gunnery; Blunt's Artillery Tactics; Wagner's Outpost Duty; Burnham's Outposts; Marryatt's Catechism of Military Training; Lippett's Minor Operations of War; Henry's Target Practice; Chatham's Military Engineering; Reed's Artillery Tactics; Manual of Courts-Martial; Troops in Campaign, etc. How indiscriminate is the selection of these books at the various colleges may be partially indicated by the following summary list: Seven of these books are used at 4 institutions, 6 at 5, 5 at 3, 4 at 12, 3 at 18, 2 at 24, and 1 at 32, while at 7 schools no text-books whatever are reported in use. It is hoped that some good is derived from whatever books are used.

It may in general be said that all classes were required to take this course at 27 schools, 3 at 7, 2 at 19, and 1 at 16; while at 17 only the officers and noncommissioned officers attended, and at 20 the course was either elective or voluntary, or there was no theoretical instruction during the year. The time devoted during the year to this course at the several colleges varied from four hours up.

At 21 colleges essays were prepared by the students and at 14 campaigns were studied. Lectures, some of them illustrated and some merely informal, were given by military professors at 94 institutions, and at a few they were also given by other military men. Major Garlington observes that "military professors should give more attention in their lecture course to our own Army, its organization, duties, and traditions, with a view of better acquaintance, creating and fostering healthy and patriotic interest among the youth of the country. At some of the schools ignorance of the most commonplace matters connected with the service was very marked." He also suggests that a sufficient number of copies of Drill Regulations, Guard Manual, Troops in Campaign, and Army Regulations be furnished for use of these schools free of cost to the students, and that a copy of publications from the Intelligence Office or from Headquarters of the Army relating to military instruction and progress be furnished the library of every institution having a military department. This may be impracticable under the law limiting publications however desirable. But little over 70 per cent of the schools have military literature in their libraries, much of which seems of doubtful utility to the young student. As mere symptoms of the current situation, a need of uniforms to aid in establishing discipline in one class of institutions and a need of books to impart the best military knowledge may indicate difficulties which have been largely overcome by the zeal and ability of those most directly engaged in this important and growing work. At first there were but 20 of these institutions. They would be startled now into admiration if they could witness the work being done by the best 20 to-day.

There are but 53 colleges at which credit in class standing is given for theoretical instruction.

Practical work.

A similar lack of uniformity, as noted in the theoretical course, may be traced throughout the practical work, which in some cases falls short of the course imposed by the War Department orders. At 96 institutions one or more of all the classes are required to take the practical course in some form; at 7 it is optional or voluntary, and at 3 there are no rules or report on the subject. The time devoted to this branch of the instruction during the past year is reported at twenty-one hours and upward, and 50 per cent of the schools exceeded one hundred hours each. At some a thorough system of drill prevails and excellent work has been done. One of the inspectors, who visited certain of these institutions for the first time during the year, reports:

> I must say that the inspection afforded a revelation to me, for which I was wholly unprepared. The students composing the battalions and gun squads at these colleges far exceeded my expectations in their soldierly appearance, bearing, and drill. With some minor exceptions there were but few differences exhibited between their movements and those of regular troops. They excelled in the extended-order movements, in marching in line, in accomplishing the turn in changing direction, and in the mechanical maneuvers of the fieldpiece. I believe the interests of the Government are being largely served by the maintenance of the military departments in these institutions.

The number of schools that practically have no drill ground remains the same as reported last year, and the number is not inconsiderable reporting the facilities for indoor drills inadequate. At one of the schools the drills during the year were without arms, which had not yet been received.

At 56 schools competitive drills were held between their organizations for trophies, prizes, the honor of carrying the battalion flag, or for position in the battalion, and at 52, individual competitive drills were

held for appointments and promotions, scholarships, and medals and other prizes. Nothing stimulates company or individual pride more than competitions, whether in the scientific or practical part of the course. At 9 schools part or all of the cadets participated in contests with other military organizations at other places with excellent results, five prizes being awarded these cadets. Many of the military professors express the belief that if time and the necessary funds were available, intercollegiate contests might be arranged with great benefit to the military department.

Problems in minor tactics were given at 38 institutions, including a very few where this work was confined to the class room, and it is gratifying to state that the military professors at a number of colleges report the students sufficiently advanced for the solution of such problems.

At 64 schools signal practice was had with fair results; at a few the proficiency attained is reported excellent.

Target practice.

Small-arms target practice has been reported at 50, gallery practice at 26, and position and aiming drills at 49 institutions, and there are but 35 at which none of these exercises were held during the year, due, principally, to lack of facilities or opportunities. At fully one-third of the schools there are no target ranges and over one-half have no provisions for gallery practice. Pistol practice has not been held, and artillery practice has been confined to the firing of blank cartridges, at a limited number of schools. The suggestion made last year that at least one of the new rifles be furnished each school for purposes of instruction is again submitted for consideration. Any information concerning, or intelligent use of, military weapons is better than crass ignorance, and it sometimes seems a pity that the most intelligent people of our own country have had hitherto such limited opportunities to obtain correct information concerning our Army and its duties. A military museum at each agricultural college would distribute information found to be very much needed in the communities where they are required to instruct in "tactics;" and "tactics" is a word of broad military significance.

Field exercises.

The military organizations at 16 institutions held encampments during the year, and an encampment was planned at others, but had to be abandoned on account of unsuitable weather. At two colleges the encampment was held on the college campus. The duties during these occasions embraced the usual service calls, policing, guard mounting, drills, target practice, parades, inspections, outposts, patrols, reconnoissance, and other features. At several the cadets did their own cooking. Tents and other camp equipage were usually furnished by the State. Too much can not be said in favor of encampment as a means of acquiring practical information; and the students not only learn valuable lessons that can not be imparted in any other way, but they enjoy the outdoor work, and, where once tried, it is usually repeated in succeeding years. Practice marches of various distances were made by the organizations at 28 colleges. At first these outings were considered utterly impracticable and objectionable before they were tried, but they have won commendation where skillfully conducted, and their benefits are becoming still more clearly recognized from experience. Field service is the soul of military life.

Ceremonies.

In addition to the 16 schools which held encampments and maintained a guard during that time, there were 20 other schools at which a guard was mounted and maintained for shorter or longer periods. At 11 institutions this practice was of daily occurrence. At 19 others instruction was given in

the ceremony of guard mounting, but no guard was maintained, and at over half of the schools an officer of the day was detailed either in connection with the guard or for disciplinary purposes.

Dress parades were held by the organizations at 84 institutions, and street parades by those at 65. Some of these battalions have become models of military bearing and conduct, exciting the interested admiration of their own communities, and winning the approbation and praise of professional soldiers.

Remarks.

Military instruction deserves to be an assured feature of education in this country. Its influence in developing mind and body, in teaching method and precision, self-control and obedience, discipline and manliness are incalculable; and the blending of classical with military education is also pregnant with happy results. The improvements in the military departments within the past four years are very marked; and I may be pardoned for stating that many of them are traceable to the work done by inspectors, who are eminently qualified by practice and experience to determine the avoidable causes of any objectionable results, to suggest appropriate remedies for their cure, and to bring about uniform methods. They have done what they could to aid the efforts of the college authorities and military professors. Inspections are looked forward to with interest, and the reports of inspectors, formerly published in the annual report of the Inspector-General, have been and still are in demand to serve as a guide in conducting or improving the work.

The demand for military instructors is largely in excess of the number authorized by law, as is indicated by the bill introduced in the last Congress (H. R. 3832, Fifty-fourth Congress, first session) providing for the detail of 50 additional officers to act as instructors in military drill and tactics wherever good results can be assured in schools with over 500 pupils. Lessons learned in boyhood are seldom forgotten, and the seed planted by the Government is sure to come to the surface in a future generation, when the need may be greatest.

While the system of military instruction is still in its infancy and is capable of extension and future improvement, it is no longer in the experimental stage; and the time seems to have come when the Government should insist upon a fair quid pro quo and uniform methods and system. The suggestion of Major Garlington that if the course of instruction at these schools were based upon the single idea of preparing students to assume the duties of an officer of volunteer infantry, more uniform and better results would be attained and greater benefit accrue to the Government, seems timely and deserving of further consideration. The difficulties of attaining uniformity—a fundamental principle of all military administration—inherent in the great variety of educational institutions, colleges, universities, private, State, denominational, nonsectarian, are fully appreciated and must constantly receive the first consideration in effecting improvements. But it seems evident that these difficulties can be overcome. The several reports on colleges, replete with admirable suggestions looking to a classification of all institutions, the grading of those of each class to uniform methods, and an equal amount of military work from each class, have already been submitted, and mere reference to them here may suffice. It is earnestly hoped that another year may show further progress in the good work now carried on at these admirable and important institutions.

INSPECTION SERVICE.

As stated elsewhere, the operation of the system of inspection districts, which was established in the interest of economy and efficiency

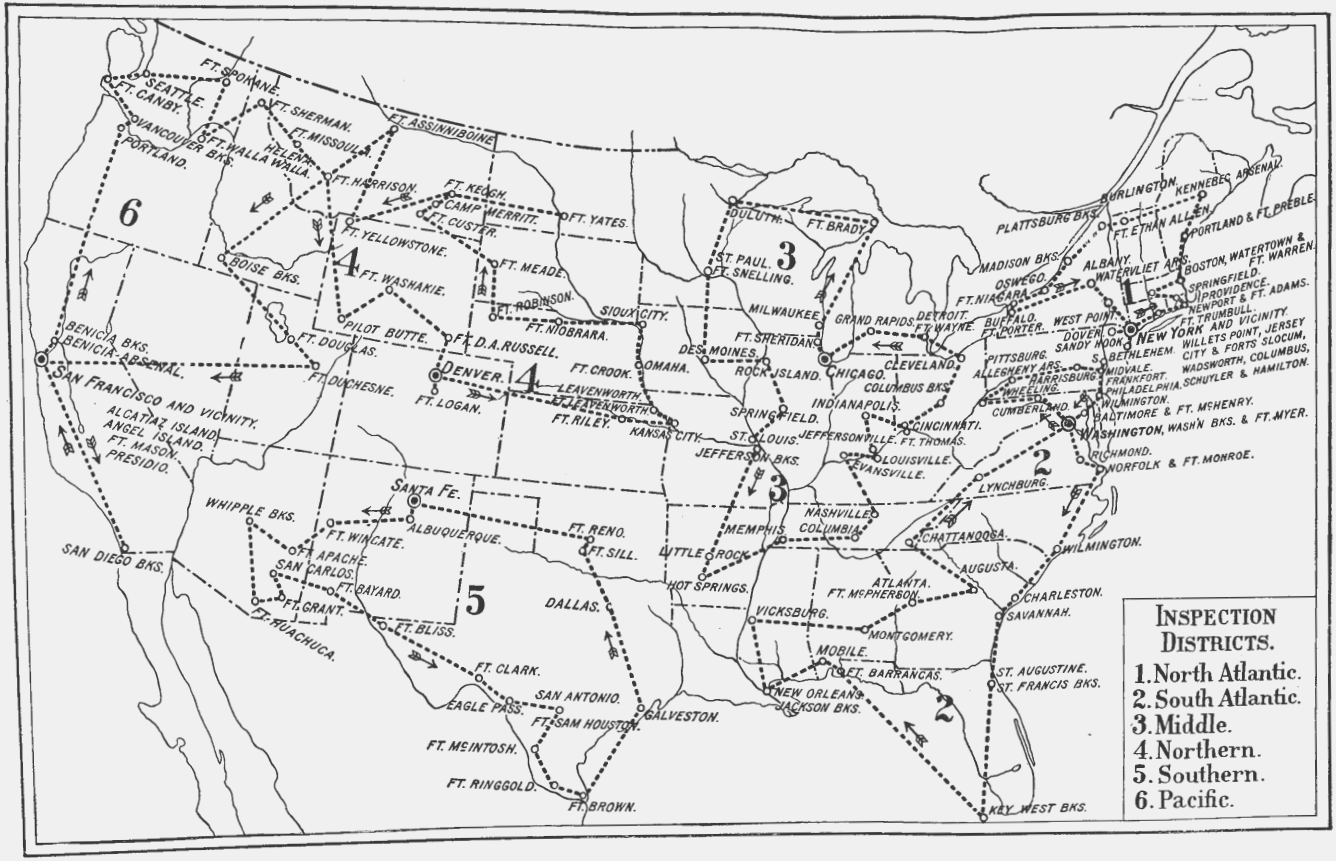
but little over a year ago, has been quite satisfactory. Under the three prescribed annual tours and the systematic inspections of places, men, and money, and the provisions of Army Regulations, Par. 879, requiring that unserviceable property be submitted for the action of an inspector at the time of his annual visit, inspectors seem to have been able to accomplish a greater average amount of work with fewer officers and less travel than was accomplished under the old system. At the incipiency of the new system certain duties were dropped or modified; but all assigned were accomplished thoroughly. Since the inauguration of inspections by districts a number of changes have been made in the work and the prescribed routes of travel of inspecting officers, due principally to the abandonment of several military posts and the establishment of others, or changes in the stations of disbursing officers and recent orders again requiring an annual inspection of recruiting stations. Altogether there were added three new military posts, recently garrisoned, and the recruiting stations at thirty-two different cities; and there were dropped five military posts whose garrisons had been withdrawn, and three subsistence depots which have been abolished, the whole imposing an annual visit to sixteen additional places. A few changes have also been made in the inspections of disbursing officers' accounts, which, while affecting travel, do not materially affect the amount of work involved.

The map submitted herewith shows the places, by districts, now required to be visited at least once annually by an inspector, and the line of travel to be followed from point to point, arranged so that each inspector may do the most in the least possible time.

Respectfully submitted.

J. C. BRECKINRIDGE,
Inspector-General.

The SECRETARY OF WAR.


FT. SPOKANE.
SEATTLE.
FT. CANBY.
VANCOUVER BKS.
PORTLAND.
FT. SHERMAN.
FT. MISSOULA.
HELENA.
FT. WALLA WALLA.
FT. HARRISON.
FT. ASSINNIBOINE.
FT. KEOGH.
CAMP MERRITT.
FT. CUSTER.
FT. YATES.
FT. YELLOWSTONE.
BOISE BKS.
FT. MEADE.
FT. WASHAKIE.
FT. ROBINSON.
SIOUX CITY.
PILOT BUTTE.
FT. NIOBRARA.
BENICIA BKS.
BENICIA ARSENAL.
FT. DOUGLAS.
FT. D.A. RUSSELL.
SAN FRANCISCO AND VICINITY.
FT. DUCHESNE.
DENVER.
FT. CROOK.
OMAHA.
FT. LOGAN.
LEAVENWORTH.
FT. RILEY.
KANSAS CITY.
ALCATRAZ ISLAND.
ANGEL ISLAND.
FT. MASON.
PRESIDIO.
SANTA FE.
WHIPPLE BKS.
ALBUQUERQUE.
FT. RENO.
FT. WINGATE.
FT. SILL.
APACHE.
SAN CARLOS.
SAN DIEGO BKS.
FT. BAYARD.
FT. GRANT.
DALLAS.
FT. HUACHUCA.
FT. BLISS.
FT. CLARK.
SAN ANTONIO.
EAGLE PASS.
FT. SAM HOUSTON.
GALVESTON.
FT. McINTOSH.
FT. RINGGOLD.
FT. BROWN.
DULUTH.
FT. BRADY.
ST. PAUL.
FT. SNELLING.
MILWAUKEE.
GRAND RAPIDS.
DETROIT.
FT. SHERIDAN.
DES MOINES.
ROCK ISLAND.
CHICAGO.
FT. WAYNE.
BUFFALO.
FT. PORTER.
FT. NIAGARA.
CLEVELAND.
COLUMBUS BKS.
INDIANAPOLIS.
SPRINGFIELD.
ST. LOUIS.
JEFFERSON BKS.
JEFFERSONVILLE.
FT. THOMAS.
CINCINNATI.
LOUISVILLE.
EVANSVILLE.
MEMPHIS.
NASHVILLE.
COLUMBIA.
LITTLE ROCK.
HOT SPRINGS.
CHATTANOOGA.
ATLANTA.
FT. McPHERSON.
VICKSBURG.
MONTGOMERY.
MOBILE.
FT. BARRANCAS.
NEW ORLEANS.
JACKSON BKS.
KEY WEST BKS.
ST. AUGUSTINE.
ST. FRANCIS BKS.
SAVANNAH.
CHARLESTON.
AUGUSTA.
WILMINGTON.
LYNCHBURG.
RICHMOND.
NORFOLK & FT. MONROE.
WASHINGTON, WASH'N BKS. & FT. MYER.
BALTIMORE & FT. McHENRY.
WILMINGTON.
CUMBERLAND.
WHEELING.
PHILADELPHIA.
FRANKFORT.
MIDVALE.
HARRISBURG.
ALLEGHENY ARS.
PITTSBURG.
DOVER.
SANDY HOOK.
BETHLEHEM.
WEST POINT.
NEW YORK AND VICINITY.
WILLETS POINT, JERSEY CITY & FORTS SLOCUM, WADSWORTH, COLUMBUS, SCHUYLER & HAMILTON.
NEWPORT & FT. ADAMS.
FT. TRUMBULL.
SPRINGFIELD.
PROVIDENCE.
BOSTON, WATERTOWN & FT. WARREN.
WATERVLIET ARS.
ALBANY.
OSWEGO.
MADISON BKS.
PLATTSBURG BKS.
BURLINGTON.
KENNEBEC ARSENAL.
FT. ETHAN ALLEN.
PORTLAND & FT. PREBLE.
1
2
3
4
5
6
INSPECTION DISTRICTS.
1. North Atlantic.
2. South Atlantic.
3. Middle.
4. Northern.
5. Southern.
6. Pacific.

REPORT OF THE JUDGE-ADVOCATE-GENERAL.

REPORT

OF THE

JUDGE-ADVOCATE-GENERAL, U. S. A.

WAR DEPARTMENT,
JUDGE-ADVOCATE-GENERAL'S OFFICE,
Washington, D. C., September 19, 1896.

Hon. DANIEL S. LAMONT,
Secretary of War.

SIR: I have the honor to submit the annual report of the Judge-Advocate-General's Department for the year ending August 31, 1896.

Commissioned officers tried by general court-martial:	
Records reported upon and submitted to the Secretary of War for action of the President	2
Records received, revised, and recorded, not requiring the action of the President (convicted, 4; acquitted, 1)	5
Cadets of the United States Military Academy tried by general court-martial:	
Records reported upon and submitted to the Secretary of War	4
Records received, revised, and recorded, not requiring further action (convicted, 1)	1
Enlisted men tried by general court-martial (convicted, 1,360; acquitted, 114)	1,474
Total trials by general court-martial	1,486
rials by general court-martial:	
Year ending August 31, 1895	1,728
Year ending August 31, 1896	1,486
Decrease	242
Decrease in number of trials by general court-martial:	
For the year 1893 as compared with 1892	28
For the year 1894 as compared with 1893	9
For the year 1895 as compared with 1894	461
For the year 1896 as compared with 1895	242

The following table shows, approximately, the number of convictions of different offences by general court-martial during the year ending August 31, 1896:

Sixteenth article of war:	
Selling ammunition	1
Seventeenth article of war:	
Losing clothing	11
Losing Government property	7
Selling clothing	11
Spoiling Government property	2
Twentieth article of war:	
Disrespect to commanding officer	15

Twenty-first article of war:	
Assaulting superior officer	3
Disobeying superior officer	60
Lifting up weapon against superior officer	1
Twenty-fourth article of war:	
Disobeying noncommissioned officer quelling a fray	3
Thirty-first article of war:	
Lying out of quarters	3
Thirty-second article of war:	
Absence without leave	233
Thirty-third article of war:	
Failure to attend drill, roll call, etc.	124
Thirty-eighth article of war:	
Drunkenness on duty	113
Thirty-ninth article of war:	
Quitting post	43
Sleeping on post	31
Fortieth article of war:	
Quitting guard	31
Forty-seventh article of war:	
Desertion	256
Fifty-fifth article of war:	
Destroying property of inhabitants	1
Sixtieth article of war:	
Larceny	16
Selling Government property	4
Sixty-second article of war:	
Absence without leave, not chargeable under the thirty-second article of war	14
Abusing public animal	5
Allowing prisoner to escape	14
Assault	37
Assault and battery	19
Assault with dangerous or deadly weapon	17
Assault with intent to kill	8
Breach of arrest	35
Burglary	1
Carrying concealed weapons	1
Committing a nuisance	8
Disobedience of standing orders or regulations	5
Disobeying commissioned officer	30
Disobeying noncommissioned officer	81
Disobeying sentinel	3
Disorderly conduct	7
Disrespect to noncommissioned officer	5
Disrespect to superior officer	12
Drawing check without funds	1
Drunkenness	82
Drunk and disorderly	50
Drunkenness, etc., causing arrest, etc., by civil authorities	10
Embezzlement	1
Escaping from guard or arrest	1
Failure to pay debts	5
False statement or report	40
False swearing	5
Fighting	2
Fraudulent enlistment	105
Hazing cadets	5
Indecent exposure of person	2
Insubordinate conduct toward commissioned officer	3
Insubordinate conduct toward noncommissioned officer	63
Larceny	61
Malingering	1
Neglect of duty	66
Perjury	2
Resisting arrest	28
Selling, losing, or wasting Government property	4
Threatening superior officer	2
Disorders, etc., charged as "conduct to the prejudice of good order and military discipline" (not included under previous heads)	262

The following table shows the desertions, classified according to the limit of punishment prescribed in the executive order of the President, published in General Orders, No. 16, Headquarters of the Army, 1895:

	Number.	Limit of confinement.
		Months.
Surrendered:		
After an absence of not more than 30 days	14	12
After an absence of more than 30 days	71	18
After an absence of more than 30 days and prior conviction considered	6	30
Apprehended:		
In service not more than 6 months at time of desertion	62	18
In service more than 6 months	101	30
In service more than 6 months and prior conviction considered	2	42
Total number of desertions	256	
Average limit of confinement		22.875

Convictions of desertion:

Year ending August 31, 1894	518
Year ending August 31, 1895	255
Year ending August 31, 1896	256

The number of trials by inferior courts-martial, the number resulting in acquittal, and the number of different men tried in the different departments are shown by the following table:

Department of—	Trials.			Acquittals	Different men tried.
	Garrison	Summary.	Total.		
California	30	906	936	41	684
Colorado	40	1,508	1,548	59	1,008
Columbia	12	630	642	21	400
East	74	4,158	4,232	115	2,418
Dakota	20	1,349	1,369	69	867
Missouri	54	2,321	2,375	112	1,420
Platte	45	1,201	1,246	21	811
Texas	11	853	864	24	539
At posts not in any of the above departments	3	341	344	10	214
Total	289	13,267	13,556	472	8,361

The number of trials by inferior courts-martial for the year ending August 31, 1895, was 14,296, as against 13,556 for the year covered by this report; showing a decrease of 740 cases.

At the last session of Congress the War Department called attention to the absence of any established system of ordinary criminal jurisdiction in certain places held by the United States for military purposes, except a very incomplete jurisdiction which was pointed out. To remedy the evil the Department submitted the draft of a bill, which, having been referred to the Committee on the Judiciary of the House of Representatives, was favorably reported (Report No. 446) and passed (H. R. 6345). It failed, however, to receive any action in the Senate. The bill is an important one, and it is to be hoped that it will pass the Senate at the next session. The reasons for the bill were fully set forth in my last annual report.

The War Department also recommended at the last session of Congress the enactment of certain legislation amending the summary court act, extending the jurisdiction of the Articles of War over discharged soldiers held as prisoners under sentence of court-martial, and making it an offence indictable in a civil court for civilian witnesses before

courts-martial to refuse to testify. The Committee on Military Affairs of the House of Representatives struck out the latter provision, the opposition to it, and, indeed, to any legislation whatever on the subject, being very decided, and a substitute for the bill (H. R. 9289), containing the recommended legislation with the exception of the provision referred to, was favorably reported to the House of Representatives (Report No. 2132), but was not called up. I feel sure that this legislation would materially strengthen the means of enforcing discipline in the Army, and I have the honor to recommend that its passage, as well as that of the bill first mentioned, be urged.

I also invite attention to another matter with reference to which legislation is desirable. Judge-advocates of departments occupy positions making them liable at all times to be called on for legal advice on official matters, and it is of importance that they should have reliable law books at hand. Formerly it was practicable to supply them with books purchased from the appropriation for contingent expenses of the Army, but this can no longer be done, as all such purchases must now be made from the appropriation for the contingent expenses at the headquarters of the military departments. This, however, is too small an appropriation to admit of adequate allotments being made. I believe that these allotments average about $50, which is entirely insufficient to provide for the wants (not limited to books only) of the offices of the judge-advocates. It is, therefore, important that the appropriation should be increased sufficiently for this purpose, and also that the legislation should designate the amount intended to be so applied.

The reports of the judge-advocates of departments present matters of interest and value. The remarks of Lieutenant-Colonel Clous, with reference to the defects of the buildings used for the confinement of military prisoners, are especially deserving of consideration. He shows that their present construction is such that resort to the very effective punishment of solitary confinement is impracticable, the buildings not being suitably constructed for such purpose. Nor, as they are at present constructed, is it practicable to separate the different classes of prisoners from each other, nor to separate soldiers awaiting trial from the prisoners under sentence. These are evils which evidently call for correction.

In the reports of two of the judge-advocates attention is again called to the insufficiency of the reward for the apprehension of deserters. The decrease in the number of trials for desertion in the last two years would seem to indicate a decrease in the number of desertions, but, as the proportion of deserters who now escape without recapture is greater than formerly, this is not a correct conclusion. On the contrary, desertion has been on the increase since 1894, when the reward was fixed at its present amount. How much of this increase is due to the smallness of the reward it is impossible to say, but the prevailing opinion in the Army is believed to be that it is in a considerable measure attributable to it.

Very respectfully,

G. NORMAN LIEBER,
Judge-Advocate-General.

REPORT OF LIEUT. COL. J. W. CLOUS, DEPUTY JUDGE-ADVOCATE-GENERAL, JUDGE-ADVOCATE DEPARTMENT OF THE MISSOURI.

HEADQUARTERS DEPARTMENT OF THE MISSOURI,
OFFICE OF THE JUDGE-ADVOCATE,
Chicago, Ill., September 8, 1896.

To the JUDGE-ADVOCATE-GENERAL, UNITED STATES ARMY,
Washington, D. C.

SIR: I have the honor to submit the annual report of the business of this office for the year ending August 31, 1896.

GENERAL COURTS-MARTIAL.

Commissioned officers tried *	3
Enlisted men tried	277
Number of acquittals	18
Number of discharges on citation of previous convictions	42

Number of convictions of different offences.

Seventeenth article of war:	
Losing clothing	5
Losing Government property	3
Selling clothing	1
Spoiling arms	1
Twentieth article of war:	
Disrespect to commanding officer	2
Twenty-first article of war:	
Disobeying superior officer	6
Lifting up weapon against superior officer	1
Twenty-fourth article of war:	
Disobeying noncommissioned officer quelling a fray	1
Thirty-first article of war:	
Lying out of quarters	3
Thirty-second article of war:	
Absence without leave	58
Thirty-third article of war:	
Failure to attend drill, roll call, etc	24
Thirty-eighth article of war:	
Drunkenness on duty	12
Thirty-ninth article of war:	
Leaving post	7
Sleeping on post	4
Fortieth article of war:	
Quitting guard	3
Forty-seventh article of war:	
Desertion	68
Sixtieth article of war:	
Larceny	4
Sixty-second article of war:	
Absence without leave not chargeable under the thirty-second article	4
Abusing public animal	3
Assault	2
Assault with dangerous or deadly weapon	6
Assault with intent to kill	1
Breach of arrest	7
Committing a nuisance	3
Creating a disturbance in quarters	2
Disobeying noncommissioned officer	21
Disrespect and insubordinate toward superior officer	1
Drunkenness	6
Drunk and disorderly	21
Drunkenness, etc., causing arrest, etc., by civil authorities	2
Fraudulent enlistment	27

* These cases are published in General Orders, No. 61, Headquarters of the Army, 1895, and General Orders, No. 19, of 1895, and No. 3, of 1896, these headquarters.

Sixty-second article of war—Continued.

Insubordinate conduct toward noncommissioned officer	10
Larceny	7
Losing or wasting Government property	1
Malingering	1
Neglect of duty	11
Perjury	1
Resisting arrest	1
Disorders, etc., charged under the sixty-second article of war (not included under previous heads)	19

The following table shows the convictions of desertion, classified according to the limit of punishment prescribed in the President's orders of March 20, 1895:

	Number.	Limit of confinement.
		Months.
Surrendered:		
After an absence of not more than 30 days	6	12
After an absence of more than 30 days	22	18
After an absence of more than 30 days and prior convictions considered	3	30
Apprehended:		
In service not more than 6 months at time of desertion	16	18
In service more than 6 months	21	30
Total number of convictions of desertion	68	
Average limit of confinement		21.70—

Convictions of desertion:	
Year ending August 31, 1895	55
Year ending August 31, 1896	68
Increase	13

INFERIOR COURTS.

The number of trials by inferior courts, the number of acquittals, and the number of different men tried are as follows:

Garrison	54
Summary	2,321
Total	2,375
Acquittals	112
Different men tried	1,420

The following table gives the average enlisted strength and number of trials by general and inferior courts for the years named:

Year.	Average enlisted strength.	Trials by general courts.	Trials by inferior courts.	Per cent. of trials by inferior courts-martial.
1891	3,004	225	1,958	65.18
1892	3,393	322	2,653	78.19
1893	3,308	290	2,140	64.69
1894	3,602	336	1,978	54.91
1895	3,689	274	2,369	64.21
1896	4,020	277	2,375	59.07

DESERTIONS.

The number of desertions, the probable cause therefor, and the posts from which the desertions occurred are shown in the following tables:

Desertions and the probable cause therefor as found by boards of survey.

The probable cause.	The year of enlistment.					
	1st.	2d.	3d.	4th.	5th.	Total.
Cause unknown	100	12	5	2	1	120
General dissatisfaction	28	6	1	.....	.....	35
To avoid trial	19	9	3	3	.....	34
Debts	8	5	1	.....	.....	14
Dislike of discipline	9	1	.....	.....	.....	10
Intoxicants	4	5	.....	.....	.....	9
General worthlessness	6	1	.....	.....	.....	7
Fast women	6	1	.....	.....	.....	7
Domestic troubles	4	1	.....	.....	.....	5
To avoid the gibes of comrades	3	1	.....	.....	.....	4
Deserted to go to Cuba	1	1	1	.....	.....	3
Had considerable money	2	1	.....	.....	.....	3
Restless disposition	1	1	1	.....	.....	3
Fear of recognition as former deserters	1	.....	2	.....	.....	3
Homesickness	3	.....	.....	.....	.....	3
Fear of horses and inability to ride	2	.....	.....	.....	.....	2
Persuaded by others	1	.....	1	.....	.....	2
Was not in his right mind	1	.....	.....	.....	.....	1
Sickness of a private nature	1	.....	.....	.....	.....	1
Went to Texas to join a base-ball team	1	.....	.....	.....	.....	1
To join English forces in South Africa	.....	1	.....	.....	.....	1
Total	201	46	15	5	1	268

The average enlisted strength and the number of desertions from posts in the department are given in the following table:

Post.	Strength.	Desertions.	Per cent.
Fort Brady, Mich	254	5	1.96
Fort Sill, Okla	443	12	2.71
Fort Wayne, Mich	278	8	2.87
Fort Sheridan, Ill	703	37	5.26
Fort Reno, Okla	396	23	5.81
Fort Riley, Kans	800	63	7.87
Fort Leavenworth, Kans	744	70	9.41
Jefferson Barracks, Mo	355	50	14.08

The percentage of desertions for this year is 6.74.

The percentage of desertions for last year was 5 02.

The maintenance of the discipline and morale of the enlisted men of the Army, as well as sound principles of military penology, demand, in my opinion, a radical change in the prison facilities afforded, not only in the old, but also in the more modern guard-houses constructed by the quartermasters' department. The sole prison room in the latter consists of an iron cage subdivided by a grating in the middle with a number of iron cells on one end. This prevents the keeping apart of the different classes of prisoners as enjoined in Army Regulation 907, and the prisoner who happens to be confined awaiting trial by, or undergoing sentence of, general court-martial for an ordinary breach of discipline, is forced into companionship with those convicted of the most serious offences.

Those who have made military punishments a study hold that experience proves that solitude is the best and safest mode of increasing the severity of a necessarily short punishment. In solitude the soldier has time and opportunity to chew the cud of reflection; while his loneliness is the more oppressive, as society has become a necessity of civilized life. Several days passed in a dark cell, in solitude, and on bread and water diet, exercise, it is said, a startling effect on the mind and body of the most recalcitrant soldier. This mode of confinement has been found most efficacious against those with whom the ordinary modes of punishment have failed.

The customs of the service and Article VII of the President's order of March 20, 1895, authorize solitary confinement on bread and water, but this punishment is not resorted to by courts because of the want of facilities of enforcing it.

In my opinion the guardhouses should be provided with accommodations for confinement of different degrees of severity, and no guardhouse should be constructed at any military post except upon plans approved by those having in charge the maintenance of discipline in the Army and the execution of military punishment.

The military codes of all civilized nations, except that of the United States, authorize the infliction of disciplinary punishments—that is to say, punishments by the direct orders of a superior without the intervention of a court—for minor offences of a purely military character. This authority is based upon the necessity of giving military commanders the effective means of maintaining order and discipline without unnecessary delay and formality.

In the Army of the United States the same necessity exists, but the award of punishment without trial is not authorized, except at the United States Military Academy, where, by existing regulations of the President, the Superintendent is empowered to inflict punishments without trial. This power has been exercised for more than three-quarters of a century, and experience has proved it to be one of the most efficacious methods for maintaining discipline of the highest order.

In connection with this subject it will not be out of place to mention that paragraph 930 of the Army Regulations enjoins the employment of methods for the preservation of discipline other than by trial before a court.

Very respectfully,

J. W. CLOUS,
Lieut. Col., Deputy Judge-Advocate-General, United States Army.

REPORT OF LIEUT. COL. EDWARD HUNTER, DEPUTY JUDGE-ADVOCATE-GENERAL, JUDGE-ADVOCATE DEPARTMENT OF DAKOTA.

HEADQUARTERS DEPARTMENT OF DAKOTA,
OFFICE OF THE JUDGE-ADVOCATE,
St. Paul, Minn., September 10, 1896.

The JUDGE-ADVOCATE-GENERAL, UNITED STATES ARMY,
Washington, D. C.

SIR: Under the requirements of paragraph No. 891, Army Regulations, 1895, I have the honor to submit the following report, based upon the records of this office for the twelve months ending August 31, 1896:

Two commissioned officers were tried; enlisted men tried by general courts-martial, 142; convictions, 128, and acquitted, 14. The number of cases tried by inferior courts during the year was, summary courts, 1,349; garrison courts, 20. Acquittals by inferior courts, 69. The number of men tried by inferior courts was 867.

The following list shows the number of convictions of different offenses by general courts-martial during the year:

Seventeenth article of war:	
Losing clothing	1
Losing Government property	1
Selling clothing	5
Twentieth article of war:	
Disrespect to commanding officer	2
Twenty-first article of war:	
Disobeying a superior officer	6
Twenty-fourth article of war:	
Disobeying a noncommissioned officer quelling a fray	1
Thirty-second article of war:	
Absence without leave	10
Thirty-third article of war:	
Failure to attend drill, roll call, etc	12
Thirty-eighth article of war:	
Drunkenness on duty	9
Thirty-ninth article of war:	
Quitting post	6
Sleeping on post	6
Fortieth article of war:	
Quitting guard	5
Forty-seventh article of war:	
Desertion	20

Sixtieth article of war:	
Selling Government property	2
Larceny	1
Sixty-second article of war:	
Absence without leave not chargeable under thirty-second article	1
Assault	1
Assault and battery	1
Assault with dangerous or deadly weapon	8
Assault with intent to kill	4
Breach of arrest	2
Committing a nuisance	1
Disobeying a commissioned officer	4
Disobeying noncommissioned officer	9
Drunkenness	12
Drunkenness, etc., causing arrest by civil authorities	2
Fighting	1
Fraudulent enlistment	9
Insubordinate conduct toward noncommissioned officer	9
Larceny	13
Neglect of duty	3
Resisting arrest	3
Selling, losing, or wasting Government property	3
Threatening to strike superior officer	1
Disorders, etc., charged as "conduct to the prejudice of good order and military discipline" (not included in previous heads)	45
Total	219

Number of men dishonorably discharged:	
For desertion	16
Through use of previous convictions	12
For serious offenses	29
Total	57

Number of noncommissioned officers reduced:	
By sentence of general courts-martial	3
By sentence of summary court	19
Total	22
Amount of fines imposed by inferior courts	$4,385.50

It is earnestly recommended that, if possible, a small appropriation be secured to be applied in the purchase of books for the use of the office of the judge-advocate at these headquarters.

Respectfully submitted.

EDWARD HUNTER,
Deputy Judge-Advocate-General, United States Army.

APPENDIX.

HEADQUARTERS DEPARTMENT OF DAKOTA,
OFFICE OF THE JUDGE-ADVOCATE,
St. Paul, Minn., July 14, 1896.

The ADJUTANT-GENERAL, DEPARTMENT OF DAKOTA, *St. Paul, Minn.*

SIR: In compliance with instructions from your office dated July 6, 1896, I have the honor to submit the following report of the business of this office for the fiscal year ended June 30, 1896:

One commissioned officer was tried.

The number of enlisted men tried and the places of trial are shown by the following table:

Post.	General courts.				Inferior courts.			Average enlisted strength.
	Pertaining to posts proper.	Pertaining to other posts in the department.	Pertaining to organizations out of department.	Total tried at posts.	Garrison.	Summary.	Total inferior courts.	
Fort Assiniboine, Mont	19	.....	.....	19	2	251	253	393
Fort Buford, N. Dak	10	.....	.....	10	1	16	17	239
Fort Custer, Mont	16	.....	.....	16	3	177	180	350
Fort Harrison, Mont. *a*	7	.....	.....	.....	.....	127	127	130
Fort Keogh, Mont	19	.....	1	20	4	140	144	339
Fort Missoula, Mont	23	7	2	32	1	106	107	281
Fort Snelling, Minn	31	4	4	39	4	310	314	515
Fort Yates, N. Dak	8	.....	3	11	1	106	107	245
Fort Yellowstone, Wyo	8	.....	.....	8	.....	50	50	125
Total	134	11	10	155	16	1,283	1,299	2,617
Acquittals	.....	.....	.....	15	5	65	70	.....
Convictions	.....	.....	.....	140	11	1,218	1,229	.....
Noncommissioned officers reduced	.....	.....	.....	4	.....	17	17	.....

a Tried at Fort Missoula, Mont., and not computed in total.

Table showing the organizations in which the trials originated.

Organization.	General courts.	Inferior courts.	
		Garrison.	Summary.
Noncommissioned staff	1	.....	.....
Hospital Corps	3	1	9
Sixth Cavalry (2 troops)	6	.....	49
Eighth Cavalry (2 troops)	3	.....	50
Tenth Cavalry	31	3	327
Third Infantry	32	4	309
Twelfth Infantry (3 companies) *a*	3	.....	15
Twenty-second Infantry	29	5	284
Twenty-fifth Infantry	37	3	240
Out of department	10	.....	.....
Total	155	16	1,283

a These companies left the department for station at Fort Niobrara, Nebr., Sept. 29, 1895.

Table affording a comparison of the number of trials and the percentage as to the enlisted strength for the years 1894–95 and 1895–96.

Years.	Trials by general courts-martial.	Per cent.	Trials by inferior courts.	Per cent.
1894–95	*a* 288	8.7	1,745	53.1
1895–96	*a* 145	5.5	1,299	49.6

a Cases pertaining to organizations outside of the department are not included.

Number of men dishonorably discharged by sentence of general courts-martial.

For desertion	20
Through use of previous convictions	13
For serious offenses where previous convictions could not be considered	28
Total	61

DESERTION.

From the special reports of boards of survey upon desertions received and filed in this office, the following data has been obtained:

Total number of desertions 120

Posts and organizations from which the men deserted.

Post.	Number.	Organization.	Number.
Fort Assiniboine, Mont	8	Hospital Corps	2
Fort Buford, N. Dak. *a*	2	Sixth Cavalry (2 troops)	7
Fort Custer, Mont	5	Eighth Cavalry (2 troops)	9
Fort Harrison, Mont	14	Tenth Cavalry	9
Fort Keogh, Mont	19	Third Infantry	34
Fort Missoula, Mont	8	Twelfth Infantry (3 companies) *b*	6
Fort Pembina, N. Dak. *a*	1	Twenty-second Infantry	40
Fort Snelling, Minn	34	Twenty-fifth Infantry	13
Fort Yates, N. Dak	21		
Fort Yellowstone, Wyo	8	Total	120
Total	120		

a Abandoned: Buford, Oct. 1, 1895; Pembina, Aug. 15, 1895.
b Left department September 29, 1895.

Place of enlistment.

St. Paul or Minneapolis	25
At posts in the department	30
Regimental recruiting parties	2
Outside of the department	63
Total	120

Length of service at time of desertion.

Less than three months	11
Three to six months	14
Six to twelve months	30
One to two years	23
Two to three years	8
Three to four years	10
Four to five years	3
Five years and over	21
Total	120

Condition as to sobriety when last seen.

Drunk	5
Under the influence of liquor	10
Sober	105
Total	120

Number of times tried previous to desertion.

Once	27
Twice	13
Three times	8
Four times	8
Five times	3
Six times or over	6
Never tried	55
Total	120

Character as given by troop or company commanders.

Excellent	2
Very good	3
Good	58
Fair	18
Indifferent	9
Poor	16
Bad	7
Worthless	7
Total	120

Moneys due, and to whom, at time of desertion.

To the United States	$1,428.54
To the soldier	3,371.47

Preparations before departure.

Took all belonging to them	35
Took part only	19
Sold everything	26
Unknown	40
Total	120

Percentage of desertions to enlisted strength for the two years indicated.

Year.	Average enlisted strength.	Number of desertions.	Percentage to enlisted strength.	Year.	Average enlisted strength.	Number of desertions.	Percentage to enlisted strength.
1892–93	3,388	313	9.20	1894–95	3,284	138	4.07
1893–94	3,651	127	3.47	1895–96	2,617	120	4.58

Opinions given in reports as bearing upon the causes of desertion.

Habitual drunkards and generally worthless	15
Supposed repeaters	7
Influenced by relatives and others	7
Violated State laws and feared punishment	5
Fraudulent enlistment and feared discovery and punishment	4
Heavily in debt	5
Suspected of being thieves	3
General dissatisfaction	9
Unsettled and roving disposition	2
Stupid (unable to learn his drill)	1
Mind affected (subject to epileptic fits)	1
Embezzlement	1
Theft (afraid of punishment)	1
From confinement (charged with assault with intent to kill)	1
From confinement (charged with striking a noncommissioned officer)	1
From confinement in hands of civil authorities (charged with larceny)	2
Infatuated with prostitutes and left with them	4
Had been and preferred the life of a sailor	1
Heard of a bench warrant being out against him for contempt of court and was afraid of arrest	1
Bigamy	1
Unknown (no opinions being advanced)	48
Total	120

Attention is respectfully invited to the remarkably low rate of desertion in the Tenth Cavalry and the Twenty-fifth Infantry.

Respectfully submitted.

EDWARD HUNTER,
Deputy Judge-Advocate-General, U. S. A., Judge-Advocate.

REPORT OF MAJ. S. W. GROESBECK, JUDGE-ADVOCATE UNITED STATES ARMY, JUDGE-ADVOCATE, DEPARTMENT OF CALIFORNIA.

HEADQUARTERS DEPARTMENT OF CALIFORNIA,
OFFICE OF JUDGE-ADVOCATE.
San Francisco, Cal., September 5, 1896.

To the JUDGE-ADVOCATE-GENERAL, UNITED STATES ARMY,
Washington, D. C.

SIR: I have the honor to submit the following report of the business of this office from September 1, 1895, to and inclusive of August 31, current year:

GENERAL COURTS-MARTIAL.

Number of sets of charges received for trial by general courts-martial 128

Of this number, 15 were returned for trial by inferior court; 6 were not recommended for trial; and in 2 cases the accused deserted.

Number of trials by general courts-martial, embracing 99 different enlisted men, as against 106 trials by general courts-martial, embracing 98 different enlisted men in preceding year 105
Acquittals 13

The offences for which these men were tried are classified as follows:

Seventeenth article of war:	
Selling clothing	1
Twentieth article of war:	
Disrespect to commanding officer	2
Twenty-first article of war:	
Disobeying superior officer	4
Thirty-second article of war:	
Absence without leave	17
Thirty-third article of war:	
Failure to attend roll call	1
Thirty-eighth article of war:	
Drunkenness on duty	11
Thirty-ninth article of war:	
Leaving post	1
Sleeping on post	2
Fortieth article of war:	
Quitting guard	2
Forty-seventh article of war:	
Desertion	*a* 11
Sixty-second article of war:	
Allowing prisoner to escape	3
Assault with intent to kill	1
Assault	4
Disobeying commissioned officer	1
Disobeying noncommissioned officer	4
Disorderly conduct	2
Drunkenness	9
Drunk and disorderly	7
Encouraging attack upon noncommissioned officer	1
Failing to assist noncommissioned officer in quelling disturbance	2
Fighting	1
Fraudulent alteration of a pass	1
Fraudulent enlistment	1
Giving away Government rations	1
Immoral conduct	1
Insubordinate conduct to noncommissioned officer	3
Insulting language to sentinel	1
Insulting language of noncommissioned officer to a private	1
Larceny	1
Leaving mounted patrol	1
Neglect of duty	5
Perjury	1
Stealing	1

a Includes 6 deserters from organizations in other departments.

Summary of punishments imposed by general courts-martial.

Amount of forfeitures (in some cases with confinement)	$1,106.00
Dishonorably discharged with forfeiture of pay and allowances	15
Dishonorably discharged with forfeitures and confinement	27

Of the foregoing number of men shown as dishonorably discharged, 25 were upon the citation of previous convictions.

INFERIOR COURTS-MARTIAL.

Number of trials by inferior courts-martial (906 by summary courts and 30 by garrison courts), embracing 684 different enlisted men, as against 929 trials by inferior courts-martial, embracing 613 different enlisted men, in preceding year	936
Acquittals	41

The offences for which these men were tried are classified as follows:

Thirty-first article of war:	
Lying out of quarters	1
Thirty-second article of war:	
Absent without leave	322
Thirty-third article of war:	
Failure to attend drills, stables, parades, roll calls	216
Thirty-eighth article of war:	
Drunkenness on duty	41
Sixty-second article of war:	
Abusive, threatening, or obscene language	6
Assault	2
Disobeying noncommissioned officer	64
Disrespect to commissioned officer	2
Disrespect, or insubordinate conduct to noncommissioned officer	6
Disorderly conduct	7
Drunkenness	72
Drunk and disorderly	72
Fighting and other disturbances	15
Gambling	13
Introducing liquor into camp	1
Neglect of duty	58
Disorders (not included under previous heads)	38

Summary of punishments imposed by inferior courts-martial.

Amount of forfeitures	$3,791.83
Number of days' confinement	1,903

Distribution of trials by general courts-martial.

Organization.	Band.	A.	B.	C.	D.	E.	F.	G.	H.	I.	K.	L.	Total.
Fourth Cavalry			6	6					a1	3	6		22
Second Artillery						a1							1
Fifth Artillery		13		1	8	3	8		9	5	4	8	59
First Infantry	3	3	2	6	2	1	1	1					19
Fourth Infantry							a1						1
Eleventh Infantry		a1											1
Twelfth Infantry	a2												2
Total trials													105

a Six deserters from other departments.

Of the foregoing trials by general courts martial:

	Men.	Trials.
Tried once	94	94
Tried twice	4	8
Tried three times	1	3
Total	99	105

Distribution of trials by inferior courts-martial.

Organization.	Band.	A.	B.	C.	D.	E.	F.	G.	H.	I.	K.	L.	M.	Total.
Ordnance Department														1
Hospital Corps														14
Fourth Cavalry			49	59						51	43			202
Fifth Artillery	8	60	3	52	120	18	59		70	25	62	47	3	527
First Infantry	12	29	20	29	30	32	18	12	10					192
Total trials														936

Of the foregoing trials by inferior courts-martial:

	Men.	Trials.
Tried once	521	521
Tried twice	105	210
Tried three times	38	114
Tried four times	11	44
Tried five times	7	35
Tried six times	2	12
Total	684	936

A comparison with preceding year is submitted as follows:

1894-95.

Average enlisted strength of the department 1,375
Total number of trials (excluding deserters from other departments), embracing 703 different enlisted men 1,026

1895-96.

Average enlisted strength of the department 1,373
Total number of trials (excluding deserters from other departments), embracing 777 different enlisted men 1,035

Very respectfully, your obedient servant,

S. W. GROESBECK,
Judge-Advocate, United States Army.

REPORT OF MAJ. E. H. CROWDER, JUDGE-ADVOCATE UNITED STATES ARMY, JUDGE ADVOCATE, DEPARTMENT OF THE PLATTE.

HEADQUARTERS DEPARTMENT OF THE PLATTE,
JUDGE-ADVOCATE'S OFFICE,
Omaha, Nebr., September 10, 1896.

To the JUDGE-ADVOCATE-GENERAL, UNITED STATES ARMY,
Washington, D. C.

SIR: Under the requirements of paragraph 891, Army Regulations, I have the honor to submit the following report of the business of this office for the period commencing September 1, 1895, and ending August 31, 1896:

GENERAL COURTS-MARTIAL.

During the period named 149 sets of charges were received, of which number 113 were tried by general courts-martial; 8 recommended for trial by summary court; 4 recommended for trial by garrison court; 6 recommended for trial in other departments; 2 withdrawn; 7 discharged before trial; 2 restored to duty without trial; 7 pending.

The cases tried include—

Noncommissioned officers	8
Privates, etc	105
Total	113

Of these trials 12 resulted in acquittal, and 4 were of men belonging to other departments.

The offenses tried include violations of the following articles of war:

Seventeenth article of war:	
Selling	1
Losing	4
Spoiling horse	1
Twentieth article of war:	
Disrespect to commanding officer	1
Twenty-first article of war:	
Disobeying superior officer	12
Thirty-second article of war:	
Absence without leave	19
Thirty-third article of war:	
Failure to attend drill, roll call, etc	18
Thirty-eighth article of war:	
Drunk on guard	5
Drunk on other duty	5
Thirty-ninth article of war:	
Quitting post	5
Sleeping on post	2
Fortieth article of war:	
Quitting guard	9
Forty-seventh article of war:	
Desertion	15
Sixtieth article of war:	
Larceny	1
Burglary	1
Loaning Government property	1
Sixty-second article of war:	
Assault	6
Assault with dangerous or deadly weapon	1
Assault with intent to do bodily injury	2
Aggravated assault on civilian	5
Malicious assault	2
Absence from extra or special duty	1
Breach of arrest	4
Disobeying noncommissioned officer	13
Disrespect to noncommissioned officer	2
Disobedience of post orders	2
Drunk and disorderly in quarters or post	6
Drunkenness	3
Drunk in quarters	1
False statement	4
False report	2
Insubordinate and disrespectful language to noncommissioned officer	8
Threatening noncommissioned officer	5
Fraudulent enlistment	9
Larceny	5
Neglect of duty	9
Resisting arrest	4
Suffering prisoners to escape	2
Theft	2
Conduct to the prejudice of good order and military discipline not included under previous headings	27

The following table shows the apportionment of the cases tried by general courts-martial among the different organizations, with the record for the same period last year:

Organization.	1895–96.	1894–95.	Organization.	1895–96.	1894–95.
Second Infantry	37	40	Second Cavalry	1	
Seventh Infantry		1	Sixth Cavalry		5
Eighth Infantry	33	50	Eighth Cavalry	13	2
Twelfth Infantry	12	14	Ninth Cavalry	10	40
Fifteenth Infantry	1		Tenth Cavalry		1
Sixteenth Infantry	1		Hospital Corps	1	1
Seventeenth Infantry		27	Private, retired		1
Twentieth Infantry		2	Noncommissioned staff	1	1
Twenty-first Infantry		3			
Twenty-second Infantry	2		Totals	113	191
First Cavalry	1	3			

During the last two months of 1895–96 there was but a detachment of the Second Infantry in this department—1 officer and 35 men.

The following table affords a comparison as to the average enlisted strength of the department and the number of trials by general courts-martial, with percentage of latter to former, for each of the five years last past:

Year.	Average enlisted strength.	Trials by general courts-martial.	Percentage.	Year.	Average enlisted strength.	Trials by general courts-martial.	Percentage.
1891–92	3,676	290	7.8	1894–95	2,116	191	9
1892–93	3,539	307	8.6	1895–96	2,523	113	4.4
1893–94	2,740	248	9				

These records have all been examined in this office, the decisions and orders of the department commander indorsed thereon, promulgated in orders, and forwarded to the office of the Judge-Advocate-General of the Army.

INFERIOR COURTS.

Garrison courts-martial.

During the period covered by this report there were 45 trials by garrison courts-martial. The records of these trials have been received, revised, and filed in this office. Of the total number of trials by garrison courts-martial, 4 resulted in acquittal.

These trials include violations of the following articles of war:

Thirty-second article of war:
- Absence without leave 11

Thirty-third article of war:
- Failure to attend drill, roll call, etc 7

Thirty-eighth article of war:
- Drunk at inspection 1
- Drunk at guard mount 1

Sixty-second article of war:
- Assault 1
- Breach of arrest 1
- Disorderly conduct, causing arrest by civil authorities 1
- Disorderly conduct in quarters 3
- Dirty rifle 2
- Disobeying noncommissioned officer 5
- Disobeying company orders 2
- Disobeying post order 2
- Drunkenness 4
- False statement 2
- Insubordinate and threatening language to noncommissioned officer 4
- Insubordinate conduct to officer 1
- Lying 2
- Neglect of duty 1
- Neglect of duty (sentinel) 1
- Conduct to the prejudice of good order and military discipline, not included under previous headings 7

The following table shows the apportionment of the cases tried by garrison courts-martial among the different organizations with the record for the same period last year:

Organization.	1895–96.	1894–95.	Organization.	1895–96.	1894–95.
Second Infantry	1	3	Ninth Cavalry	3	1
Eighth Infantry	33	22	Twenty-second Infantry	3	.....
Twelfth Infantry	2	1	Hospital Corps	.....	3
Seventeenth Infantry	3	16	Totals	45	47
Sixth Cavalry	.....	1			
Eighth Cavalry	.....	.....			

The following table affords a comparison as to the average enlisted strength of the department and the number and percentage of trials by garrison courts-martial, with the number and percentage of men tried, during the five years last past:

Year.	Average enlisted strength.	Trials by garrison courts-martial.		Men tried.	
		Number.	Per cent.	Number	Per cent.
1891–92	3,676	39	1.06	39	1.06
1892–93	3,539	43	1.2	42	1.1
1893–94	2,740	46	1.6	46	1.6
1894–95	2,116	47	2.2	41	1.9
1895–96	2,523	45	1.7	39	1.5

SUMMARY COURTS.

During the period covered by this report there were 1,201 trials by summary courts. The monthly transcripts of these trials have been received, examined, and filed in this office. Of the total number of trials by summary courts, 17 resulted in acquittal. In one case sentence was set aside as void for lack of jurisdiction of offense tried.

These trials include violations of the following articles of war:

Seventeenth article of war	5
Thirty-first article of war	4
Thirty-second article of war	282
Thirty-third article of war	554
Thirty-eighth article of war	81
Thirty-ninth article of war	1
Sixty-second article of war:	
Absence without leave not chargeable under thirty-second article of war	69
Assault	19
Assault with weapon	1
Abusing horse	6
Breach of arrest	23
Committing nuisance	8
Dirty gun, clothing, etc	28
Disrespectful and insubordinate language to noncommissioned officer	60
Disobeying noncommissioned officer	70
Disobeying post orders	15
Disobeying company orders	9
Disrespectful language to superior officer	9
Drunkenness	65
Drunkenness, etc., causing arrest by civil authorities	12
Drunk or disorderly at post or in quarters	60
Drunk and disorderly in city	8
False report (noncommissioned officer)	1
False statement	14
Introducing liquor into post	2
Neglect of duty	22
Neglect of duty (sentinel)	18
Resisting arrest	4
Disorders, etc., charged as "conduct to the prejudice of good order and military discipline," not included under previous headings	162

The following table shows the apportionment of the cases tried by summary courts among the different organizations, with the record for the same period last year:

Organization.	1895-96.	1894-95.	Organization.	1895-96.	1894-95.
Second Infantry	233	332	Sixth Cavalry	.....	10
Eighth Infantry	274	328	Eighth Cavalry	246	32
Twelfth Infantry	142	194	Ninth Cavalry	249	250
Seventeenth Infantry	4	146	Hospital Corps	9	14
Twenty-first Infantry	.....	21			
Twenty-second Infantry	44	.....	Totals	1,201	1,327

The following table exhibits the number of cases tried by summary courts at the several posts in the department during the years 1894-95 and 1895-96:

Post.	1895-96.	1894-95.	Post.	1895-96.	1894-95.
Fort McKinney (abandoned November, 1894)	.....	31	Fort D. A. Russell	264	323
Fort Meade	248	33	Fort Washakie	50	34
Fort Niobrara	145	301	Fort Crook	45	.....
Fort Omaha	235	357	Camp Pilot Butte	8	2
Fort Robinson	206	246	Totals	1,201	1,327

The following table shows the average enlisted strength of the department, the number and percentage of trials by summary court, and the number and percentage of men tried, during the five years last past:

Year.	Average enlisted strength.	Trials by summary court.		Men tried	
		Number.	Per cent.	Number.	Per cent.
1891-92	3,676	2,504	68.1	1,301	35.3
1892-93	3,539	1,736	49.0	1,043	29.4
1893-94	2,740	1,729	63.1	977	35.6
1894-95	2,116	1,327	62.7	791	37.3
1895-96	2,523	1,201	47.6	772	30.5

The number of different men tried by summary courts for this year is somewhat increased by the transfer of a new regiment to this department in July last. But for this fact it is thought that the percentage of different men tried would be lower than heretofore reported in this department.

The following table shows the average enlisted strength of the department, the number and percentage of trials of enlisted men by both general and inferior courts-martial, during the period covered by this report, together with the record for the same period last year:

Year.	Average strength.	General.		Garrison.		Summary.	
		Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
1894-95	2,116	191	9.0	47	2.2	1,327	62.7
1895-96	2,523	113	4.4	45	1.7	1,201	47.6
Increase	407	.....	.....	.....	.....	.....	.....
Decrease	.....	78	4.6	2	5	126	15.1

The foregoing tables, exhibiting a comparison of the statistics of this year with those of previous years since the institution of the summary court, show a marked decrease in the percentage of trials and of men tried by both general and inferior courts.

Very respectfully,

E. H. CROWDER,
Major and Judge-Advocate, United States Army.

REPORT OF OFFICER IN CHARGE, JUDGE-ADVOCATE'S OFFICE, DEPARTMENT OF THE EAST.

HEADQUARTERS DEPARTMENT OF THE EAST,
Judge-Advocate's Office, September 9, 1896.

The JUDGE-ADVOCATE-GENERAL, UNITED STATES ARMY, *Washington, D. C.*

SIR: In obedience to the provisions of paragraph 891, Army Regulations, I have the honor to submit the following report of the business of this office for the period commencing September 1, 1895, and ending August 31, 1896:

Commissioned officers tried by general court-martial, none.
Enlisted men tried by general court-martial (convicted, 454; acquitted, 36)..... 490
Total trials by general court-martial 490
Trials by general court-martial, year ending August 31, 1895..... 517

Decrease..... 27

Cases apparently brought before general court-martial with a view to discharge on proof of five or more previous convictions:
Year ending August 31, 1895..... 144
Year ending August 31, 1896..... 61

Decrease..... 83

Trials for fraudulent enlistment alone:
Year ending August 31, 1895..... 21
Year ending August 31, 1896..... 23

Increase over last year..... 2
Increase of trials this year as compared with last, leaving out trials with a view to discharge on proof of prior convictions and trials for fraudulent enlistment. 54

Number of convictions of different offenses, taken from the records of trials by general courts-martial in the Department during the year ending August 31, 1896.

Seventeenth article of war:
Losing or selling clothing..... 21
Twentieth article of war:
Disrespect to commanding officer..... 2
Twenty-first article of war:
Attempting to strike superior officer 1
Disobeying superior officer..... 17
Thirty-second article of war:
Absence without leave 71
Thirty-third article of war:
Failure to attend drill, roll call, etc..... 42
Thirty-eighth article of war:
Drunkenness on duty..... 31
Thirty-ninth article of war:
Quitting post..... 11
Sleeping on post 8
Fortieth article of war:
Quitting guard..... 7
Forty-seventh article of war:
Desertion..... 128
Fifty-fifth article of war:
Destroying property belonging to inhabitants of the United States..... 1
Sixtieth article of war:
Larceny 2
Sixty-second article of war:
Absence without leave, not chargeable under thirty-second article 3
Abusing public animal..... 1
Allowing prisoner to escape 3
Assault..... 12
Assault and battery..... 7

Sixty-second article of war—Continued.

Assault with intent to kill	1
Breach of arrest	13
Disobeying commissioned officer	14
Disobeying noncommissioned officer	28
Disobeying sentinel	2
Drunkenness	30
Drunk and disorderly	3
Drunkenness, etc., causing arrest, etc., by civil authorities	1
Embezzlement	1
False statement	13
False swearing	3
Fraudulent enlistment	41
Indecent exposure of person	2
Insubordinate conduct toward commissioned officer	3
Insubordinate conduct toward noncommissioned officer	13
Introducing liquor into post	2
Larceny	16
Neglect of duty	16
Overpowering and escaping from sentinel	1
Pawning clothing	1
Resisting arrest	6
Disorders, etc., charged as "conduct to the prejudice of good order and military discipline," not included under previous headings	88

The following table shows the desertions, classified according to the limit of punishment prescribed in the Executive order of the President, published in General Orders, No. 16, Headquarters of the Army, 1895:

	Number.	Limit of confinement.
		Months.
Surrendered:		
After an absence of not more than 30 days	11	12
After an absence of more than 30 days	32	18
Apprehended:		
In service not more than 6 months	38	18
In service more than 6 months	50	30
Total number of desertions	131	
Average limit of confinement		22.007

Trials for desertion:

Year ending August 31, 1895	111
Year ending August 31, 1896	131
Increase	20

Of the number brought to trial, 26 were of cases originating in other departments.

Number of desertions in the department from July 1, 1894, to June 30, 1895	310
Number of desertions in the department from July 1, 1895, to June 30, 1896	412
Increase over last year	102

The average enlisted strength, the number of trials by inferior courts-martial, the number resulting in acquittal, and the number of different men tried at the different posts in the department are shown in the following table:

Post.	Average strength.	Trials.			Acquittals.	Different men tried.
		Garrison.	Summary.	Total.		
Fort Adams, R. I	314	3	252	255	12	134
Fort Barrancas, Fla	145	2	87	89	5	43
Columbus Barracks, Ohio	574	.....	379	379	5	325
Fort Columbus, New York Harbor	227	4	117	121	7	75
Fort Ethan Allen, Vt	248	.....	143	143	2	84
Fort Hamilton, New York Harbor	315	4	148	152	5	84
Jackson Barracks, La	143	.....	65	65	2	36
Key West Barracks, Fla	140	10	117	127	7	61
Madison Barracks, N. Y	548	.....	345	345	4	158
Fort McHenry, Md	205	9	97	106	4	64
Fort McPherson, Ga	567	7	303	310	9	183
Fort Monroe, Va	543	.....	177	177	5	107
Fort Myer, Va	318	2	126	128	.....	80
Fort Niagara, N. Y	241	5	190	195	.....	104
Plattsburg Barracks, N. Y	561	3	216	219	10	116
Fort Porter, N. Y	136	.....	74	74	.....	52
Fort Preble, Me	72	.....	7	7	.....	7
Fort Schuyler, New York Harbor	133	.....	70	70	.....	47
Fort Slocum, New York Harbor *a*	216	2	168	170	.....	80
St. Francis Barracks, Fla	168	3	85	88	2	44
Fort Thomas, Ky	562	8	427	435	18	216
Fort Trumbull, Conn	74	.....	54	54	.....	30
Fort Wadsworth, New York Harbor	205	3	189	192	2	118
Fort Warren, Mass	140	.....	55	55	1	47
Washington Barracks, D. C	415	9	178	187	15	123
In camps, on marches, etc	.....	.....	89	89	.....	.....
Total	7 210	74	4,158	4,232	115	2,418

a Late Davids Island.

The number of trials by inferior courts for the period ending August 31, 1895, was 4,290, as against 4,232, for the year covered by this report, showing a decrease of 58 cases this year as compared with the corresponding period last year.

Very respectfully,

THOMAS WARD,
Assistant Adjutant-General, in Charge of Office.

REPORT OF CAPT. A. C. SHARPE, ACTING JUDGE-ADVOCATE, DEPARTMENT OF THE COLORADO.

HEADQUARTERS DEPARTMENT OF THE COLORADO,
OFFICE OF THE JUDGE-ADVOCATE,
Denver, Colo., August 31, 1896.

To the JUDGE-ADVOCATE-GENERAL, UNITED STATES ARMY,
Washington, D. C.

SIR: In compliance with paragraph 891, Army Regulations, I have the honor to submit the following report of the business of this office for the year ending this date:

COURTS-MARTIAL.

* * * * * * *

There were 129 enlisted men tried by general courts-martial during this period, from the different organizations serving in this department, and including deserters from organizations not in the department, as follows:

Noncommissioned staff	1
First Cavalry	7
Second Cavalry	20
Seventh Cavalry	21
Ninth Cavalry	2
Seventh Infantry	20

Eleventh Infantry	14
Sixteenth Infantry	25
Twenty-fourth Infantry	12
Hospital Corps	2
	124
From other organizations	5
Total	129

The number of enlisted men tried by general courts-martial, at the different posts in the department, is shown by the following schedule:

Fort Apache	10
Fort Bayard	14
Fort Douglas	28
Fort Duchesne	2
Fort Grant	14
Fort Huachuca	9
Fort Logan	34
Whipple Barracks	8
Fort Wingate	10
Total	129

The following schedule exhibits the nature of the offenses for which enlisted men were tried by general courts-martial:

Sixteenth article of war:	
Selling ammunition	1
Seventeenth article of war:	
Losing clothing	2
Losing Government property	1
Twentieth article of war:	
Disrespect to commanding officer	2
Twenty-first article of war:	
Disobeying superior officer	3
Twenty-fourth article of war:	
Disobeying noncommissioned officer in quelling fray	1
Thirty-second article of war:	
Absence without leave	20
Thirty-third article of war:	
Failure to attend drills, roll call, etc	11
Thirty-eighth article of war:	
Drunkenness on duty	18
Thirty-ninth article of war:	
Quitting post	3
Sleeping on post	3
Fortieth article of war:	
Quitting guard	3
Forty-seventh article of war:	
Desertion	18
Sixtieth article of war:	
Larceny	4
Selling Government property	2
Sixty-second article of war:	
Allowing prisoner to escape	4
Assault and battery	6
Assault with dangerous or deadly weapon	2
Breach of arrest	4
Carrying concealed weapons	1
Disobeying commissioned officer	2
Disobeying noncommissioned officer	4
Disobeying sentinel	1
Disrespect to superior officer	2
Drunkenness	2
Drunk and disorderly	4
Drunkenness causing arrest by civil authority	1
False swearing	2

Sixty second article of war—Continued.

False marking and scoring at target range	3
Fraudulent enlistment	8
Indecent exposure of person	1
Insubordinate conduct toward noncommissioned officer	4
Larceny	4
Making false statements	4
Resisting arrest	4
Disorders, etc., charged as "conduct to the prejudice of good order and military discipline," not included under previous heads	27

Of the whole number of trials by general courts-martial, 5 resulted in acquittal. Twenty-two men were dishonorably discharged through citation of previous trials and convictions under paragraph 3, General Orders, No. 16, series 1895, Adjutant-General's Office.

Inferior courts.

Posts.	Number of trials by—		Total.
	Summary court.	Garrison court.	
Fort Apache	77	2	79
Fort Bayard	211	6	217
Fort Douglas	282	1	283
Fort Duchesne	23	1	24
Fort Grant	116	7	123
Fort Huachuca	183	15	198
Fort Logan	392	2	394
San Carlos	15		15
Whipple Barracks	154	2	156
Fort Wingate	55	4	59
Total	1,508	40	1,548

In 40 cases objection was made to trial by summary court.

The following schedule exhibits the nature of the offenses for which enlisted men were tried by inferior courts:

Violation of the—		Violation of the—	
Seventeenth article of war	1	Thirty-eighth article of war	81
Twenty-first article of war	5	Thirty-ninth article of war	1
Thirty-first article of war	2	Fortieth article of war	4
Thirty-second article of war	372	Sixty-second article of war	734
Thirty-third article of war	563		

Number of acquittals by summary court	53
Number of acquittals by garrison court-martial	6
Total	59
Number of different men tried	1,008
Per cent of enlisted men tried by inferior court	30.07

DESERTIONS.

There have been 133 desertions from the different organizations serving in this department, during the past year, as follows:

First Cavalry	4
Second Cavalry	30
Seventh Cavalry	14
Ninth Cavalry	0
Seventh Infantry	28
Eleventh Infantry	22
Sixteenth Infantry	27
Twenty-fourth Infantry	8
Total	133

The number of desertions from the different posts in the department is as follows:

Fort Apache	8
Fort Bayard	14
Fort Douglas	27
Fort Duchesne	0
Fort Grant	6
Fort Huachuca	4
Fort Logan	43
Whipple Barracks	17
Fort Wingate	14
Total	133
Per cent. of desertions to average strength	3.96

REMARKS.

Comparing the present with former years, it will be observed that the percentage of trials both by general and inferior courts is steadily diminishing. The conditions of garrison life and field service, and the strength of the command remain practically the same, yet it is gratifying to note that the number of trials of enlisted men by general courts-martial has fallen from 252 in 1894, and 179 in 1895, to but 129 in the year just closed. Of these totals, 15 in 1894 were men belonging to organizations stationed in other departments, 8 in 1895, and 5 in the present year. The most notable decrease occurred in the Twenty-fourth Infantry, which stood at 34 in 1894 and 1895, but has fallen during the past twelve months to 12.

Trials by inferior courts numbered 2,102 in 1894 and 1,729 in 1895, as against 15 for the present year. Very few cases of felony or other serious crimes have occurred, nearly all the offenses considered being mere misdemeanors or lapses of a purely military character. These figures suggest a most favorable state of discipline and morale.

Desertions.—There is a slight decrease in the percentage of desertions since last year. The reports of boards convened to investigate causes confirm me in the opinion, heretofore expressed, that this evil can be abated only by rendering apprehension and punishment more certain. Men desert for the most frivolous reasons, and for no reasons at all. Growing weary of the restraints incident to military life, they abandon their companies and their colors with as little apparent concern as a laborer would quit his job. If their apprehension was assured by a reasonable reward and their punishment in no case less than confinement for a period equal to the unexpired portion of their enlistment, I feel confident that the percentage of losses and the consequent demoralizing effect due to this crime would perceptibly diminish.

Very respectfully,

A. C. SHARPE,
Captain, United States Army, Acting Judge-Advocate.

REPORT OF CAPT. EDWIN F. GLENN, ACTING JUDGE-ADVOCATE, DEPARTMENT OF THE COLUMBIA.

HEADQUARTERS DEPARTMENT OF THE COLUMBIA,
JUDGE-ADVOCATE'S OFFICE,
Vancouver Barracks, Wash., September 10, 1896.

The JUDGE-ADVOCATE-GENERAL, UNITED STATES ARMY,
Washington, D. C.

SIR: In compliance with paragraph 891, Army Regulations, I have the honor to submit the following report for the year ending August 31, 1896:

GENERAL COURTS-MARTIAL.

Number of general court-martial records received, revised, recorded, and forwarded to the Judge-Advocate-General during the year ending August 31, 1896. Sixty-five cases of enlisted men.

Convictions	62
Acquittals	3
Total cases	65

Comparison of total number with tha of two preceding years.

Cases tried: 1893–94	83
1894–95	72
1895–96	65
Decrease from last year	7
60 men tried once	60 cases.
1 man tried twice	2 cases.
1 man tried three times	3 cases.
62 men tried with a total of	65 cases.

One commissioned officer of the Fourteenth Infantry tried and dismissed during the year.

Distribution of cases tried by general courts among the different military posts in the department.

Post.	Cases tried at post.	Of men belonging to post.	Of men belonging to other posts.	Of men belonging to other departments.	Men of post tried at other posts.	Total number of men of post tried.	Average strength of garrison.	Per cent.	Per cent last year.
Boise Barracks	.....	.....	.....	.....	3	3	119	2.5	3.3
Fort Canby	1	1	.....	.....	7	8	121	6.6	4
Fort Sherman	18	16	.....	2	2	18	282	6.4	8.1
Fort Spokane	3	3	.....	.....	.....	3	190	1.6	1.6
Vancouver Barracks	30	20	9	1	.....	20	587	3.4	2.5
Fort Walla Walla	13	10	3	.....	.....	10	246	4.1	7.5
Total and averages	65	50	12	3	12	62	1,545	4	4.4

Number of convictions of different offenses tried by general courts in the department during the year ending August 31, 1896.

Seventeenth article of war:	
Losing accouterments	1
Twenty-first article of war:	
Disobeying superior officer	5
Thirty-second article of war:	
Absence without leave	9
Thirty-third article of war:	
Failure to attend drill, roll call, etc	6
Thirty-eighth article of war:	
Drunkenness on duty	3
Thirty-ninth article of war:	
Quitting post	1
Sleeping on post	2
Fortieth article of war:	
Quitting guard	1
Forty-seventh article of war:	
Desertion	17
Sixtieth article of war:	
Larceny	3
Sixty-second article of war:	
Assault	2
Attempting to strike noncommissioned officer	1
Breach of arrest, private	1
Disregard of orders	5
Dirty at inspection	1
Drunkenness	7
Fraudulent enlistment	8
Making false statement	3
Neglect of duty	4
Refusing medical treatment	1
Resisting arrest	5
Theft	5
Using insolent language to his commanding officer	4
Using insubordinate language	3
Using threatening language	3

Comparison of number of cases tried for desertion with that of previous year.

Number of convictions of desertion	17
Convicted of "absence without leave," charge "desertion"	3
Number of cases tried for desertion 1895–96	20
Number tried last year	13
Increase	7
Number of men dishonorably discharged	38
Same, last year	27
Number of men dishonorably discharged for minor offenses on account of previous convictions	9
Same, last year	8
Number of trials in which evidence of previous convictions was introduced	21
Same, last year	24
Number of noncommissioned officers reduced to the ranks	1

Table exhibiting the organization to which the enlisted men tried by general courts belong.

Organization.	Band.	A.	B.	C.	D.	E.	F.	G.	H.	L.	M.	Total.
Fourth Cavalry		4			1		3	2	3			13
Fifth Artillery			4								3	7
Fourth Infantry	4	5	4		1	2	4	1				21
Fourteenth Infantry		2	2	2	1	1	4	2	3			17
Twenty-second Infantry		1										1
Twenty-fifth Infantry			1									1
Hospital Corps												2
Total number of men tried												62

It will be observed that one commissioned officer was tried and dismissed during the year and that the total number of trials of enlisted men by general courts-martial show a decrease of 7 from last year. As the number of trials has decreased each year since 1893–94, it is worthy of remark. Without any definite data upon which to base the assumption, it is assumed that this is due to the fact that a better class of men are enlisting in the Army. There is no doubt that the present system of detecting repeaters has helped to reduce the number of trials.

INFERIOR COURTS-MARTIAL.

Garrison courts-martial.

Number of cases tried by garrison courts-martial during the year ending August 31, 1896	12
Number of men tried	10
Convictions	9
Acquittals	3
Total cases	12

Summary courts.

Number of cases tried by summary courts during the year ending August 31, 1896	630
Number of men tried	390
Convictions	612
Acquittals	18
Total cases	630
Noncommissioned officers reduced to the ranks by sentence of inferior courts	7
Forfeitures imposed and executed	$2,414
Stoppages imposed and executed	30c.
Number of days confinement at hard labor	2,063
Number of days solitary confinement on bread and water diet	10
To be reprimanded by post commander	1

Distribution of cases tried by inferior courts, with number confined and released without trial, at the posts in the department.

Post.	Average strength of garrison.	Number of cases tried.		Number of men tried.	Per cent. men tried.	No. confined and released without trial
		Summary.	Garrison.			
Boise Barracks	119	55	1	35	29.4	.....
Fort Canby	121	32	2	29	23.9	5
Fort Sherman	282	137	.....	83	29 4	3
Fort Spokane	190	58	.....	41	21.6	1
Vancouver Barracks	587	154	5	113	19.3	34
Fort Walla Walla	246	194	4	101	41.1	.....
Total and average	1,545	630	12	a402	25.9	43

a Two men tried both at Forts Sherman and Walla Walla consequent upon change of station. Number of different men tried, 400.

Distribution of cases and men tried by inferior courts among the different organizations serving in the department.

Organization.	Trials.	Band.	A.	B.	C.	D.	E.	F.	G.	H.	L.	M.	Total.
Fourth Cavalry	Cases	11	55	....	....	23	20	40	50	57	....	....	256
	Men	6	27	....	....	15	13	23	24	27	....	....	135
Fifth Artillery	Cases	.....	....	18	....	....	....	....	....	3	....	11	32
	Men	.....	....	13	....	....	....	....	....	3	....	11	27
Fourth Infantry	Cases	4	38	22	16	17	21	31	40	20	....	....	209
	Men	2	20	16	12	13	17	16	27	11	....	....	134
Fourteenth Infantry	Cases	3	25	25	16	17	15	15	12	11	....	....	139
	Men	1	20	18	10	12	8	11	9	11	....	....	100
Hospital Corps	Cases	.....	....	....	....	....	....	....	....	....	....	....	6
	Men	.....	....	....	....	....	....	....	....	....	....	....	4
Total	Cases	.....	....	....	....	....	....	....	....	....	....	....	642
	Men	.....	....	....	....	....	....	....	....	....	....	....	400

NOTE.—Troops, batteries, and companies showing no trials in above table are not serving in the department.

Number of times tried by inferior courts:

268 men tried once	268 cases.
63 men tried twice	126 cases.
42 men tried three times	126 cases.
19 men tried four times	76 cases.
3 men tried five times	15 cases.
4 men tried six times	24 cases.
1 man tried seven times	7 cases.
400 men tried with a total of	642 cases.

Number of cases tried by inferior courts	642
Number tried last year	738
Decrease	96

Classification of offenses tried by inferior courts.

Absence without leave (laid under thirty-second article)	135
Absence from drill, roll call, etc. (laid under thirty-third article)	255
Drunkenness on duty (laid under thirty-eighth article)	57
Disorders charged as "Conduct to the prejudice of good order and military discipline" (laid under sixty-second article)	253
Total number of offenses	700

It is noted that there is a large percentage of decrease in trials by inferior courts also and a corresponding decrease for the past three years. The garrison court-martial was resorted to by 12 men.

DESERTIONS.

Number of desertions during the year ending August 31, 1896 89
Number reported last year 74

Increase 15

Causes, etc., of desertion, ascertained under the provisions of paragraph 115, Army Regulations, and comparison of same data for three preceding years.

Year.	Character as set forth in reports of boards of survey.						Causes of desertion—Opinions given in reports of boards of survey.													Nativity.	
	Excellent.	Good.	Fair.	Bad.	Worthless.	Not formed.	Not ascertained.	Dissatisfaction with service.	Drink.	Debts, unable to pay.	Unsound mind.	Inaptitude for service.	To avoid support of woman.	Influenced by woman.	To escape trial.	Despondency.	Roving disposition.	Enlisted for shelter through winter.	Too much work.	Not included under preceding heads.	American.	Foreign.
1895-96	3	55	17	5	4	5	44	7	4	11	1	5	1	1	8	1	2	2	2	....	74	15
1894-95	3	44	12	9	3	3	37	10	4	10	2	....	....	....	3	....	....	1	....	7	57	17
1893-94	2	27	10	5	2	1	25	4	....	7	....	....	....	....	4	....	....	....	....	7	32	15
1892-93	2	76	24	8	8	4	69	23	....	4	....	....	....	....	9	....	....	....	....	17	79	43

Year.	No. tried by courts-martial and No. of trials.				Length of service.						Months in which desertions occurred.											
		Inferior court.									1895.					1896.						
	General courts.	Tried once.	Tried more than once.	Not tried.	Less than 1 year.	Between 1 and 2 years.	Between 2 and 3 years.	Between 3 and 4 years.	Between 4 and 5 years.	Over 5 years' service.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.
1895-96	4	14	17	57	38	19	5	7	5	15	3	4	6	6	3	4	10	14	8	4	6	12	9
1894-95	6	11	20	41	32	18	4	3	5	12	9	6	7	2	1	2	4	4	11	4	10	7	7
1893-94	2	13	11	22	21	15	3	1	2	5	3	3	5	2	6	1	1	1	5	5	8	3	4
1892-93	1	17	21	83	71	37	5	2	1	6	7	6	8	4	6	4	6	14	18	25	17	7	...

Distribution of cases of desertion among the different military posts in the department.

Post.	Average strength of garrison.	Number of desertions.	Per cent.	Per cent. last year.
Boise Barracks	119	6	5.0	4.9
Fort Canby	121	7	5.8	3.2
Fort Sherman	282	34	12.1	5.0
Fort Spokane	190	2	1.1	2.1
Vancouver Barracks	587	32	5.5	5.2
Fort Walla Walla	246	8	3.3	6.0
Total and average	1,545	89	5.8	4.8

Distribution of cases of desertion among the different organizations serving in the department.

Organization.	Band.	A.	B.	C.	D.	E.	F.	G.	H.	L.	M.	Total.	Average strength of organization.	Per cent.
Fourth Cavalry	.....	3	(a)	(a)	....	1	5	1	4	....	....	14	360	3.9
Fifth Artillery	(a)	(a)	2	(a)	(a)	(a)	(a)	(a)	1	(a)	4	7	113	6.2
Fourth Infantry	4	6	13	1	....	1	7	4	1	....	....	37	429	8.6
Fourteenth Infantry	.....	2	3	2	3	2	8	7	4	....	....	31	587	5.3
Noncommissioned staff	.....	....	....	....	....	....	....	....	....	....	....	.....	39	.....
Hospital Corps	.....	....	....	....	....	....	....	....	....	....	....	.....	17	.....
Total and average	.....	....	....	....	....	....	....	....	....	....	....	89	1,545	5.8

a Not serving in the department.

In my annual report to the department commander I made use of the following language which still expresses my views upon this subject, viz:

"It is true that the records show an increase of fifteen desertions during the year, but I can find nothing contained in the trials by the military courts or in the investigations—'Report on cause of desertion'—that throws any light upon the subject. The literature upon this subject that has been published does not help us to ascertain either the cause of or a cure for the disease.

"If the American people were better informed in regard to the profession of arms and particularly as to the exact status of a soldier, it is believed that less sympathy would exist for those who undertake to violate their contract of enlistment by desertion, and this would necessarily tend to cause a decrease in the number of desertions. I still think the reward offered for the apprehension of those committing this offense is too trivial and should be abolished entirely, or made sufficiently large to warrant an effort upon the part of the officer making such arrests. It is true that one who deserts is of no value as a soldier, but the punishment imposed is of value as a deterrent, and should be inflicted upon every man who commits the offense."

GENERAL REMARKS.

In conclusion I beg to submit the suggestion that efforts looking to the enabling of courts-martial to compel civilian witnesses to testify when summoned to appear before them be renewed and pushed until Congress confers the desired powers. It is not believed that it is necessary or desirable for courts-martial to have any further power than to certify such contempts to the nearest United States courts, since as soon as it is known that a military court possesses the desired power there will be no occasion for its use.

Very respectfully, your obedient servant,

EDWIN F. GLENN,
Captain and Acting Judge-Advocate, United States Army.

REPORT OF CAPT. FRANK L. DODDS, ACTING JUDGE-ADVOCATE, DEPARTMENT OF TEXAS.

HEADQUARTERS DEPARTMENT OF TEXAS,
JUDGE-ADVOCATE'S OFFICE,
San Antonio, Tex., September 12, 1896.

To the JUDGE-ADVOCATE-GENERAL, UNITED STATES ARMY,
Washington, D. C.

SIR: I have the honor to submit the following report of the business of this office for the year ending August 31, 1896:

There were no commissioned officers tried.

The following table shows the number of general, garrison, and summary courts-martial cases tried at the several posts in the department, with the percentage of trials:

Post.	Average enlisted strength of garrison.	Number and percentage of trials.					
		General cases tried.	Percentage of general cases tried.	Garrison cases tried.	Summary cases tried.	Total inferior cases tried.	Percentage of inferior cases tried.
Fort Bliss	197	15	7.61	2	59	61	30.96
Fort Brown	125	1	.80	1	107	108	86.40
Fort Clark	415	30	7.23	6	157	163	39.28
Camp Eagle Pass	61	.....	.....	.....	32	32	52.46
Fort Hancock[a]	6	.....	.....	.....	1	1	16.67
Fort McIntosh	140	9	6.43	.....	46	46	32.86
Fort Ringgold	165	9	5.45	.....	105	105	63.64
Fort Sam Houston	694	42	6.05	2	346	348	50.14
Total	1,803	106	5.88	11	853	864	47.92
Convictions	.....	96	.....	4	836	840	.....
Acquittals	.....	10	.....	7	17	24	.....

[a] Abandoned October 25, 1895. This post is averaged for the year, to equalize the average for the department.

There were 539 different enlisted men tried by inferior courts-martial.

The different offenses tried by general courts-martial were as follows:

Nature of offense.	Article of war violated.	Cases tried.
Selling clothing	Seventeenth	3
Disrespect toward commanding officer	Twentieth	1
Disobeying superior officer	Twenty-first	7
Absence without leave	Thirty-second	18
Failure to attend drill, roll call, etc	Thirty-third	9
Drunkenness on duty	Thirty-eighth	15
Quitting post	Thirty-ninth	7
Sleeping on post	do	3
Quitting guard	Fortieth	1
Desertion	Forty-seventh	11
Unlawfully removing Government property with intent to wrongfully dispose of same.	Sixtieth	1
Absence without leave not chargeable under thirty-second article of war	Sixty-second	3
Abusing public horse	do	1
Allowing prisoner to escape	do	2
Assault and battery	do	1
Attempting to bribe another soldier to commit theft	do	1
Breach of arrest	do	3
Challenging a noncommissioned officer to fight	do	1
Committing a nuisance	do	2
Conduct to the prejudice of good order and military discipline	do	8
Creating a disturbance in post or quarters	do	2
Disobeying noncommissioned officer	do	2
Disorderly conduct, causing arrest by civil authorities	do	3
Disorderly conduct in quarters	do	1
Disrespect toward noncommissioned officer	do	2
Drunkenness	do	8
Drunkenness, causing arrest by civil authorities	do	1
Drunkenness, disorderly conduct, and creating a disturbance	do	5
Employing another soldier to commit theft	do	1
Failing to report for fatigue duty	do	1
Failing to salute an officer	do	1
Fraudulent enlistment	do	1
Insubordinate conduct toward noncommissioned officer	do	5
Insulting language toward the national flag of the United States	do	1
Larceny	do	7
Making false statement to an officer	do	5
Neglect of duty	do	4
Profane language	do	2
Quitting fatigue	do	1
Refusing to go to quarters in arrest	do	1
Resisting arrest	do	3
Resisting noncommissioned officer	do	1
Threatening conduct toward a civilian	do	1
Threatening, obscene, and abusive language toward noncommissioned officer.	do	5
Threatening to shoot a fellow-soldier	do	1
Sentinel sitting down on post	do	2
Striking a noncommissioned officer	do	3

The total of cases tried is distributed among organizations as follows:

Regiment or corps.	General trials.	Inferior trials.	
		Garrison.	Summary.
Hospital Corps	4	.....	8
Signal Corps	2	.....	.....
Depot detachment, mounted service	1	.....	.....
Fifth Cavalry	28	5	312
Seventh Cavalry	6	1	4
Third Artillery	2	.....	21
Eleventh Infantry	1	.....	.....
Eighteenth Infantry	33	1	269
Twenty-third Infantry	29	4	231
Indian scouts	.....	.....	8
Total	106	11	853

The following table affords comparisons as to the average enlisted strength of the department, and number and percentage of trials, for the periods stated:

Year.	Average enlisted strength.	Trials by courts-martial.		Percentage of trials.	
		General.	Inferior.	General.	Inferior.
1895	1,987	120	910	6.04	45.80
1896	1,803	106	864	5.88	47.92

My annual report to the department commander for the past fiscal year upon the subject of desertions is made an appendix hereto.

Respectfully submitted.

FRANK L. DODDS,
Captain and Acting Judge-Advocate.

APPENDIX.

HEADQUARTERS DEPARTMENT OF TEXAS,
JUDGE-ADVOCATE'S OFFICE,
San Antonio, Tex., July 24, 1896.

To the ADJUTANT-GENERAL, DEPARTMENT OF TEXAS.

SIR: I have the honor to submit, for the information of the department commander, in accordance with paragraph 116, Army Regulations, the following report of desertions within this department for the preceding fiscal year:

American born	82
Foreign born	16
Total	98

Of these, 50 enlisted outside of the department, 48 enlisted in the department.

Causes of desertion, taken from the separate special reports rendered in each case, viz:

Charged with theft and desertion	1
Committed theft	1
Chronic deserter, "repeater"	1
Debts	6
Dislike of service	9
Drunkenness	3
Family troubles	1
Fear of punishment for offenses committed	3
Fear of personal violence at hands of enraged comrades for dastardly crime committed	1
Fraudulent money transactions	1
Implicated in raping a woman	1
Intemperate habits	1
Objected to serving in Texas	1
Of unsound mind	1
Reduction to ranks	1
To avoid separation from wife or family	2
To better himself in Mexico	1

Too much fatigue	2
Unpleasant relations with comrades	1
Worthlessness	3
Unknown causes	57
Total	98

34 had served one day to six months.
24 had served six months to one year.
11 had served one year to two years.
5 had served two years to three years.
6 had served three years to four years.
4 had served four years to five years.
14 had served five years and over.

—

98

The following table gives the posts and organizations from which the men deserted:

Posts.	Number.	Corps or regiment.	Number.
Fort Bliss	8	Hospital Corps	2
Fort Brown	2	Fifth Cavalry	32
Fort Clark	18	Seventh Cavalry	5
Camp Eagle Pass	4	Third Artillery	6
Fort Hancock	2	Eighteenth Infantry	26
Fort McIntosh	8	Twenty-third Infantry	27
Fort Ringgold	11	Total	98
Fort Sam Houston	45		
Total	98		

The following table exhibits the character and rank of these deserters:

Character.	Number.	Rank.	Number.
Excellent	8	Sergeants	2
Excellent when sober	1	Trumpeters	2
Very good	16	Musicians	1
Very good when sober	1	Privates	93
Good	41	Total	98
Fair	7		
Indifferent	3		
Very indifferent	1		
Poor	3		
Bad	7		
Worthless	5		
Unknown	5		
Total	98		

The number of desertions for the year ending June 30, 1895, and the percentage of loss from this cause, with comparison with the fiscal year just closed, are given below:

Year.	Average enlisted strength.	Number of desertions.	Percentage of loss.
1895	1,963	120	6.11
1896	1,845	98	5.31

The percentage of loss from desertion has decreased so slightly in the past year that a recommendation for the restoration of the former reward for apprehension, viz, $60, would appear to be advisable, as having a deterrent effect on those who, contemplating desertion, might consider the chances of arrest and punishment. In 1894, when the reward was $60, the percentage of loss from desertion was but 4.33. In 1895 and 1896, when but $10 reward was paid, the increase, as shown in the above table, was marked.

Very respectfully,

FRANK L. DODDS,
Captain and Acting Judge-Advocate.

REPORT OF THE QUARTERMASTER-GENERAL OF THE ARMY.

REPORT

OF

THE QUARTERMASTER-GENERAL.

QUARTERMASTER-GENERAL'S OFFICE,
Washington, October 1, 1896.

SIR: I have the honor to submit the annual report of the Quartermaster's Department for the fiscal year ended June 30, 1896.

FINANCIAL STATEMENT.

By acts of Congress approved February 12 and March 2, 1895, and February 26 and June 8, 1896, there was appropriated for the service of the Quartermaster's Department for the fiscal year ended June, 30, 1896, the sum of		$7,093,880.00
During the fiscal year there was deposited to the credit of appropriations 1895-96, amounts received from sales to officers, etc., the sum of		412,280.69
Making a total of		7,506,160.69
Of this amount there was remitted to disbursing officers	$6,090,597.02	
There was paid out on account of settlements made at Treasury of claims and accounts	14,222.16	
		6,104,819.18
Leaving a balance available for payment of outstanding obligations incurred, or fulfillment of contracts properly entered into within the fiscal year, of		1,401,341.51
On the 1st of July, 1895, there was on hand from regular appropriations for the service of the Quartermaster's Department, pertaining to the fiscal year ended June 30, 1895, including the sum of $709,351, remaining from the $750,000 appropriated for barracks and quarters, by act approved February 12, 1895, for year 1895-96		2,300,924.71
And from appropriations pertaining to previous fiscal years, including those for specific and indefinite purposes, the sum of		1,023,095.33
Making a total balance on hand from all appropriations July 1, 1895, of		3,324,020.04
For specific purposes there was appropriated during the fiscal year ended June 30, 1896		189,579.33
During the year there was deposited and transferred to credit of the appropriations other than those for 1895-96 (shown above) the sum of		410,225.03
Making a total of		3,923,824.40
Of said amount there was remitted to disbursing officers the sum of	$1,877,630.98	
There was paid out on account of Treasury settlements and transferred the sum of	450,200.10	
There was carried to the surplus fund the sum of	792,646.05	
		3,120,477.13
Leaving a balance of		803,347.27

DUTIES OF THE QUARTERMASTER'S DEPARTMENT.

Under existing laws the Quartermaster's Department, under the direction of the Secretary of War, provides the Army with military stores and supplies requisite for its use, such as clothing and equipage, tents, band instruments, tableware and mess furniture, equipments for post bakeries, fuel, forage, stationery, lumber, straw for bedding for men and animals, all materials for camp, and for shelter for troops and stores, furniture for barracks, such as bunks, benches, chairs, tables, lockers, heating and cooking stoves for use in public barracks and quarters, tools for mechanics and laborers in the Quartermaster's Department, furniture, text-books, papers, and equipment for post schools, reading matter for post libraries, wagons, ambulances, carts, saddles, harness, water supply, sewerage, plumbing, illuminating supplies, and heating for all military posts and buildings.

The Department is also charged with the duty of transporting, by land and water, troops, munitions of war, equipments, and all articles of military supplies from the place of purchase to the several armies, garrisons, posts, and recruiting places.

Under act of Congress amending section 1661, Revised Statutes, for arming and equipping the militia, this Department supplies quartermaster stores, clothing, and equipage to the militia of the several States and Territories, and transports the same to said States and Territories. It also furnishes transportation for ordnance and ordnance stores issued by the United States to the militia of the several States and Territories. It also transports the property for other Executive Departments on requisitions, payments therefor being made by the respective Departments to the carriers upon accounts forwarded through the Quartermaster-General's Office for that purpose.

This Department prepares the necessary plans and constructs all buildings at military posts, such as barracks, quarters, storehouses, hospitals, etc., builds wharves, constructs and repairs roads for military purposes, builds all necessary military bridges, provides, by hire or purchase, grounds for military encampments and buildings; contracts for all horses for cavalry, artillery, and for the Indian scouts, and for such infantry and members of the Hospital Corps in the field campaigns as may be required to be mounted; pays for all incidental expenses of the military service which are not provided by other corps.

The care and maintenance of national cemeteries is an additional duty of this Department. It also provides suitable headstones to mark the graves of all soldiers, sailors, or marines who served during the late war, including those who have been buried in private cemeteries and other burial places.

Section 1139, Revised Statutes, makes it the duty of the Quartermaster-General, under the direction of the Secretary of War, to prescribe and enforce a system of accountability for all quartermaster's supplies furnished the Army, its officers, seamen, and marines.

The administration of the affairs of the Department during the last fiscal year was conducted under the able supervision of my predecessor, Gen. R. N. Batchelder.

CLOTHING AND EQUIPAGE SUPPLIES.

The sum of $1,100,000 was appropriated by Congress for this branch of the service for the past fiscal year.

There was placed to the credit of the appropriation for clothing and equipage during the fiscal year the sum of $178,545.89 and the sum of

$84,573.95 from sales to officers, etc., making a total of $1,363,119.84 available for clothing and equipage supplies for the fiscal year.

Of this amount the sum of $1,076,783.09 was paid out during the year, leaving a balance on hand June 30, 1896, of $286,336.75, which will be required to meet outstanding obligations entered into prior to July 1, 1896.

The issues to the militia of the several States and Territories during the fiscal year amounted to the sum of $180,914.18.

The following issues were made during the fiscal year, which, with the sales credited to miscellaneous receipts, represents a total loss to the clothing appropriation:

To the militia of the District of Columbia	$1,357.26
For Apache Indian prisoners of war at Fort Sill, Okla	2,114.99
Sale of leather and shoe findings left on hand at the Fort Leavenworth Military Prison at the time of its transfer to the Department of Justice, less expense of sale	24,807.97
Sale of old pattern and unserviceable clothing and equipage at the Philadelphia, Pa., Jeffersonville, Ind., St. Louis, Mo., and San Francisco, Cal., general depots, less expense of sale	18,424.71
Total	46,704.93

ISSUES TO INDIAN PRISONERS OF WAR.

During the past fiscal year the total charge against the appropriations of this Department on account of issues, etc., in maintaining the Indian prisoners of war held in confinement by the military authorities at Fort Sill, Okla., was as follows:

Clothing and equipage	$2,114.99
Other quartermaster's supplies	6,896.53
Employees (superintendents, interpreters, packers, and teamsters)	2,756.80
Total	11,768.32

FORAGE CAPS.

The new pattern forage cap was introduced into the Army on January 1 last. The first issue called forth some criticisms, which were immediately inquired into, resulting in a cap with heavier cloth, lighter and nonshrinkable lining, and better workmanship.

The caps will hereafter be made of dark-blue cloth, weighing about 16¾ instead of 14 ounces to the linear yard. Upholsterers' hair cloth, thoroughly shrunk, will be used as a stiffening for the sides with no heavy lining in the crown. The aim of the Department has been to construct a cap that will combine lightness with durability and retention of shape, which seems to have been accomplished. Actual use in service will soon demonstrate whether the object sought has been attained.

CAP DEVICES FOR ENLISTED MEN.

This Department has had under consideration for some time the improvement of the cap devices for the enlisted men of the Army. An order has been placed with manufacturers to furnish devices for the Engineer Corps, and the cavalry, artillery, and infantry arms of the service. This device is of solid brass, to which are fastened, by means of hard solder, the letters and numbers and also a screw by means of which the device itself is rigidly fastened to the cap. The entire ornament is gilded and therefore need not be taken from the cap for the purpose of cleaning. This device is comparatively inexpensive and considered more durable. Samples for devices for enlisted men of the staff corps are now under consideration.

BUCKSKIN GAUNTLETS.

To overcome the continued dissatisfaction with the leather gauntlets furnished to mounted troops it has been decided, after years of experiments with goat and calf skin gauntlets, to hereafter make them of the genuine oil-tanned buckskins, which, if properly made, it is believed will bring about satisfactory results.

ARCTIC OVERSHOES.

The attention of the Department having frequently been called to the excessive weight of the arctic overshoes, the subject has received careful consideration and a new standard of improved quality and of lighter weight adopted. The weight of the new shoes is 2 pounds 14 ounces per pair against 3 pounds 8 ounces per pair of those formerly supplied.

SHOES WITH RUBBER HEEL LIFTS.

During the past year 500 pairs of the present pattern shoes, provided with rubber heel lifts, were purchased by this Department and issued to troops at a number of the military posts for trial. From reports received it appears that these heels are apt to come off; they last only a few weeks, requiring frequent repair and the issue of extra heels. For these and other reasons it is not considered advisable to introduce them into the Army in lieu of the present standard.

RUBBER PONCHOS.

An improvement has been made in the rubber ponchos, by the adoption of one that will combine lightness with durability. Standards have been procured and distributed to the general depots to be followed in making future purchases. The weight of the new ponchos is fixed at not less than 1 pound 15 ounces nor more than 2 pounds 2 ounces, while the average weight of those formerly issued was 2 pounds 8 ounces.

IMPROVEMENT IN TENTS.

Letters patent upon the improvements in a tent support for conical wall tents, submitted by Maj. Charles W. Williams, quartermaster, United States Army, have been granted by the Interior Department to the officer named free of charge, so that the invention may be used by the Government without the payment of royalty thereon.

Reports have been received from the posts where 12 of these improved tents were sent for trial, from which it appears that with a few minor changes these tents will prove of great value if adopted for general use. The subject is receiving further consideration.

AUSTRIAN SHELTER TENT AND OVERCOAT COMBINED.

Sixteen of the above-mentioned tents and overcoats combined were furnished this Department free of charge by the patentees, Messrs. Isaac Mautner & Son, of Vienna, Austria, and sent to several military posts for trial. From reports received, the general opinion is that the tents are not adapted to the wants of our service, and that the troops generally prefer the equipments furnished by this Department.

During the year all the demands from the Army and from the militia for clothing and equipage supplies have been promptly met.

TRANSPORTATION.

During the past fiscal year the Quartermaster's Department furnished transportation for 458,953 persons, 3,932 animals, and 91,067 tons of material and supplies.

The sum of $103,541.36 was expended during the fiscal year for the principal movement of troops, exclusive of deductions on account of land-grant and bond-aided railroads.

For summer encampments, practice marches, etc., the sum of $6,452.76 was expended, and also the sum of $7.626.13 for the transportation of enlisted men engaged in rifle competition and target practice.

Four thousand eight hundred and thirty-eight persons, 1,270 animals, and 37,783,821 pounds of freight were transported during the fiscal year over the bond-aided Pacific railroads, their branches and leased lines.

The 8 steamboats owned by the Quartermaster's Department were kept in service during the year, at a cost of $91,930.93, including repairs. In addition to that sum, an expenditure of $3,769 was made for the hire of vessels temporarily required while 3 of the Government steamers were undergoing repairs. An additional sum of $6,394.25 was also expended during the year for the charter and hire of additional vessels which were temporarily required.

TELEGRAPHING ON ARMY BUSINESS.

Under a decision of the Comptroller of the Treasury of February 17, 1896, disbursing quartermasters pay telegraph companies transmitting messages over lines operated by these companies along the bond-aided Pacific railroads, and the heretofore existing prohibition in Army Regulations, 1208, has been withdrawn by General Orders, No. 17, Adjutant-General's Office, 1896.

CAVALRY AND ARTILLERY HORSES.

There have been 873 cavalry and 86 artillery horses provided during the year, at an average cost for cavalry horses of $130.54 each, and for artillery horses of $149.10 each.

The standard of the horses required for the cavalry and artillery service of the Army has been more explicitly indicated, and the qualities as described in the Army Regulations are being rigidly insisted upon. The horses were purchased exclusively under the contract system, as provided by law.

Thirty-eight team horses and 283 mules were purchased at a cost of $35,973.20, the average cost of the former being $171.46 each, and the latter $104.09 each.

During the fiscal year there were sold, died, etc., 1,144 cavalry and artillery horses, 47 team horses, and 241 mules, leaving on hand at the close of the year 6,004 cavalry and artillery horses, 238 team horses, and 3,082 mules.

ROADS, WALKS, ETC.

The sum of $178,408.55 was expended during the year for roads, walks, grading, and bridges; $10,879.89 for wharves, and $259,255.34 for water supply, sewerage, plumbing, and drainage.

REGULAR SUPPLIES.

The sum of $82,905.47 was expended for lighting, heating, and cooking apparatus, and $24,471.79 for tableware and cooking utensils.

BARRACKS AND QUARTERS.

By act of Congress approved February 12, 1895, there was provided under the head of "Barracks and Quarters" the sum of $750,000, of which the sum of $100,000 was made immediately available for improvements at Columbus Barracks, Ohio, leaving for other purposes $650,000.

This sum was expended during the fiscal year in the construction of barracks, officers' quarters, storehouses, stables, etc., for the repair and alteration of buildings and for rent, over one-half of the same being expended for repairs and alterations and for rent.

There was also expended during the year the sum of $44,824.76 for the construction and repair of hospitals at military posts.

MILITARY POSTS.

Congress, by act approved June 30, 1896, provided the sum of $225,000 "for the construction of buildings at and the enlargement of such military posts as in the judgment of the Secretary of War may be necessary."

This sum was apportioned as follows:

Fort Crook, Nebr	$9,916.95
Fort Ethan Allen, Vt	23,887,15
Fort Hamilton, N. Y	2,504.00
Fort Harrison, Mont	21,373.00
Little Rock, Ark	360.00
Fort Logan, Colo	16,620.43
Fort Monroe, Va	11,998.26
Fort Myer, Va	35,344.00
Plattsburg Barracks, N. Y	20,906.20
Presidio of San Francisco, Cal	53,137.00
Fort Thomas, Ky	28,001.44
Balance June 30, 1896	951.57
Total	225,000.00

Some of the buildings authorized at the posts above mentioned have already been completed, others are in course of erection, and others under contract.

PRESIDIO OF SAN FRANCISCO, CAL.

The planting and cultivation of trees on the Presidio Reservation was continued during the year. The roadway to connect McDowell and First avenues (via pumping station), contracted for last year, was completed at a total cost of $8,137.14.

A further sum of $1,055.76 was expended to provide a drainage system for this roadway to protect the embankment leading to the bridge across the arm of Mountain Lake.

A contract has been entered into for the construction of a roadway to connect McDowell avenue with the road in the ravine to the southwest of the national cemetery, at a cost of $2,375.

The stone and iron gateways at Lombard street and First avenue entrances to the reservation, contracted for in the previous fiscal year, have been completed, at a cost of $3,886.89.

A contract has been made for the construction of a stone inclosing wall along part of the reservation lines, for an estimated length of 2,200 feet, at $4.67 per linear foot.

COLUMBUS BARRACKS, OHIO.

From the $100,000 appropriated by act approved February 12, 1895, under the head of "Barracks and Quarters," for improvements, barracks, officers' quarters, and other buildings at this post, the following structures have been contracted for during the year:

Garbage cremator	$1,839.00
Addition to quartermaster's stable	1,467.00
Coal shed	2,229.49
Coal and oil house for barracks No. 11	967.00
Total	6,502.49

DAMAGE BY STORM.

During the year the damage done by storms at Jefferson Barracks, Mo., Forts Brown and Ringgold, Tex., and Plattsburg Barracks, N. Y., amounted to $6,968.46.

RESERVATIONS.

Under act of Congress approved June 27, 1890, appropriating $16,500 for purchase of land for target range for use at Fort McPherson, Ga., a desirable tract of about 1,271 acres, situated partly in Carroll and partly in Haralson counties, 1½ miles southeast of Waco, Ga., and about 50 miles from the post of Fort McPherson, has finally been secured within the appropriation. The land has been suitably marked by boundary stones and a wire inclosing fence erected.

Under act approved July 8, 1886, authorizing the sale of the ground comprising Old Fort Brady, Mich., 36 lots have been sold at public and private sale, realizing $32,675.79, which sum, less cost of sales, has been deposited in the Treasury.

The remaining unsold lots are in charge of the quartermaster at Fort Brady, Mich., to whom application for purchase is made.

Under act of Congress approved March 1, 1890, the military reservation of Old Fort Bliss, Tex., was platted, appraised, and advertised for sale on July 3, 1895. Eight lots have been sold, for which the sum of $4,950 was realized. This sum, less expense of sale, has been deposited in the Treasury.

The remaining unsold lots are in charge of the quartermaster at New Fort Bliss, Tex., for disposal.

The act of August 9, 1894, provides that when this reservation shall have been sold, "so much of the receipts therefrom as may be necessary not to exceed four thousand dollars are hereby appropriated to the construction of a military road between the city of El Paso and New Fort Bliss, Texas; said money to be expended under the direction of the Secretary of War."

Under the acts of Congress approved August 18, 1894, and June 11, 1896, 161.8 acres of additional land has been acquired at Fort Ethan Allen, Vt. The deed of warranty to this land has been obtained and is now awaiting the opinion of the Department of Justice as to validity, etc. The appropriation made for the purchase of the land in the acts above mentioned amounted to $10,000.

Under the act approved February 12, 1895, the Secretary of War has accepted from the Spokane and Eastern Trust Company, without cost to the United States, a site of 1,022 acres of land situated near the city of Spokane, Wash., for the purpose of locating and establishing an army post thereon. A deed therefor was duly executed October 31,

1895, and recorded among the county records, the Department of Justice having rendered favorable opinion regarding the title.

The sum of $100,000 was appropriated by act approved June 11, 1896, to begin the construction of buildings, etc., at this post.

The citizens of Seattle, Wash., representing the Chamber of Commerce, under the authority contained in the act of Congress approved March 2, 1895, tendered to the Secretary of War a tract of 703.21 acres on Magnolia Bluff, about 3 miles from Seattle, for the new military post at that place. This site was approved by the Secretary of War March 2, 1896, subject to Department of Justice rendering favorable opinion regarding title, etc.

Under act of Congress approved March 2, 1895, the Secretary of War was authorized to establish a military post at or near the city of Bismarck, N. Dak., provided not less than 640 acres of land suitable for the purpose should be donated free of cost to the United States.

Under authority of this act and Special Orders 296, Adjutant-General's Office, 1895, a board of officers was appointed to make a thorough examination of all the sites offered and report its findings to the Secretary of War for his action.

The sum of $40,000 was appropriated by act approved June 11, 1896, to begin the construction of buildings, etc., at this post.

The following reservations have been transferred to the Interior Department:

Fort Buford, N. Dak.
Fort Hancock, Tex.
Cat Island, Mississippi, portion of.
Horn Island, Mississippi, portion of.
Round Island, Mississippi.
Petit Bois Blanc Island, Mississippi, portion of.
Fort Pembina, N. Dak.
Fort Stanton, N. Mex.
Fort Niobrara, Nebr., 720 acres.
Fort Macomb, La., portion of.

The Fort Townsend, Wash., reservation was, by direction of the President, retransferred from Interior to War Department for military uses.

NATIONAL CEMETERIES.

There are 83 national cemeteries and 75 authorized superintendents.

All buildings at national cemeteries which were contracted for during the previous fiscal year have been completed, and a gatekeeper's lodge has been erected at the northeastern entrance to the Arlington, Va., National Cemetery.

Contracts have also been made for the erection of a brick outbuilding in the Chalmette, La., National Cemetery, and for rostrums at the Baton Rouge, La., Camp Butler, Ill., Poplar Grove, Va., and Salisbury, N. C., national cemeteries.

Ten thousand six hundred and thirty-nine marble headstones were provided during the year to mark the graves of Union soldiers, sailors, and marines in national, post, city, and village cemeteries.

The sum of $9,061.54 was expended during the fiscal year in making necessary repairs to roadways to national cemeteries.

At the San Francisco, Cal., National Cemetery the grounds were enlarged by an addition of about 6 acres on the western side, and a contract made for the construction of a stone wall to inclose the same.

The necessary repairs to the buildings, fences, walks, drives, drainage, water supply, etc., have been made at the various cemeteries during the year and the grounds kept in good condition.

MEMORIAL BRIDGE.

The matter of constructing a bridge over the Potomac River, between the Naval Observatory grounds and the Arlington Reservation, with a view of furnishing a short and direct route to the Arlington Cemetery and Park, and afford rapid communication between this city and the military post of Fort Myer, Va., is a very important one. It has been strongly urged by my predecessor, and I earnestly recommend that a bill similar to Senate bill 176, Fifty-fourth Congress, first session (introduced by Senator Frye, of Maine), and amended and passed by the Senate February 12, 1896, may be enacted into law at the coming session of Congress.

APPROACHES TO ARLINGTON NATIONAL CEMETERY.

The improvement of the public roads from the Aqueduct Bridge, near Georgetown, to the Arlington National Cemetery and Park has also been strongly urged in previous reports, and it is hoped that this important matter may receive the favorable action of Congress at its next session. The estimates made by the engineers of the War Department for the construction of good macadamized roads of a substantial and durable character fix the cost of this improvement at $50,000.

Respectfully,

C. G. SAWTELLE,
Quartermaster-General, United States Army.

Hon. DANIEL S. LAMONT,
Secretary of War.

List of papers accompanying the annual report of the Quartermaster-General for the fiscal year ended June 30, 1896.

1. Financial statement prepared by Col. George H. Weeks, assistant quartermaster-general, U. S. A., showing balances on hand June 30, 1895, amounts appropriated, expended, etc., and balances remaining on hand June 30, 1896.
2. Report of Capt. C. P. Miller, assistant quartermaster, U. S. A., of the operations of the construction and repair division, for the fiscal year ended June 30, 1896.

Financial statement for fiscal year ending June 30, 1896.

[From the balance books, in which all debits and credits are recorded.]

Appropriations.	Balance in Treasury undrawn July 1, 1895.	Appropriated.		Placed to credit of appropriations during the year, being the proceeds of sales to officers, etc.	Placed to credit of appropriations by Treasury transfer warrants.	Total to be accounted for.	Remitted to disbursing officers.	Requisitions issued on settlements made at Treasury of claims and accounts.	Amounts charged against appropriations by Treasury transfer warrants.	Amounts carried to surplus fund, act June 20, 1874.	Balances in Treasury undrawn June 30, 1896, and available for outstanding obligations.	Total accounted for.
		Amount.	Date of act.									
1893 and prior years.												
Regular supplies				$0.85		$0.85				$0.85		$0.85
Transportation of the Army and its supplies				4,031.40		4,031.40				4,031.40		4,031.40
Clothing, camp and garrison equipage				12.69		12.69				12.69		12.69
Total				4,044.94		4,044.94				4,044.94		4,044.94
1893 and prior years, transfer account.												
Transportation of the Army and its supplies				197.36		197.36		$15.75	$181.61			197.36
Clothing, camp and garrison equipage					$1.92	1.92		1.92				1.92
National cemeteries					102.14	102.14		102.14				102.14
Total				197.36	104.06	301.42		119.81	181.61			301.42
1894. transfer account.												
Transportation of the Army and its supplies				15.75		15.75			15.75			15.75
Clothing, camp and garrison equipage				1.92		1.92			1.92			1.92
Total				17.67		17.67			17.67			17.67
1893–94.												
Regular supplies	$270,241.23			3,079.62		273,320.85		4.15		273,316.70		273,320.85
Incidental expenses	20,310.54			339.64		20,650.18	$127.86	7.74		20,514.58		20,650.18

Horses for cavalry and artillery	23,013.70				23,013.70				23,013.70		23,013.70
Barracks and quarters	3,165.28			2.87	3,168.15				3,168.15		3,168.15
Transportation of the Army and its supplies	412,471.94			4,578.85	417,050.79	7,299.93	25,113.14		384,637.72		417,050.79
Clothing, camp and garrison equipage	67,977.28			544.73	68,522.01	11,500.00	6.00		57,016.01		68,522.01
Construction and repair of hospitals	383.65			11.25	394.90				394.90		394.90
National cemeteries	1,564.97				1,564.97		34.46		1,530.51		1,564.97
Pay of superintendents of national cemeteries	1,068.66				1,068.66				1,068.66		1,068.66
Shooting galleries and ranges	338.70				338.70				338.70		338.70
Quarters for hospital stewards	47.81				47.81				47.81		47.81
Total	800,583.76			8,556.96	809,140.72	18,927.79	25,165.49		765,047.44		809,140.72
1894–95.											
Regular supplies	399,856.21			52,844.05	452,700.26	74,333.37	2,870.89			$375,496.00	452,700.26
Incidental expenses	33,606.87			4,440.64	38,047.51	7,996.10	368.70			29,682.71	38,047.51
Horses for cavalry and artillery	33,897.79			691.85	34,589.64	4,777.20				29,812.44	34,589.64
Barracks and quarters	82,773.03			2,436.94	85,209.97	74,137.18	43.11			11,029.68	85,209.97
Transportation of the Army and its supplies	471,513.32			23,852.77	495,366.09	292,860.05	102,724.17			99,781.87	495,366.09
Clothing, camp and garrison equipage	502,921.18			28,542.51	531,463.69	488,730.12	348.12	25,056.90		17,328.55	531,463.69
Construction and repair of hospitals	9,880.27			724.53	10,604.80	10,528.74	7.06			69.00	10,604.80
National cemeteries	14,027.95			182.08	14,210.03	13,521.69	14.83			673.51	14,210.03
Pay of superintendents of national cemeteries	780.51			2.50	783.01					783.01	783.01
Shooting galleries and ranges	10.43			1,374.49	1,384.92					1,384.92	1,384.92
Quarters for hospital stewards	38.12			87.99	126.11	9.13				116.98	126.11
Military posts	24,229.18			74.93	24,304.11	24,249.18				54.93	24,304.11
Repairing roads to national cemeteries	1,371.72			128.57	1,500.29					1,500.29	1,500.29
Burial of indigent soldiers	2,000.00				2,000.00					2,000.00	2,000.00
Headstones for graves of soldiers	14,667.13			32.94	14,700.07	12,751.71	218.54			1,729.82	14,700.07
Land for rifle range near Madison Barracks, N. Y.				13.00	13.00					13.00	13.00
Total	1,591,573.71			115,429.79	1,707,003.50	1,003,894.47	106,595.42	25,056.90		571,456.71	1,707,003.50
Barracks and quarters 1895 and 1896	709,351.00			5,351.58	714,702.58	680,186.99	440.00			34,075.59	714,702.58

Financial statement for fiscal year ending June 30, 1896—Continued.

Appropriations.	Balance in Treasury undrawn July 1, 1895.	Appropriated. Amount.	Appropriated. Date of act.	Placed to credit of appropriations during the year, being the proceeds of sales to officers, etc.	Placed to credit of appropriations by Treasury transfer warrants.	Total to be accounted for.	Remitted to disbursing officers.	Requisitions issued on settlements made at Treasury of claims and accounts.	Amounts charged against appropriations by Treasury transfer warrants.	Amounts carried to surplus fund, act June 20, 1874.	Balances in Treasury undrawn June 30, 1896, and available for outstanding obligations.	Total accounted for
1896.												
Regular supplies		$2,300,000.00	Feb 12, 1895	$137,226.94		$2,437,226.94	$1,970,519.50	$3,703.16			$463,004.28	$2,437,226.94
Incidental expenses		600,000.00	do	440.00		600,440.00	550,186.17	1,190.17			49,063.66	600,440.00
Horses for cavalry and artillery		80,000.00	do	485.30		129,485.30	104.738.05	493.50			24,253.75	129,485.30
		25,000.00	Feb. 26, 1896									
		24,000.00	June 8, 1896									
Transportation of the Army and its supplies		2,450,000.00	Feb. 12, 1895	8,654.91		2,458,654.91	1,918,192.12	8,372.77			532,090.02	2,458,654.91
Clothing, camp and garrison equipage		1,100,000.00	do	263,119.84		1,363,119.84	1,076,336.53	446.56			286,336.75	1,363,119.84
Construction and repair of hospitals		45,000.00	do	1,470.04		46,470.04	46,111.04				359.00	46,470.04
National cemeteries		100,000.00	Mar. 2, 1895	575.00		100,575.00	96,582.90	16.00			3,976.10	100,575.00
Pay of superintendents of national cemeteries		61,880.00	do	16.00		61,896.00	61,743.01				152.99	61,896.00
Shooting galleries and ranges		10,000.00	Feb. 12, 1895			10,000.00	9,999.07				.93	10,000.00
Quarters for hospital stewards		7,000.00	do	195.81		7,195.81	7,180.77				15.04	7,195.81
Military posts		225,000.00	Mar. 2, 1895	96.85		225,096.85	196,300.13				28,796.72	225,096.85
Repairing roads to national cemeteries		8,000.00	do			8,000.00	7,893.08				106.92	8,000.00
Burial of indigent soldiers		3,000.00	do			3,000.00	1,500.00				1,500.00	3,000.00
Headstones for graves of soldiers		25,000.00	do			25,000.00	13,314.65				11,685.35	25,000.00
Road to the national cemetery Presidio of San Francisco, Cal		10,000.00	do			10,000.00	10,000.00					10,000.00
Fort Wayne Military Reservation		20,000.00	do			20,000.00	20,000.00					20,000.00
Total		7,093,880.00		412,280.69		7,506,160.69	6,090,597.02	14,222.16			1,401,341.51	7,506,160.69

Certified claims.											
Regular supplies		107.87	June 8, 1896			107.87		7.63		100.24	107.87
Incidental expenses		1,128.44	do			1,128.44		1,128.44			1,128.44
Horses for cavalry and artillery		250.00	do			250.00		250.00			250.00
Barracks and quarters		40,772.84	do			40,772.84		12,363.05		28,409.79	40,772.84
Transportation of the Army and its supplies	$1,011.82	23,162.22	do		$73,105.21	97,279.25		8,283.29		88,995.96	97,279.25
Horses and other property lost in the military service		107,225.34	do			107,225.34		474.85	$73,105.21	33,645.28	107,225.34
Signal Service transportation		2.24	do			2.24		2.24			2.24
Pay, transportation, services, and supplies of Oregon and Washington volunteers in 1855 and 1856		198.38	do			198.38		198.38			198.38
Total	$1,011.82	172,847.33			73,105.21	246,964.36		22,707.88	73,105.21	151,151.27	246,964.36
Indefinite or special.											
Additional lands Fort Ethan Allen Military Reservation	7,000.00					7,000.00				7,000.00	7,000.00
Burial of indigent soldiers	2.57	700.00	June 8, 1896			702.57			$2.57	700.00	702.57
Bellevue rifle range		600.00	do			600.00				600.00	600.00
Headstones for graves of soldiers	17,874.66			29.67		17,904.33	700.00	90.32	17,114.01		17,904.33
Hospital, Fort Meade, S. Dak	25,000.00					25,000.00	24,632.91			367.09	25,000.00
Military posts	109,050.94			24,450.00		133,500.94	115,593.82	17,350.00	557.12		133,500.94
Military storehouse, Omaha, Nebr	11,219.13					11,219.13	200.00			11,019.13	11,219.13
Purchase of buildings at military posts	9,977.48					9,977.48				9,977.48	9,977.48
Purchase of land for target range, Fort McPherson, Ga	16,500.00					16,500.00	16,500.00				16,500.00
Reconstructing bridge, Niobrara River, Nebraska	57.84					57.84			57.84		57.84
Road to the national cemetery Presidio of San Francisco, Cal	9,995.00					9,995.00	9,995.00				9,995.00
Road to the national cemetery, Hampton, Va	2,000.00					2,000.00				2,000.00	2,000.00
Repairing roads to national cemeteries	5,187.58					5,187.58	2,200.00		2,987.58		5,187.58
Road from national cemetery near Mound City to Mounds Junction, Ill	25.90					25.90			25.90		25.90

Financial statement for fiscal year ending June 30, 1896—Continued.

Appropriations.	Balance in Treasury undrawn July 1, 1895.	Appropriated.		Placed to credit of appropriations during the year, being the proceeds of sales to officers, etc.	Placed to credit of appropriations by Treasury transfer warrants.	Total to be accounted for.	Remitted to disbursing officers.	Requisitions issued on settlements made at Treasury of claims and accounts.	Amounts charged against appropriations by Treasury transfer warrants.	Amounts carried to surplus fund, act June 20, 1874.	Balances in Treasury undrawn June 30, 1896, and available for outstanding obligations.	Total accounted for.
		Amount.	Date of act.									
Indefinite or special—Cont'd.												
Road to national cemetery, Illinois	.....	$15,000.00	June 8, 1896	.....	.....	$15,000.00	.....	.....	.....	.....	$15,000.00	$15,000.00
Sewerage system, Fortress Monroe, Va	$4,800.00	.....	.....	.....	.....	4.800.00	$4,800.00	.....	.....	.....	.....	4,800.00
Water supply, Fort D. A. Russell, Wyo	2,808.65	.....	.....	.....	.....	2,808.65	.....	.....	.....	$2,808.65	.....	2,808.65
Relief of A. T. Hensley	.....	432.00	May 6, 1896	.....	.....	432.00	.....	$432.00	.....	.....	.....	432.00
Total indefinite	221,499.75	16,732.00	.....	$24,479.67	.....	262,711.42	174,621.73	17,872.32	.....	23,553.67	46,663.70	262,711.42
Pacific roads.												
1893 and prior years	.....	.....	.....	.....	$232.43	232.43	.....	$232.43	.....	.....	.....	232.43
1894	.....	.....	.....	.....	6,829.66	6,829.66	.....	6,829.66	.....	.....	.....	6,829.66
1895	.....	.....	.....	.....	151,155.56	151,155.56	.....	151,155.56	.....	.....	.....	151,155.56
1896	.....	.....	.....	.....	20,720.14	20,720.14	.....	20,720.14	.....	.....	.....	20,720.14
Total	.....	.....	.....	.....	178,937.79	178,937.79	.....	178,937.79	.....	.....	.....	178,937.79
Grand total	3,324,020.04	7,283,459.33	.....	570,358.66	252,147.06	11,429,985.09	7,968,228.00	366,060.87	$98,361.39	792,646.05	2,204,688.78	11,429,985.09

The records of this office show the following amounts remitted from regular and indefinite or special appropriations:

Remitted from regular appropriations fiscal year 1896.

Departments, etc.	Regular supplies	Incidental expenses	Horses for cavalry and artillery.	Barracks and quarters.	Transportation of the Army and its supplies	Clothing and equipage.
Department of the East	$302,812.89	$77,376.08		$103,628.32	$232,683.04	$418.00
Department of the Missouri	292,845.39	58,675.50		83,398.04	229,093.91	1,016.00
Department of Texas	128,228.58	30,802.40		36,165.63	89,193.63	26.20
Department of the Platte	191,007.80	40,476.48	$5,458.80	26,698.02	108,692.93	346.75
Department of Dakota	236,313.03	44,130.08		50,884.33	179,409.38	1,105.95
Department of California	76,551.07	26,407.32	4,216.09	24,058.28	82,819.00	30.00
Department of the Colorado	299,366.45	42,404.70	50.00	44,319.96	252,052.40	
Department of the Columbia	77,834.54	23,207.88		14,014.88	71,281.64	47.92
Depot at New York	62,314.99	31,147.60	2,800.00	7,681.62	143,280.22	103.76
Depot at Philadelphia	34,158.23	25,445.06		9,246.63	63,269.18	910,899.48
Depot at San Francisco	10,131.95	18,525.10		14,268.66	30,715.61	70,488.36
Depot at St. Louis	19,961.02	18,936.70	89,919.56	2,012.24	107,986.48	12,238.64
Depot at Washington	38,406.51	25,920.47		57,016.85	88,282.89	144.00
Depot at Jeffersonville	124,749.84	28,293.33		2,425.06	103,773.17	79,441.97
Columbus Barracks, Ohio	2,028.20			58,096.28	5,935.60	
Jefferson Barracks, Mo	3,994.25	720.20		67,651.37	20,189.51	
Plattsburg Barracks, N. Y	1,762.12	5,341.25		2,521.20	6,324.10	
Madison Barracks, N. Y	295.03	310.00		44.00	157.50	
Fort Bliss, Tex	2,480.09	1,923.30		20,154.83	2,208.58	
Fort Crook, Nebr	3,710.15	6.00		44,742.26	45,874.51	
Fort Ethan Allen, Vt	1,016.58	3,088.06	2,293.60	2,504.59	5,892.71	
Fort Harrison, Mont	4,257.00	6,225.00		3,645.15	6,061.95	
Fort McPherson, Ga	3,247.60	4,630.00		698.40	459.15	
Fort Riley, Kans		3,300.00				
Fort Sheridan, Ill		3,300.00		25.00		
Fort Thomas, Ky	3,268.83	4,242.21		509.30	12,389.32	
Fort Wayne, Mich	35.00	2,120.00		360.00	289.62	
Hot Springs, Ark	6,424.25	2,188.65		397.00	1,349.50	
Little Rock, Ark	2,504.99	4,982.32		995.98	15,534.58	
Powder depot, Dover, N. J	110.74					
Springfield Armory, Mass	1,795.50	330.00				
West Point, N. Y	26,868.86	11,567.71			4,874.82	2.00
Willets Point, N. Y	2,123.50	2,060.84		2,023.11	4,034.70	10.00
Los Angeles, Cal		1,000.00				
Military prison, Fort Leavenworth, Kans		352.00				
Allegheny Arsenal, Pa	496.71	35.00			83.41	
Augusta Arsenal, Ga	686.72	22.50			62.84	
Benicia Arsenal, Cal	1,661.31	146.85			481.11	
Columbus Arsenal, Tenn	776.45	19.25			45.27	2.50
Frankford Arsenal, Philadelphia, Pa	10.40				1,014.96	
Indianapolis Arsenal, Indianapolis, Ind	412.21	5.00				
Kennebec Arsenal, Augusta, Me	1,100.00	20.00			25.00	5.00
Rock Island Arsenal, Rock Island, Ill	1,276.21	153.71			1,082.10	
Watertown Arsenal, Watertown, Mass	1,859.95	176.59			850.00	10.00
Watervliet Arsenal, West Troy, N. Y	1,634.56	171.03			437.80	
Total	1,970,519.50	550,186.17	104,738.05	680,186.99	1,918,192.12	1,076,336.53

Remitted from regular appropriations fiscal year 1896—Continued.

Departments, etc.	Construction and repair of hospitals.	National cemeteries.	Pay of superintendents of national cemeteries.	Shooting galleries and ranges.	Quarters for hospital stewards.	Military posts.
Department of the East	$6,904.39			$1,610.65	$3,758.77	$12,002.26
Department of the Missouri	3,726.23	$51.50		4,056.32	536.25	
Department of Texas	3,123.32			1,187.23	1,279.82	
Department of the Platte	707.32			335.80	288.17	
Department of Dakota	1,123.22			63.80	411.52	
Department of California	795.55			186.35	116.18	36,668.00
Department of the Colorado	6,586.34			837.17	648.90	16,620.43
Department of the Columbia	569.94			221.75	94.25	
Depot at New York		3,725.20	$900.00			
Depot at Philadelphia		3,584.90	2,280.00			
Depot at San Francisco		5,708.73	736.00			
Depot at St. Louis		8,377.29	10,620.00			
Depot at Washington	20,004.00	40,846.46	21,894.18		3.75	35,344.00
Depot at Jeffersonville		1,610.33	3,754.16			
Columbus Barracks, Ohio						
Jefferson Barracks, Mo						
Plattsburg Barracks, N. Y						21,003.05
Madison Barracks, N. Y						
Fort Bliss, Tex						
Fort Crook, Nebr						4,695.00
Fort Ethan Allen, Vt				1,500.00		20,237.15
Fort Harrison, Mont	151.50					21,373.00
Fort McPherson, Ga		32,247.49	21,558.67			
Fort Riley, Kans						
Fort Sheridan, Ill						
Fort Thomas, Ky	540.00					27,997.24
Fort Wayne, Mich						
Hot Springs, Ark	1,716.00					
Little Rock, Ark						360.00
Powder Depot, Dover, N. J						
Springfield Armory, Mass						
West Point, N. Y						
Willets Point, N. Y	163.23				43.16	
Los Angeles, Cal						
Military prison, Fort Leavenworth, Kans						
Allegheny Arsenal, Pa						
Augusta Arsenal, Ga						
Benicia Arsenal, Cal						
Columbus Arsenal, Tenn						
Frankford Arsenal, Philadelphia, Pa						
Indianapolis Arsenal, Indianapolis, Ind						
Kennebec Arsenal, Augusta, Me						
Rock Island Arsenal, Rock Island, Ill		431.00				
Watertown Arsenal, Watertown, Mass						
Watervliet Arsenal, West Troy, N. Y						
Total	46,111.04	96,582.90	61,743.01	9,999.07	7,180.77	196,300.13

Remitted from regular appropriations fiscal year 1896—Continued.

Departments, etc.	Repairing roads to national cemeteries.	Headstones for graves of soldiers.	Burial of indigent soldiers.	Road to the national cemetery, Presidio of San Francisco, Cal.	Fort Wayne Military Reservation.	Total.
Department of the East						$741,194.40
Department of the Missouri		$35.00				673,434.14
Department of Texas						290,006.81
Department of the Platte						374,012.07
Department of Dakota						513,441.31
Department of California						251,847.84
Department of the Colorado						662,886.35
Department of the Columbia						187,272.80
Depot at New York		12,964.15				264,917.54
Depot at Philadelphia						1,048,883.48
Depot at San Francisco				$10,000.00		160,574.41
Depot at St. Louis	$1,972.41					272,024.34
Depot at Washington	3,804.92	300.00	$1,500.00			333,468.03
Depot at Jeffersonville						344,047.86
Columbus Barracks, Ohio						66,060.08
Jefferson Barracks, Mo						92,555.33
Plattsburg Barracks, N. Y						36,951.72
Madison Barracks, N. Y						806.53
Fort Bliss, Tex						26,766.80
Fort Crook, Nebr						99,027.92
Fort Ethan Allen, Vt						36,532.69
Fort Harrison, Mont						41,713.60
Fort McPherson, Ga	2,115.75	15.50				64,972.56
Fort Riley, Kans						3,300.00
Fort Sheridan, Ill						3,325.00
Fort Thomas, Ky						48,946.90
Fort Wayne, Mich					$20,000.00	22,804.62
Hot Springs, Ark						12,075.40
Little Rock, Ark						24,377.87
Powder Depot, Dover, N. J						110.74
Springfield Armory, Mass						2,125.50
West Point, N. Y						43,313.39
Willets Point, N. Y						10,458.54
Los Angeles, Cal						1,000.00
Military prison, Fort Leavenworth, Kans						352.00
Allegheny Arsenal, Pa						615.12
Augusta Arsenal, Ga						772.06
Benicia Arsenal, Cal						2,289.27
Columbus Arsenal, Tenn						843.47
Frankford Arsenal, Philadelphia, Pa						1,025.36
Indianapolis Arsenal, Indianapolis, Ind						417.21
Kennebec Arsenal, Augusta, Me						1,150.00
Rock Island Arsenal, Rock Island, Ill						2,943.02
Watertown Arsenal, Watertown, Mass						2,896.54
Watervliet Arsenal, West Troy, N. Y						2,243.39
Total	7,893.08	13,314.65	1,500.00	10,000.00	20,000.00	6,770,784.01

Remitted from indefinite or special appropriations.

Department, etc.	Military posts.	Headstones for graves of soldiers.	Road to the national cemetery, Presidio of San Francisco, Cal.	Repairing roads to national cemeteries.	Military storehouse, Omaha, Nebr.
Department of the Platte					
Department of California	$4,547.82				
Depot at New York		$700.00			
Depot at Philadelphia	550.00				
Depot at San Francisco			$9,995.00		
Depot at Washington	26,100.00			$2,200.00	
Jefferson Barracks, Mo	14,545.00				
Fort Bliss, Tex	7,600.00				
Fort Crook, Nebr	17,400.00				$200.00
Fort McPherson, Ga					
Little Rock, Ark	44,851.00				
Fort Monroe, Va					
Total	115,593.82	700.00	9,995.00	2,200.00	200.00

Department, etc.	Purchase of land for target ranges, Fort McPherson, Ga.	Hospital, Fort Meade, S. Dak.	Sewerage system, Fortress Monroe, Va.	Total.
Department of the Platte		$24,632.91		$24,632.91
Department of California				4,547.82
Depot at New York				700.00
Depot at Philadelphia				550.00
Depot at San Francisco				9,995.00
Depot at Washington				28,300.00
Jefferson Barracks, Mo				14,545.00
Fort Bliss, Tex				7,600.00
Fort Crook, Nebr				17,600.00
Fort McPherson, Ga	$16,500.00			16,500.00
Little Rock, Ark				44,851.00
Fort Monroe, Va			$4,800.00	4,800.00
Total	16,500.00	24,632.91	4,800.00	174,621.73

REPORT OF CAPT. C. P. MILLER, ASSISTANT QUARTERMASTER, UNITED STATES ARMY.

WAR DEPARTMENT,
QUARTERMASTER-GENERAL'S OFFICE,
Washington, D. C., August 15, 1896.

GENERAL: I have the honor to submit my report of the work of the construction and repairs division of this office during the past fiscal year.

Congress by the act making appropriations for the support of the Army, approved February 12, 1895, under head of "barracks and quarters" provided		$750,000.00
Of which sum		100,000.00
was made immediately available for improvements, barracks, officers' quarters, and other buildings at Columbus Barracks.		
Leaving for other purposes		650,000.00
From this balance there has been authorized for construction and repairs	$528,958.71	
Authorized for rent of recruiting stations, lodgings for recruits, etc.	23,219.60	
Authorized for rent of offices, barracks, quarters, labor, etc.	92,992.81	
		645,171.12
Balance June 30, 1896		4,828.88

The buildings constructed with the $100,000 appropriated for improvements at Columbus Barracks, Ohio, referred to above, are shown in my report of the operations of this division for the fiscal year ending June 30, 1895, and in the tabulated statements of this report under "Military posts."

There remains an unexpended balance of this amount of $355.28.

NEW CONSTRUCTION.

During the year there has been authorized from the barracks and quarters appropriation, for the erection of public buildings at different military posts, consisting of barracks, officers' quarters, storehouses, stables, etc., the sum of $273,991.19.

For the construction and repair of hospitals at military posts already established and occupied there has been authorized from the appropriation for that purpose expenditures amounting to $44,824.76.

REPAIRS.

There has been authorized for repairs, alterations, and improvements to public buildings, and for the purchase of building materials and tools at various posts from the barracks and quarters appropriation expenditures amounting to $254,967.52.

The different military departments and depots to which the barracks and quarters appropriation has been allotted are shown in the following statement:

Recapitulation of the expenditures authorized for construction, repairs, etc., from the appropriation for barracks and quarters, 1895–96.

Department, depot, etc.	Construction.	Repairs.	Total.
Department of the East	$94,830.45	$71,967.49	$166,797.94
Department of the Missouri	82,567.56	37,063.81	119,631.37
Department of the Platte	56,596.00	16,128.06	72,724.06
Department of Dakota	20,753.41	24,003.20	44,756.61
Department of Texas	8,725.76	44,938.66	53,664.42
Department of the Colorado	5,228.21	30,793.65	36,021.86
Department of California	1,230.50	11,059.18	12,289.68
Department of the Columbia	85.30	11,241.83	11,327.13
Willets Point	1,900.00	180.44	2,080.44
Jeffersonville depot	.....	2,431.28	2,431.28
New York depot	.....	2,082.75	2,082.75
Philadelphia depot	2,074.00	2,485.17	4,559.17
St. Louis depot	.....	150.00	150.00
Washington depot	.....	42.00	42.00
Hot Springs Army and Navy General Hospital	.....	400.00	400.00
Total	273,991.19	254,967.52	528,958.71

The following list shows the different buildings which have been authorized to be constructed at the various posts, the expenditures therefor being included in the foregoing statement under the head of construction:

Post.	Designation.	Material.	Amount authorized.
Department of the East.			
Davids Island	Two observation stations	Wood	$208.00
	Ambulance shed	do	128.55
	Ordnance storehouse	Brick	4,000.00
	Guardhouse	do	7,400.00
Fort Ethan Allen	Commanding officer's quarters	do	10,050.60
Jackson Barracks	Addition to subsistence storehouse	do	1,388.00
Key West Barracks	Addition to quartermaster's storehouse	Wood	445.00
Madison Barracks	Guardhouse	Brick	6,998.00
Fort Myer	Two double sets officers' quarters	do	26,686.00
	Two cavalry stables	do	21,300.00
	Shed for band horses	Wood	262.21
	Bathroom, addition to noncommissioned staff quarters, No. 5.	do	112.69
	Bathroom, addition to noncommissioned staff quarters, No. 6.	do	119.73
	Stable, guardhouse	Brick	1,700.00
	Ordnance storehouse	do	1,475.00

Post.	Designation.	Material.	Amount authorized.
Department of the East—Continued.			
Fort Myer	Band barracks	Brick	$7,907.00
St. Francis Barracks	Hose-carriage shed	Wood	52.27
Washington Barracks	Water-closet for barrack No. 6	Brick	1,344.00
	Coal shed	Wood	3,254.00
	Total		94,830.45
Department of the Missouri.			
Jefferson Barracks	2 cavalry stables	Brick	18,508.00
	8 sets bachelor officers' quarters	do	18,650.00
	Wagon shed	Wood	1,965.00
	4 double stable guard buildings	Brick	5,884.00
	Blacksmith shop	do	3,090.00
	Fire-station building	do	2,250.00
	Band barrack	do	5,817.00
	Subsistence storehouse	do	7,400.00
Fort Leavenworth	2 cavalry stables	do	17,880.00
	Alterations in quarters Nos. 177 and 178	Wood	184.56
	Toilet addition to guardhouse	Brick	939.00
	Total		82,567.56
Department of the Platte.			
Fort Crook	4 double sets officers' quarters	Brick	44,736.00
Fort Meade	1 cavalry stable	Wood	2,000.00
	1 double set officers' quarters	do	7,710.00
Fort Robinson	Coal shed	do	2,150.00
	Total		56,596.00
Department of Dakota.			
Fort Assinniboine	Quartermaster's stable	Brick	2,797.00
	Additions to barracks Nos. 20, 21, 23, 24	do	14,733.00
	Extension of cavalry blacksmith shop No. 54.	do	1,500.00
Fort Custer	44 coal sheds for barracks, quarters, etc.	Wood	758.40
	Coal-storage warehouse	do	232.95
Fort Harrison	Magazine	Brick	524.90
Fort Missoula	Addition to bath house	Wood	139.06
Fort Yates	Addition to pump house	do	68.10
	Total		20,753.41
Department of Texas.			
Fort Bliss	Band stand	Wood	709.08
	Cavalry stable	do	3,767.13
	Outhouse for cavalry corral	Brick	204.33
Camp Eagle Pass	Reconstructing bakery	Brick and stone.	403.22
Fort Sam Houston	Quartermaster's stable	Wood	2,260.00
San Antonio	Closet in quarters No. 13, department headquarters.		25.00
	Coal shed	Wood	150.00
	Signal-service building	do	1,207.00
	Total		8,725.76
Department of the Colorado.			
Fort Grant	2 sets noncommissioned staff quarters	Adobe	2,000.00
	Remodeling quartermaster's and subsistence storehouse.	do	854.57
	Gun shed	Wood	675.33
	Barrack kitchen	do	167.25
Fort Huachuca	Rebuilding outhouses	do	402.42
Fort Logan	Toilet addition to guardhouse	Brick	320.00
	Riding-track inclosure	Wood	808.64
	Total		5,228.21
Department of California.			
Benicia Barracks	Addition to quartermaster's storehouse	Wood	431.50
	3 company water-closet buildings and 8 outhouses.	do	799.00
	Total		1,230.50
Department of the Columbia.			
Fort Canby	Blacksmith shop	Wood	85.30
General depots, etc.			
Philadelphia	Toilet-room addition, building No. 3	Brick	2,074.00
Willets Point	Garbage cremator	do	1,900.00

Authorizations have also been made from the appropriation for regular supplies, for construction of buildings, etc., as follows:

Post.	Designation.	Material	Amount authorized.
Fort Bliss	Forage storehouse	Wood and iron	$4,444
Fort Hamilton	do	Brick	6,732
Do	Bake oven	do	500
Fort Sill	Forage storehouse	Wood	2,680
Fort Logan	do	Wood and iron	1,250
Fort Assiniboine	do	Wood	2,200
Fort Myer	Addition to forage storehouse	Brick	3,500
	Total		21,306

MILITARY POSTS.

In the act making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1896, Congress provided $225,000 "for the construction of buildings at and the enlargement of such military posts as in the judgment of the Secretary of War may be necessary." This sum has been apportioned as follows:

Post.	Character of work.		Allotment.
Fort Crook	1 set of quarters for commanding officer	$9,200 00	
	Extra work on new buildings, etc	716.95	
			$9,916.95
Fort Ethan Allen	Cavalry drill hall	20,187 00	
	1 double set noncommissioned staff officers' quarters	3,650.00	
	Printing and advertising	50.15	
			23,887.15
Fort Hamilton	Wagon shed	2,500.00	
	Printing	4.00	
			2,504.00
Fort Harrison	2 double sets officers' quarters		21,373.00
Little Rock, Ark	Extra work on buildings at new post		360.00
Fort Logan	8 sets bachelor officers' quarters	16,610.00	
	Advertising	10.43	
			16,620.43
Fort Monroe	8 sets bachelor officers quarters	11,985.00	
	Advertising	13.26	
			11,998.26
Fort Myer	1 double barrack	34,780.00	
	Extra work in barracks Nos. 1 and 2	564.00	
			35,344.00
Plattsburg Barracks	Infantry drill hall	20,487.00	
	Extra work on new hospital	419.20	
			20,906.20
Presidio of San Francisco	1 double barrack	36,668.00	
	Quartermaster's stable	16,469.00	
			53,137.00
Fort Thomas	Infantry drill hall	17,227.00	
	1 double set of quarters for medical officers	10,487.00	
	Extra work, printing, and advertising	287.44	
			28,001.44
	Balance June 30, 1896		951.57
	Total		225,000 00

The character and cost of the buildings authorized during the year at the different military posts and chargeable to the amount indicated in the preceding table are as stated below.

The expense of plumbing, heating, and gas piping in the buildings, unless otherwise shown, is chargeable to other appropriations of the Quartermaster's Department.

FORT CROOK, NEBR.

There is being built at this post under contract—

One set of commanding officers' quarters (brick)	$9,200.00
Plumbing in same	674.00
Heating in same	850.00
Gas piping in same	40.00

FORT ETHAN ALLEN, VT.

At this post there have been built—

Cavalry drill hall (brick) No. 41	$20,187.00
One double set noncommissioned staff officers' quarters (brick)	3,650.00
Total	23,837.00
Plumbing in noncommissioned staff officers' quarters	374.00
Gas piping in same	13.00

FORT HAMILTON, NEW YORK HARBOR.

Contract has been made for building—

One wagon shed (wood)	$2,500.00

FORT LOGAN, COLO.

Contract has been entered into for constructing at this post—

Eight sets bachelor officers' quarters (brick) No. 26	$16,610.00
Plumbing in same	2,350.00
Heating in same	2,168.00
Gas piping in same	120.00

FORT MONROE, VA.

There have been authorized and are now being constructed at this post—

Eight sets bachelor officers' quarters (brick) No. 80	$11,985.00
Plumbing in same	1,588.00
Heating in same	1,284.00
Gas piping in same	75.00

FORT MYER, VA.

During the year there has been constructed at the above-named post—

One double barrack (brick) No. 54	$34,780.00
Extra work on same	329.00
	35,109.00
Plumbing in same	2,800.00
Heating in same	3,219.24
Gas piping in same	230.00

PLATTSBURG BARRACKS, N. Y.

At this post there has been built—

One infantry drill hall (brick) No. 41	20,487.00

FORT HARRISON, MONT.

There has been erected at the above post during the year the following additional buildings:

Two double sets officers' quarters (brick) Nos. 7 and 8	$21,373.00
Plumbing in same	1,629.00
Heating in same	2,497.00
Gas piping in same	160.00

FORT THOMAS, KY.

During the year the following additional buildings have been constructed:

Infantry drill hall (brick) No. 56	$17,297.00
One double set officers' quarters (brick) Nos. 57 and 58	10,630.20
	27,927 20
Plumbing in drill hall	59.00
Plumbing in officers' quarters	1,222 00
Steam heating, ranges, etc., in same	1,450 00
Gas piping and fixtures in same	285.00
Gas machines in same	526.00

PRESIDIO OF SAN FRANCISCO, CAL.

Further improvements are being made at this post by the construction of—

One double barrack (brick) No. 3	$36,668.00
One quartermaster's stable (brick)	16,469.00
	53,137.00
Plumbing in barracks	2,194.00
Gas piping in barracks	190.00
Wardrobe lockers in barracks	600.00
Plumbing in stable	876.00

TREES AND TREE CULTURE.

Planting of trees in the southwest corner of the reservation was commenced in December, under authority from this office of June 12, 1895, and continued until February 13, when it was suspended under telegraphic instructions from the Secretary of War. Planting was resumed in March under the original plan as modified by the Secretary of War March 10. Twenty-six acres of the flat in this portion of the reservation were plowed and harrowed in February and planting of trees therein was in progress when work was suspended. Under the Secretary's instructions the trees planted were removed and the flat sowed in grass.

Purchase of trees during the year was as follows: 30,101 Monterev pines, 6,800 Oregon pines, 541 redwoods.

The following were raised in the nursery from seed: 51,700 cypress, 25,179 eucalyptus. Of the above-named trees 32,746 pines, 15,250 cypress, 1,820 eucalyptus, and 541 redwoods were set out in the southwest corner of the reservation, along portions of the new roadway connecting McDowell avenue with First avenue, along the margin of Mountain Lake, near the Marine Hospital fence, and along the fence up Lyon street. About 1,000 trees were also set out around the new mortar batteries on Fort Point Bluffs on request of the Engineer Department. Numerous vacant spaces in previous plantings have been filled. Upward of 17,000 eucalyptus trees, 20,000 cypress trees, and 1,500 Oregon pines remain in the nursery owing to the decrease of the area it was originally planned to plant this year. Many of the cypress and pine trees can be utilized next spring in filling vacancies that will arise in this year's planting, but it is feared that eucalyptus trees will be almost a total loss, as they will then be too large to transplant successfully.

ROADWAYS.

The roadway to connect McDowell and First avenues, via the pumping station, which was contracted for and commenced in the previous fiscal year, was completed at a total cost of $8,137.14, including extra drains, macadamizing, and excavations found to be necessary and ordered during the progress of the work. It was subsequently found necessary to provide a drainage system for this roadway to protect the embankment leading to the bridge across the arm of Mountain Lake, and under authority from this office the work was satisfactorily done at a cost of $1,055.76.

On plans and specifications submitted by the depot quartermaster, San Francisco, the construction of a roadway to connect McDowell avenue with the road in the ravine to the southwest of the national cemetery was ordered, and contract entered into for the work at a cost of $2,375. The roadway is now being built.

GATEWAYS AND WALLS.

The stone and iron gateways at Lombard street and First avenue entrances to the reservation, which were contracted for in the previous fiscal year, were completed at a cost of $3,886.89, including the cost of preparing and cutting designs for the caps of the posts, and some additional foundations, etc., which were considered necessary and ordered. These gateways, which are set back a short distance from the reservation lines, have been provided with wing walls, at a cost of $814.89 for those at Lombard street, including some necessary additional foundations, and $697.44 for those at First avenue, including cost of some necessary preparatory grading.

Under instructions from this office a contract has been entered into for the construction of a stone inclosing wall along part of the reservation lines, at a cost of $4.67 per lineal foot for an estimated length of 2,200 feet, and work has been commenced at Lombard street entrance connecting with the wing walls there and running southward.

FLUME AND DITCHES.

Under authority from this office, dated February 13, 1896, the drainage flume has been repaired and strengthened, and the ditches that drain the Presidio marsh thoroughly cleaned, at a cost of $166.57.

The following is a statement of expenditures during the year from the special appropriations made for the above purposes, and their condition on June 30, 1896, viz:

From appropriation of $10,000 (act of Congress approved August 5, 1892):	
Partial payment for First avenue gateway	$1,347.25
Labor planting and caring for young trees	220.16
Purchase of tree seed	6.00
Services of artist drawing design of wreath for caps of posts of Lombard street and First avenue gateways	49.00
Expenditures previously reported	8,377.59
Total	10,000.00
From appropriation of $10,000, act of Congress approved March 3, 1893:	
Advertising for proposals for new roadway and inclosing wall	$57.59
Services inspector construction of roadway	32.50
Settlement made in Treasury Department	5.00
Balance on hand	9,904.91
Total	10,000.00

Expenditure of this balance is provided for in construction of new roadway and inclosing wall now in progress.

From appropriation of $10,000, act of Congress approved August 18, 1894—fiscal year 1894–95:	
Construction of roadway connecting First and McDowell avenues	$8,137.14
Partial payment for First avenue and Lombard street gateways	1,594.20
Advertising for proposals for gateways	91.67
Services of engineer setting stakes for line of roadway	20.00
Inspector construction of roadway and gateways	36.00
Blue prints of plans of roadway	8.16
Expenditures previously reported	112.83
Total	10,000.00
From appropriation of $10,000, act of Congress approved March 2, 1895—fiscal year 1895–96:	
Advertising for proposals for trees	$81.45
Purchase of 36,901 pine trees	1,667.95
Purchase of 541 redwood trees	119.02
Plowing and harrowing 26 acres	156.25
Purchase of tree protectors	5.92
Labor, transplanting, cultivating, and planting young trees, removing, repairing, and constructing inclosing fences, care of nurseries, hire of teams in connection with tree planting	2,306.64
Construction of drainage system along embankment of roadway connecting First and McDowell avenues	1,055.76
Purchase of grass seed sowed along embankment	102.00
Advertising for proposals for wing walls	38.81
Preparing ground for wing walls at First avenue entrance	25.00
Partial payment for wing walls at Lombard street entrance	692.44
Removing wooden gateway from First avenue entrance and setting up at Seventh avenue entrance	21.20
Partial payment for Lombard street gateway	1,582.25
Services of artist and draftsman preparing plans for designs of gateposts	92.50
Blue prints of drawing of said plans	12.00
Purchase of lime for additional foundations for new gateways (not provided for in the contract)	18.00
Services of inspector construction of gateways and roadway, connecting McDowell and First avenues	626.50
Services of engineer establishing lines, etc., for new roadways, and inspector construction of wing walls inclosing wall, and roadway connecting McDowell avenue with the lower road	300.00
Repairing drainage flume and cleaning ditches	166.57
Balance on hand	929.74
Total	10,000.00

This balance is required to make final payment for wing walls at Lombard street and First avenue entrances.

COLUMBUS BARRACKS, OHIO.

From the $100,000 appropriated by act approved February 12, 1895, under the head of barracks and quarters, for improvements, barracks, officers' quarters, and other buildings at this post, the following additional structures have been contracted for during the year:

Garbage cremator	$1,839.00
Addition to quartermaster's stable	1,467.00
Coal shed	2,229.49
Coal and oil house for barracks No. 11	967.00
Total	6,502.49

Expenditures authorized for water supply, sewerage, plumbing, and drainage, also for roads, walks, grading, bridges, wharves, etc., chargeable to the appropriation for Army transportation.

Post.	Water supply, sewerage, plumbing, and drainage.	Roads, walks, grading, bridges, etc.	Wharves.	Miscellaneous.
Fort Adams	$3,118.90	$1,195.00	$70.50	$112.50
Alcatraz Island	928.01		916.10	
Angel Island	638.64			
Fort Apache	745.80	45.00		114.73
Fort Assiniboine	4,300.39	24.00		
Fort Barrancas	1,011.35	263.00	427.00	
Fort Bayard	711.45	117.00		
Bedloes Island			525.00	
Benecia Barracks	4,360.17	813.80		90.00
Fort Bliss	3,693.66	305.30		50.40
Boise Barracks	1,620.03			
Boston, Mass	9.10			
Fort Brady	318.42	98.97		
Fort Brown	649.65			340.80
Fort Buford	184.80			
Fort Candy	1,056.36	175.00	273.50	
Chicago, Ill	7.50			
Fort Clark	732.87			187.10
Columbus Barracks	4,716.14	4,816.25		495.00
Fort Columbus	1,047.00			
Fort Crook	7,412.98	34,601.31		6.80
Fort Custer	638.02	15.00		
Fort D. A. Russell	802.04	732.00		
Davids Island	2,217.16	4,162.07	1,615.50	3,340.27
Denver, Colo	64.05			
Fort Douglas	13,947.20	297.70		
Fort Duchesne	133.00			
Camp Eagle Pass	1,460.59	35.00		
Fort Ethan Allen	1,466.89	3,389.65		35.00
Fort Foote, Md	22.75			
Fort Gaines, Ala		48.75		
Governors Island	5,849.72	3,780.46		
Fort Grant	3,717.61	125.83		20.88
Fort Hamilton	2,462.17	9,399.50	1,572.00	
Fort Hancock	680.95			
Fort Harrison	2,401.07	1,669.65		25.00
Hot Springs Army and Navy Hospital	193.00			13.55
Fort Huachuca	757.56			
Jackson Barracks	1,772.10	301.25	2,900.00	
Jefferson Barracks	10,429.95	12,365.58		1,227.33
Jeffersonville depot	247.78			
Fort Keogh	727.21			
Key West Barracks	82.65			6.00
Fort Leavenworth	6,930.16			123.50
Little Rock, new post near	4,912.29	9,080.15		
Fort Logan	3,508.96			58.00
Fort McClary, Me	11.50			
Fort McHenry	621.48	319.29		
Fort McIntosh	707.93			
Fort McPherson	431.25	398.77		75.00
Madison Barracks	1,215.90	588.00		
Fort Marion, Fla		34.60		
Fort Mason	158.50	150.00		
Fort Meade	6,974.50	389.66		
Fort Missoula	987.80	28.15		
Fort Monroe	5,401.49	1,014.90	320.50	1,849.00
Fort Myer	18,982.20	21,532.72		624.00
Fort Niagara	2,270.27	701.00		
Fort Niobrara	979.45			
Fort Omaha	223.00	58.90		8.40
Omaha, Nebr	15.75	154.70		
Fort Ontario	10.00			
Philadelphia depot	2,294.15	195.00		7,988.90
Camp Pilot Butte	5.00			
Plattsburg Barracks	319.63	3,454.40		250.00
Fort Porter	3,269.00			
Fort Preble	251.26			
Presidio of San Francisco	29,434.23	41,393.00		366.58
Fort Pulaski, Ga				11.75
Fort Reno	5,597.65	270.21		
Fort Riley	7,810.79	609.64		
Fort Ringgold	5,659.89	59.50		
Fort Robinson	1,584.30	295.00		
St. Francis Barracks	759.80			
St. Louis depot	66.07			20.00
St. Paul, Minn				
Fort Sam Houston	1,074.23	695.00		

Expenditures authorized for water supply, sewerage, plumbing, and drainage, etc.—Cont'd.

Post.	Water supply, sewerage, plumbing, and drainage.	Roads, walks, grading, bridges, etc.	Wharves.	Miscellaneous.
San Antonio, Tex	$2,519.40	$174.45		
San Carlos, Ariz	10.00			
San Diego Barracks	59.90	738.86		
Fort Schuyler	387.95	489.30	$26.25	
Fort Sheridan	14,525.88	2,716.39	150.00	$103.75
Fort Sherman	442.09	75.00		
Fort Sill	191.57	1,000.00		
Fort Snelling	6,418.47	329.65		
Fort Spokane	487.29	7.72		
Fort Stanton	35.60			
Fort Thomas	3,234.23	9,348.61		97.89
Fort Trumbull	2,027.00	160.00	968.10	
Vancouver Barracks	1,351.20	8.75		
Vancouver depot	674.58	10.00		
Fort Wadsworth	1,177.52	306.00	400.00	
Fort Walla Walla	1,271.09	114.00		
Fort Warren	13,729.98		557.50	307.56
Fort Washakie	673.10	82.00		
Washington Barracks	1,817.07	579.00		33.00
Washington depot	43.25			
Fort Wayne	413.30	963.05	2.00	10.00
West Point, N. Y				110.00
Whipple Barracks	649.20	150.00		
Willets Point	2,589.50	654.64	155.94	
Fort Wingate	575.84	260 60		
Fort Winthrop, Mass	190 21			
Fort Yates	2,081.36			
Fort Yellowstone	474.24	40.87		
Miscellaneous	1,398.50			214.00
Total	259,255.34	178,408.55	10,879.89	18,316.69

Grand total, $466,860.47.

Expenditures authorized for lighting, heating, and cooking apparatus, chargeable to the appropriation for regular supplies for 1895–96.

Station.	Amount.	Station.	Amount.
Fort Adams, R. I	$764.00	Fort Meade, S. Dak	$1,958.81
Angel Island, Cal	25.50	Fort Missoula, Mont	31.25
Fort Apache, Ariz	12.50	Fort Monroe, Va	1,934.30
Fort Assinniboine, Mont	18,906.00	Fort Myer, Va	10,629.11
Fort Barrancas, Fla	302.25	New York depot, N. Y	56 22
Fort Bayard, N. Mex	50.00	Fort Niagara, N. Y	306.00
Benicia Barracks, Cal	58.00	Fort Niobrara, Nebr	4.50
Fort Bliss, Tex	7.54	Fort Omaha, Nebr	30.00
Boise Barracks, Idaho	620.00	Philadelphia depot, Pa	124.40
Fort Brady, Mich	231.84	Plattsburg Barracks, N. Y	1,350.90
Camp Eagle Pass, Tex	34.00	Fort Porter, N. Y	301.55
Fort Canby, Wash	50.00	Fort Preble, Me	231.70
Fort Clark, Tex	223.00	Presidio of San Francisco, Cal	192.08
Fort Columbus, New York Harbor	331.55	Fort Reno, Okla	33.00
Columbus Barracks, Ohio	3,485.94	Fort Riley, Kans	4,890.30
Fort Crook, Nebr	4,230.00	Fort Ringgold, Tex	66.30
Fort Custer, Mont	10.00	Fort Robinson, Nebr	246.00
Fort D A. Russell, Wyo	36.00	St. Paul, Minn	127.34
Davids Island, N. Y	2,288.22	Fort Sam Houston, Tex	438.85
Denver, Colo	3.85	San Antonio, Tex	36.50
Fort Douglas, Utah	124.00	Fort Schuyler, N. Y	525.00
Fort Ethan Allen, Vt	882.30	Fort Sheridan, Ill	2,654.14
Fort Grant, Ariz	56.72	Fort Sill, Okla	49.00
Fort Hamilton, N. Y	804.11	Fort Snelling, Minn	144.25
Fort Harrison, Mont	2,657.00	Fort Thomas, Ky	3,454.09
Hot Springs Army and Navy Hospital, Ark	2,744.50	Fort Trumbull, Conn	128.75
Jackson Barracks, La	500.00	Vancouver Barracks, Wash	85.00
Jefferson Barracks, Mo	2,894.63	Fort Wadsworth, N. Y	53.54
Jeffersonville depot, Ind	1,101.42	Fort Warren, Mass	255.00
Fort Keogh, Mont	180.00	Fort Washakie, Wyo	74.00
Fort Leavenworth, Kans	2,501.50	Washington Barracks, D. C	779.25
Little Rock, Ark., new post near	240.00	Whipple Barracks, Ariz	195.00
Fort Logan, Colo	2,351.40	Willets Point, N. Y	497.90
Madison Barracks, N. Y	1,753.67	Fort Wingate, N. Mex	300.50
Fort McHenry, Md	131.95	Fort Yates, N. Dak	96.75
Fort McPherson, Ga	30.80	Total	82,905.47

For shelter, shooting galleries, ranges for small-arms target practice, repairs, and expenses incident thereto Congress, in the act making appropriation for support of the Army, approved February 12, 1895, provided $10,000, which has been apportioned as follows:

Department.	Character of work.	Amount.
Department of the East	Repairs, etc	$3,047.69
Department of the Missouri	do	4,056.32
Department of the Platte	do	276.00
Department of Dakota	do	123.60
Department of Texas	do	1,187.23
Department of the Colorado	do	837.17
Department of California	do	186.35
Department of the Columbia	do	221.75
Balance June 30, 1896		63.89
Total		10,000.00

HOSPITALS.

In the act making appropriations for the support of the Army for the fiscal year ending June 30, 1896, Congress appropriated $45,000 for construction and repairs of hospitals at military posts already established and occupied, including the extra-duty pay of enlisted men employed on the same, and including also all expenditures for construction and repairs required at the Army and Navy Hospital at Hot Springs, Ark., except quarters for the officers. This fund has been disbursed by officers of the Quartermaster's Department on estimates approved by the Surgeon-General of the Army, as follows:

Department and post.	Amount.
Department of the East.	
Fort Adams	$395.50
Fort Barrancas	47.01
Fort Columbus	656.34
Columbus Barracks	202.77
Davids Island	495.68
Fort Ethan Allen	137.19
Fort Hamilton	150.00
Jackson Barracks	621.80
Key West Barracks	53.84
Fort McHenry	40.27
Fort McPherson	1,891.50
Fort Monroe	52.50
Fort Myer	20,013.50
Fort Niagara	27.41
Plattsburg Barracks	31.75
Fort Porter	403.96
Fort Preble	95.79
St. Francis Barracks	160.84
Fort Schuyler	400.63
Fort Thomas	1,143.57
Fort Trumbull	400.00
Fort Warren	342.97
Washington Barracks	30.00
Total	27,794.82
Department of the Missouri.	
Fort Brady	204.38
Jefferson Barracks	483.11
Fort Leavenworth	429.41
Fort Reno	286.86
Fort Sheridan	890.10
Fort Sill	450.00
Fort Wayne	61.80
Total	2,805.66

Department and post.	Amount.
Department of the Platte.	
Fort D. A. Russell	$45.58
Fort Niobrara	100.00
Fort Omaha	10.21
Fort Robinson	450.00
Fort Washakie	100.00
Total	705.79
Department of Dakota.	
Fort Assinniboine	75.76
Fort Harrison	187.64
Fort Keogh	176.90
Camp Merritt	102.63
Fort Missoula	85.92
Fort Yates	290.67
Total	919.52
Department of Texas.	
Fort Bliss	227.80
Fort Brown	123.13
Fort Clark	270.28
Fort McIntosh	82.00
Fort Ringgold	181.01
Fort Sam Houston	2,208.25
Total	3,092.47
Department of the Colorado.	
Fort Apache	507.23
Fort Bayard	102.80
Fort Douglas	1,136.15
Fort Duchesne	163.60
Fort Grant	171.97
Fort Huachuca	633.75

Department and post.	Amount.
Department of the Colorado—Cont'd.	
Fort Logan	$2,665.92
Whipple Barracks	122.40
Fort Wingate	634.31
Total	6,138.13
Department of California.	
Alcatraz Island	168.25
Angel Island	123 84
Benicia Barracks	382 05
Fort Mason	206 79
Presidio of San Francisco	39.50
Total	920.43
Department of the Columbia.	
Boise Barracks	88.29
Fort Canby	93.30
Fort Sherman	$89.29
Fort Spokane	106.63
Vancouver Barracks	84.98
Fort Walla Walla	106.22
Total	568.71
Independent posts.	
Hot Springs Army and Navy Hospital	1,716.00
Willets Point	163.23
Total	1,879 23
Balance June 30, 1896	175.24
Grand total	45,000.00

The above statement includes the cost of a new hospital building at Fort Myer, Va., which has been completed.

HOSPITAL STEWARDS' QUARTERS.

In the Army appropriation act for the fiscal year ending June 30, 1896, Congress also appropriated $7,000 for construction of quarters for hospital stewards at military posts already established and occupied, including the extra-duty pay of enlisted men employed on same. This sum has been apportioned to the posts named below:

Post.	Amount.
Fort Adams	$99.35
Alcatraz Island	21.33
Fort Apache	115.89
Fort Assinniboine	40.08
Fort Barrancas	1,002.44
Fort Bayard	33.00
Benicia Barracks	44 55
Fort Bliss	26.10
Boise Barracks	8 50
Fort Brady	57.00
Fort Buford	67 52
Fort Canby	20 00
Fort Clark	201 12
Fort Columbus	35 50
Columbus Barracks	69.50
Fort Custer	53.10
Fort D. A. Russell	75 98
Davids Island	97.25
Fort Douglas	67.40
Fort Grant	100.30
Fort Hamilton	89.00
Fort Huachuca	129.50
Jefferson Barracks	56.50
Fort Leavenworth	293.22
Fort Logan	60.21
Fort McHenry	80.81
Fort Mason	44.56
Fort Meade	102.77
Fort Missoula	$13.66
Fort Myer	14 45
Fort Niagara	25 00
Fort Porter	103.68
Fort Preble	19 05
Fort Reno	52.40
Fort Ringgold	3.00
Fort Robinson	79.00
St. Francis Barracks	1,640 69
Fort Sam Houston	1 009 46
Fort Schuyler	59 24
Fort Sill	65 48
Fort Snelling	84.82
Fort Spokane	8.78
Fort Thomas	90.75
Fort Trumbull	74 84
Vancouver Barracks	48.00
Fort Walla Walla	8.80
Fort Washakie	96.50
Washington Barracks	239.75
Willets Point	43.16
Fort Wingate	17 50
Fort Yates	35.55
Fort Yellowstone	71.39
Balance June 30, 1896	2.57
Total	7,000.00

Included in the above is a new set of steward's quarters at St. Francis Barracks, Fla.

DAMAGES BY STORMS.

On July 17, 1895, a wind and hail storm damaged many of the buildings at Jefferson Barracks, Mo. The necessary repairs cost $645.

On August 29 and 30, 1895, a severe storm passed over Fort Brown and Fort Ringgold, Tex., doing considerable damage to buildings, etc., amounting to $2,116.15 at the former and $2,039.44 at the latter post.

On December 31, 1895, Plattsburg Barracks, N. Y., was visited by a severe wind storm, but the principal damage was confined to the mess hall kitchen and the cooking and ventilating apparatus and piping in same. Repairs have been completed at a total cost of $2,167.87.

The destructive tornado of May 27, 1896, at St. Louis, Mo., slightly damaged the buildings at the clothing depot.

Losses by fire.

Post.	Buildings.	Remarks.
Fort Clark	2 cavalry stables, Nos. 14 and 15	Destroyed.
Fort Yates	Cavalry stable No. 44	Do.
Jefferson Barracks	Barrack No. 26	Do.
Do	Buildings Nos. 23, 25, and 48	Slightly damaged.
Fort Stanton	Barrack No. 6, used as post exchange	Destroyed except stone walls.
Fort Keogh	Officers' quarters No. 12	Considerably damaged.
Fort Niobrara	Hospital No. 44	Repairs estimated at $1,238.
Fort Apache	Woodshed, etc., at noncommissioned staff quarters No. 1 A.	Destroyed; of no special value.
Fort Niobrara	Barrack No. 18	Cost of repairs about $350.
Fort Missoula	Officers' quarters No. 12	Slightly damaged.
Fort Logan	Noncommissioned staff quarters No. 73	Cost of repairs, $200.
Fort Bliss	Barrack No. 38	Slightly damaged.
Fort Ethan Allen	Barrack of Troop F, Third Cavalry	Do.

Statement of property rented by the Quartermaster's Department for use as offices, barracks, quarters, encampments, etc., during the fiscal year and the amount of rent paid therefor.

DEPARTMENT OF THE EAST.

Post or station.	Kind of property.	Purpose for which used.	Monthly rate of rent.	Total amount for year.
Boston, Mass	8 rooms	Offices and storerooms, quartermaster's and subsistence departments.	$90.00	$1,080.00
Baltimore, Md	5 rooms	Offices, quartermaster's and subsistence departments.	88.33	416.65
	2 rooms	Offices, quartermaster's department	47.92	335.40
Buffalo, N. Y	do	Office, quartermaster's department	62.50	735.42
New Orleans, La	6 rooms	Offices and storerooms, quartermaster's and subsistence departments.	70.00	490.00
	Building	do	83.33	415.65
Washington, D. C	3 rooms	Quarters for veterinary surgeon, Fort Myer, Va.	12.00	144.00
Reading, Mason, Waynesville, Xenia, Camp Chase, and West Jefferson, Ohio.	Ground	Camp for First and Second Battalions Seventeenth Infantry on practice march to Fort Thomas, Ky.		40.50
Sacketts Harbor, N. Y.	4 rooms	Quarters for 2 lieutenants	12.00	26.90
Plattsburg, N. Y	1 room	Quarters for hospital steward	11.00	44.00
Encampment	Ground	Practice march, Light Battery K, from Fort Adams, R. I., to Berkshire Hills, Mass., and return.		7.00
Burlington, Vt	1 room	Office constructing quartermaster, Fort Ethan Allen, Vt.	14.58	156.24
	Building	Stable for public animals	12.00	144.00
Atlanta, Ga	2 rooms	Office, paymaster	25.00	300.00
	do	Office, quartermaster	25.00	300.00
	1 room	Quarters, post quartermaster sergeant	12.00	63.60
	do	Quarters, sergeant of ordnance	12.00	63.20

Statement of property rented by the Quartermaster's Department, etc.—Continued.

DEPARTMENT OF THE EAST—Continued.

Post or station.	Kind of property.	Purpose for which used.	Monthly rate of rent.	Total amount for year.
Atlanta, Ga	2 rooms	Quarters, detachment battalion of engineers.	$25.00	$125.60
	do	Quarters, detachment signal corps	12.00	117.20
Cincinnati, Ohio	3 rooms	Office, purchasing commissary of subsistence.	35.00	157.50
Newport, Ky		Stable accommodations for 2 public animals.	10.00	120.00
Total				5,283.86

DEPARTMENT OF THE MISSOURI.

Chicago, Ill	28 rooms	Offices, headquarters department	$1,000.00	$12,000.00
	6 floors	Offices, subsistence department and storehouses for quartermaster and subsistence departments.	416.66	4,999.92
	Building	Stables for animals of the quartermaster's department.	150.00	1,800.00
	1 room	Quarters for signal sergeant	12.00	144.00
	do	Quarters for hospital steward	12.00	144.00
Kansas City, Mo	2 rooms	Office, subsistence department	50.00	600.00
	1 room	Quarters, commissary sergeant	8.00	32.00
Leavenworth, Kans	do	Office, paymaster	25.00	208.33
Rush Springs, Ind. T		Shelter for teamsters	25.00	225.00
Fort Sheridan, Ill	Ground	Encampment of troops en route to and from Camp Douglas, Wis.		10.00
Fort Wayne, Mich	do	Encampment of troops en route to and from target range at Mount Clemens, Mich.		20.00
	do	Encampment of troops en route to and from Island Lake, Mich.		47.25
Detroit, Mich	Building	Office, constructing quartermaster, Fort Wayne, Mich.	30.00	360.00
Little Rock, Ark	3 rooms	Office, constructing quartermaster of new post.	30.00	360.00
	Building	Stable for public animals	5.00	60.00
Total				21,010.50

DEPARTMENT OF THE PLATTE.

Omaha, Nebr	41 rooms	Offices, department headquarters	$666.67	$8,000.00
	1 room	Quarters for commissary sergeant	12.00	144.00
Ogden, Utah	2 rooms	Offices and storeroom, quartermaster's agent.	22.00	264.00
Market Lake, Idaho	1 room	Quartermaster's storehouse	20.00	22.67
Montpelier, Idaho	do	do	20.00	77.33
	do	Quartermaster's office	12.00	15.20
	Ground	Practice march troops		2.50
Total				8,525.70

DEPARTMENT OF DAKOTA.

Helena, Mont	5 rooms	Offices, quartermaster's department	$50.00	$600.00
	1 room	Storeroom, quartermaster's department	10.00	120.00
	3 rooms	Stable, quartermaster's department	10.00	120.00
		Lodgings for enlisted men		2.25
St. Paul, Minn	1 room	Quarters for signal sergeant	12.00	132.00
Twin Lake, Minn	Ground	Camps for United States troops from Fort Snelling to Lake City, Minn.		13.00
Hastings, Minn		do		14.00
Fronteuac, Minn		do		15.00
Red Wing, Minn		do		12.00
Missoula, Mont	Ground	Camp for United States troops on practice march from Fort Missoula.		3.00
Total				1,031.25

Statement of property rented by the Quartermaster's Department, etc.—Continued.

DEPARTMENT OF TEXAS.

Post or station.	Kind of property.	Purpose for which used.	Monthly rate of rent.	Total amount for year.
Edinburg, Tex	Building and ground.	Quarters and storeroom for a detachment.	$15.00	$15.00
Hebbronville, Tex	1 room	Office for quartermaster's agent	8.00	96.00
Santa Maria, Tex	Building and ground.	Quarters and storeroom for a detachment		150.00
Laredo, Tex	1 room	Quarters for signal sergeant Fort McIntosh.	12.00	144.00
San Antonio, Tex	do	Quarters for veterinary surgeon Fort Sam Houston.	12.00	144.00
	do	Quarters for commissary sergeant	12.00	144.00
	do	Quarters for signal sergeant	12.00	54.00
	do	do	12.00	46.80
	do	do	12.00	102.80
	do	do	12.00	144.00
	do	do	12.00	101.60
	do	do	12.00	64.00
	do	do	12.00	63.60
	do	do	12.00	46.00
El Paso, Tex	do	Office constructing quartermaster Fort Bliss.	{ 18.00 / 20.00 }	112.80
Total				1,428.60

DEPARTMENT OF CALIFORNIA.

San Francisco, Cal	5 rooms	Offices for department headquarters	$750.00	$9,000 00
	4 stalls	Stabling for public animals	47.00	423.00
	Building	Stable, headquarters department	45.00	135.00
	1 room	Quarters for signal sergeant	12.00	144.00
Los Angeles, Cal	do	Office, purchasing commissary	30 00	300 00
San Diego, Cal	Building	Post hospital	75.00	900.00
	32 rooms	Officers' quarters	12.00	1,657.20
Total				12,559.20

DEPARTMENT OF THE COLUMBIA.

Portland, Oreg	6 rooms	Offices paymasters and depot quartermaster.	$77.00	$385.00
	7 rooms	do	111.00	777.00
Walla Walla, Wash	1 room	Office, paymaster	30.00	180.00
Fifth Plain Creek, Wash.	Ground	Camp for United States troops		5.00
Total				1,347.00

DEPARTMENT OF THE COLORADO.

Albuquerque, N. Mex	1 room	Office for paymaster	$25.00	$300.00
Brock, Utah	do	Quarters for signal sergeant	10.00	80.34
Carthage, N. Mex	do	do	12.00	92.00
Cooleys, Ariz	do	do	12.00	144 00
Denver, Colo	46 rooms	Headquarters Department of the Colorado.	666.66	7,999.92
Holbrook, Ariz	1 room	Quarters for signal sergeant	12.00	144.00
Fort Logan	do	do	12.00	24.00
Mammoth, Ariz	do	do	12.00	4.00
Price, Utah	Building	Quartermaster's storehouse	15.00	180.00
	1 room	Quarters for signal sergeant	12.00	129.60
San Antonio, N. Mex	do	do	12.00	26.00
Silver City, N. Mex	do	do	12.00	44.40
Taylors Ranch, Utah	do	do	10.00	39.66
Willcox, Ariz	2 rooms	Quarters for signal sergeants	24.00	150.00
Total				9,357.92

Statement of property rented by the Quartermaster's Department, etc.—Continued.

GENERAL DEPOTS OF THE QUARTERMASTER'S DEPARTMENT.

Post or station.	Kind of property.	Purpose for which used.	Monthly rate of rent.	Total amount for year.
New York depot	1 room	Quarters for hospital steward	$14.00	$168.00
	Building	Stable and carriage house for public animals and vehicles.	112.50	1,350.00
Philadelphia depot	14 rooms	Offices and stables	179.17	2,150.04
	1 room	Office for attending surgeon	18.00	216.00
Washington depot	Ground	Stables and storehouses	150.00	1,800.00
	1 room	Quarters for hospital steward	21.00	252.00
	do	do	12.00	144.00
	do	do	12.00	144.00
	do	Quarters for private hospital corps	12.00	144.00
	do	do	12.00	144.00
	do	Quarters for sergeant signal corps	12.00	144.00
		Quarters for sergeant	12.00	144.00
	do	do	12.00	144.00
	do	do	12.00	84.60
	do	do	12.00	19.60
	do	Office for military attaché, Paris, France		360.00
		Office for military attaché, Berlin Germany.		360.00
		Office for military attaché, London, England.		144.00
		Office for military attaché, Rome, Italy		300.00
		Office for military attaché, Vienna, Austria.		180.00
		Office for military attaché, Madrid, Spain		126.82
		Office for military attaché, Brussels, Belgium.		147.00
St. Louis depot	Building	Storehouse for medical department	166.67	2,000.04
San Francisco depot	do	Offices and storerooms for medical, subsistence, and quartermaster's departments.	833.33	9,999.96
		Storehouse for quartermaster's supplies	125.00	1,500.00
		Storage of oils and turpentine $1\frac{3}{10}$ cents per case and 0.12 cents per barrel.		652.03
	1 room	Quarters for commissary sergeant	12.00	140.40
Total				22,958.49

RECAPITULATION.

Departments, etc.	Amount.
Department of the East	$5,283.86
Department of the Missouri	21,010.50
Department of the Platte	8,525.70
Department of Dakota	1,031.25
Department of Texas	1,428.60
Department of California	12,559.20
Department of the Colorado	9,357.92
Department of the Columbia	1,347.00
New York depot	1,518.00
Philadelphia depot	2,366.04
Washington depot	4,782.02
St. Louis depot	2,000.04
San Francisco depot	12,292.39
Total	83,502.52

Statement showing property rented by the Quartermaster's Department during the fiscal year ending June 30, 1896, for use as recruiting stations, etc., and amount paid for lodgings.

Place where rented.	Number of rooms.	Purpose for which used.	Monthly rate of rent.	Total amount for the year.
Baltimore, Md	Building	Recruiting station	$40.00	$480.00
Cumberland, Md	3 rooms	do	28.72	180.93
	do	do	29.00	29.00
		Lodgings		35.25
Boston, Mass	3 floors	Recruiting station	60.00	720.00
Providence, R. I	2 rooms	Recruiting station ($1 per day)		365.00
		Lodgings		277.00
Lynn, Mass	1 room	Recruiting station	18.00	28.14
	do	Lodgings	8.50	13.28
Rutland, Vt	do	Recruiting station	25.00	75.00
	2 rooms	Dormitories	22.00	66.00
Bellows Falls, Vt	1 room	do	20.00	48.00
Buffalo, N. Y	7 rooms	Recruiting station	45.00	540.00
Albany, N. Y	6 rooms	do	40.00	480.00
Newark, N. J	9 rooms	do	55.00	165.00
Jersey City, N. J	2 rooms	do	35.00	420.00
		769 lodgings		192.25
Springfield, Mass	1 floor and 1 room.	Recruiting station	41.50	124.50
New Haven, Conn	8 rooms	do	45.50	364.00
Brooklyn, N. Y	3 rooms	do	38.00	228.00
New York City	14 rooms	do	130.00	1,550.00
Philadelphia, Pa	9 rooms	do	72.50	870.00
Pittsburg, Pa	Building	do	75.00	900.00
Harrisburg, Pa	6 rooms	do	47.00	564.00
Allegheny, Pa	2 rooms	do	29.00	137.27
Cincinnati, Ohio	11 rooms	do	67.00	546.13
	15 rooms	do	64.00	249.60
Cleveland, Ohio	5 rooms	do	63.37	760.44
Des Moines, Iowa	1 room	do	25.00	300.00
	do	Dormitory	30.00	270.00
Detroit, Mich	6 rooms	Recruiting station	63.00	756.00
Evansville, Ind	8 rooms	do	50.41	604.92
Grand Rapids, Mich	2 rooms	do	20.00	94.67
Indianapolis, Ind	8 rooms	do	50.00	600.00
Louisville, Ky	5 rooms	do	57.00	684.00
Milwaukee, Wis	6 rooms	do	56.00	672.00
Nashville, Tenn	9 rooms	do	50.00	600.00
Springfield, Ill	2 rooms	do	23.00	276.00
	1 room	Dormitory	16.00	192.00
Dayton, Ohio	do	Temporary recruiting station	35.00	39.67
Lexington, Ky	2 rooms	do	25.00	46.67
Janesville, Wis	1 room	do	10.00	22.00
Madison, Wis	do	do	20.00	40.00
Bloomington, Ill	do	do	15.00	15.00
Litchfield, Ill	do	do	16.00	16.00
Taylorville, Ill	do	do	12.00	12.00
Saginaw, Mich	do	do	18.00	72.00
Wheeling, W. Va	2 rooms	do	19.33	127.35
		Lodgings at various places		301.74
Omaha, Nebr	do	Recruiting station	25.00	50.00
Lincoln, Nebr	do	do	25.00	50.00
		Lodgings		3.25
Minneapolis, Minn	8 rooms	Recruiting station	72.00	504.00
St. Paul, Minn	6 rooms	do	82.00	738.00
	do	do	66.33	198.99
Chicago, Ill	8 rooms	do	82.00	984.00
	10 rooms	do	78.58	235.74
	6 rooms and 2 floors.	do	86.33	604.31
Dallas, Tex	3 rooms	do	34.00	408.00
		Lodgings		81.25
Washington, D. C	2 floors	Recruiting station	64.00	192.00
Richmond, Va	Building	do	50.00	425.00
Lynchburg, Va	5 rooms	do	34.50	414.00
San Francisco, Cal	6 rooms	do	70.00	840.00
Portland, Oreg	5 rooms	do	43.00	516.00
		Lodgings		159.25
Seattle, Wash	3 rooms	Recruiting station	25.00	300.00
	Building	Dormitory	29.00	348.00
Stafford, Ariz		Lodgings		1.50
Willcox, Ariz		do		15.50
Total				23,219.60

RESERVATIONS.

Under the act of June 27, 1890 (General Orders, No. 69, of 1890), appropriating $16,500 for purchase of land for target ranges for use of Fort McPherson, Ga., a desirable tract of about 1,271 acres, situated partly in Carroll and partly in Haralson counties, 1½ miles southeast of Waco, Ga., and about 50 miles from the post of McPherson, has finally been secured within the appropriation, favorable opinion regarding title having been certified by the Department of Justice and deeds duly recorded among county records.

The land has been suitably marked by boundary stones and a wire inclosing fence erected.

Under terms of act approved July 8, 1886 (General Orders, No. 52, of 1886), the grounds comprising Old Fort Brady, Mich., authorized to be sold, were duly platted, appraised, etc., and under public advertisement the buildings and fencing were disposed of at auction in October, 1893, for the sum of $2,072.50.

Thirty-six lots have under the act been sold at public and private sale (at not less than appraised value), total amount realized being $32,675.79, which sum (less cost attending sales) has been deposited in the Treasury.

The remaining unsold lots are in charge of the post quartermaster, Fort Brady, Mich., to whom application for purchase is made.

Under act approved March 1, 1890, the military reservation of Old Fort Bliss, Tex., was platted, appraised, and advertised for sale at public auction July 3, 1895.

At that sale the following lots were disposed of at not less than appraised value, deeds covering same being subsequently executed by the Secretary of War:

Lot 5, with appurtenances, to Consolidated Kansas City Smelting and Refining Co	$1,300
Lot 6, with appurtenances, to Consolidated Kansas City Smelting and Refining Co	1,095
Lot 21 to S. Ryan and J. F. Satterthwaite	50
Lot 22	25
Lot 24	25
Lot 25	75
Lots 4 and 12, with appurtenances, were on May 7, 1896, sold at private sale at appraised valuation to Paul Flury for	2,380
Total thus far realized	4,950

which sum, less expenses attending sales, has been deposited in the Treasury.

Remaining lots are in charge of quartermaster at New Fort Bliss for disposal.

The act of August 9, 1894, provides that when this reservation shall have been sold "so much of the receipts therefrom as may be necessary, not to exceed four thousand dollars, are hereby appropriated to the construction of a military road between the city of El Paso and New Fort Bliss, Texas; said money to be expended under the direction of the Secretary of War."

In sundry civil act approved August 18, 1894 (General Orders, No. 13, of 1894), $7,000 is granted for acquiring additional lands, not exceeding 190 acres, at Fort Ethan Allen, Vt.

Owner of desired grounds not being willing to sell for the sum appropriated, condemnation proceedings followed, the Department of Justice advising the War Department January 28, 1896, that the court had

accepted and confirmed the report of the commissioners and ordered that Graton Brand, the owner of the land, convey the same to the United States by good and sufficient deed of warranty, upon payment by the United States of the $10,000 awarded as damages.

In order to complete the purchase, Congress, in sundry civil act of June 11, 1896, appropriated the additional $3,000. The deed of warranty has been obtained and is now awaiting opinion of the Department of Justice as to validity, etc.

In Army act approved February 12, 1895 (General Orders, No. 10, of 1895), the following appears:

That upon the transfer and conveyance to the United States of a good and sufficient title to not less than one thousand acres of land, without cost to the United States, situated at or near the city of Spokane, in the county of Spokane, in the State of Washington, and on or near a railroad and constituting an eligible and suitable site for an army post, if approved and accepted by the Secretary of War for that purpose, then and thereupon the Secretary of War is hereby authorized to establish and locate on said land a United States Army post of such character and capacity as the Secretary of War shall direct and approve.

The Secretary of War having accepted a site of 1,022 acres, tendered through the Spokane and Eastern Trust Company, a deed therefor was duly executed October 31, 1895, and recorded among county records, the Department of Justice having previously rendered favorable opinion regarding title.

In sundry civil act approved June 11, 1896, the following appears:

For beginning the construction of permanent buildings, providing for sewerage, water supply, roads and other means of communication, and other necessary improvements at the military post at Spokane, Washington, to be expended under the direction of the Secretary of War, one hundred thousand dollars.

In sundry civil act approved March 2, 1895 (General Orders, No. 13 of 1895), the following appears:

The Secretary of War is hereby authorized within his discretion to establish a military post at such point on Puget Sound as shall in his judgment best subserve the public interests: *Provided*, That six hundred and forty acres of land suitable for the purpose shall be donated free of cost to the United States, or such greater quantity of land as in the opinion of the Secretary of War shall be necessary for that purpose.

Citizens of Seattle, representing the Chamber of Commerce, having tendered a tract of 703.21 acres on Magnolia Bluff, about 3 miles from Seattle, the site was approved by the Secretary of War March 2, 1896, subject to Department of Justice rendering favorable opinion regarding title, etc.

Sundry civil act of March 2, 1895 (General Orders, No. 13 of 1895), further provides:

That the Secretary of War is hereby authorized within his discretion to establish a military post at or near the city of Bismarck, North Dakota, in place of the present post of Fort Yates, to be abandoned, as in his judgment shall best subserve the public interest: *Provided*, That a sufficient quantity of land, not less than six hundred and forty acres, as in the opinion of the Secretary of War will be suitable for the purpose, shall be donated free of cost to the United States. Said post to be established only after a thorough official examination of all the sites that may be offered to the United States for the purpose above mentioned, such examination to be made by a board of three army officers to be selected by the Secretary of War outside of the military district in which such post is to be established, and said board shall report its findings in all matters to the Secretary of War for his action.

Under Special Orders, No. 296 of 1895, Adjutant-General's Office, a board of officers was appointed to meet at Bismarck, N. Dak., at call of senior member, for purpose of making a thorough examination of all the sites offered for donation to the United States for the purpose and report its findings to the Secretary of War for his action.

In sundry civil act approved June 11, 1896, the following appears:

For beginning the construction of permanent buildings, providing for sewerage, water supply, roads and other means of communication, and other necessary improvements at the military post at Bismarck, North Dakota, to be expended under direction of the Secretary of War, forty thousand dollars.

Sundry civil act of March 2, 1895 (General Orders, No. 13 of 1895), transfers the military prison of Fort Leavenworth, Kans., including buildings, grounds, etc., "from the Department of War to the Department of Justice," while General Orders, No. 19 of 1895, Adjutant-General's Office, publishes action of President of February 18, 1895, defining limits or bounds of the lands "set apart for the exclusive use of the military prison."

Under act of June 10, 1896, other designated grounds upon the military reservation are assigned for the erection of new penitentiary buildings:

Provided, That when the United States penitentiary shall be occupied and applied to the purposes contemplated by this act, the buildings and grounds within the said military reservation of Fort Leavenworth that were transferred from the Department of War to the Department of Justice in accordance with the provisions of the act of Congress approved March second, eighteen hundred and ninety-five, shall be restored to the control of the said Department of War: *And provided further*, That this prison reservation shall be open for military tactical purposes, when such purposes do not interfere with the discipline of said prison.

The act approved May 19, 1896, authorizes retransfer of the 409 acres of land comprising the Del Rio Military Reservation, Tex., to original grantors, "The San Felipe Agricultural Manufactory and Irrigation Company."

In sundry civil act approved June 11, 1896, the following appears:

* * * * * * *

For improving the Fort Wayne Military Reservation twenty thousand dollars, to be immediately available.

* * * * * * *

For the purchase of land for a target range for the use of troops stationed at Jefferson Barracks, Missouri, eighteen thousand dollars: *Provided*, That any land purchased hereunder shall be unincumbered by any private or public ways or roads.

General orders affecting military reservations, etc., published during the fiscal year are as follows:

General Orders, No. 45 of 1895, announces transfer of Fort Meade, S. Dak., to Department of the Platte.

General Orders, No. 49 of 1895, publishes act, etc., transferring Fort Mackinac, etc., to State of Michigan.

General Orders, No. 50 of 1895, announces that Fort Buford, N. Dak., and Fort Hancock, Tex., will be discontinued and public lands turned over to Interior Department under orders to be promulgated hereafter.

General Orders, No. 57 of 1895, announces that the fortifications at Sandy Hook, New York Harbor, will hereafter be known and designated as Fort Hancock, in honor of the late Maj. Gen. W. S Hancock, U. S. A.

General Orders, No. 58 of 1895, publishes President's action for transfer of the following abandoned reservations to the Interior Department: Fort Buford, N. Dak.; Cat Island, Miss., portion of; Horn Island, Miss., portions of; Round Island, Miss.; Petit Bois Blanc Island, Miss., portions of; Fort Hancock, Tex.

General Orders, No. 60 of 1895, publishes President's action transferring the Fort Pembina (N. Dak.) Reservation to the Interior Department.

General Orders, No. 3 of 1896, announces transfer of the Fort Stanton (N. Mex.) Military Reservation to the Interior Department.

General Orders, No. 7 of 1896, announces enlarging of the San Francisco National Military Cemetery by taking about 15 acres from lands heretofore forming part of the military reservation on northwest side of existing cemetery.

General Orders, No. 16 of 1896, publishes action of the President of April 4, 1896, reserving a part of the group of islands known as Sucia Islands, in the Gulf of Georgia, Washington, "for military purposes and proclaimed a military reservation."

General Orders, No. 18 of 1896, publishes President's action of May 1, 1896, rescinding previous order for transfer of Fort Townsend Reservation, Wash., to the Interior Department and directing its retransfer to the War Department for military uses.

General Orders, No. 19 of 1896, publishes President's action of May 9, 1896, relinquishing 720 acres of the Fort Niobrara (Nebr.) Military Reservation to the Interior Department.

General Orders, No. 21 of 1896, publishes act of May 15, 1896, authorizing Secretary of War to make use of national military parks and their approaches for military maneuvers for the Regular Army and the National Guard or Militia of the States.

General Orders, No. 26 of 1896, publishes President's action of June 19, 1896, enlarging limits of the Fort Douglas (Utah) Reservation; also President's action of June 26, 1896, transferring to Interior Department certain portions of the Fort Macomb (La.) Military Reservation.

Custodians are employed and paid by the Quartermaster's Department in caring for the following reservations:

Old Fort Bliss, Tex., A. G. Mallory, $60 per month.

Madison Barracks target range, James Fleming, $15 per month.

At Fort Townsend, Wash., J. T. Brown, and at Monterey, Cal., Frances Doud serve as custodians without money consideration.

Very respectfully,

C. P. MILLER,
Captain and Assistant Quartermaster, U. S. A.

The QUARTERMASTER-GENERAL
UNITED STATES ARMY,
Washington, D. C.

REPORT OF THE COMMISSARY-GENERAL OF SUBSISTENCE.

REPORT

OF THE

COMMISSARY-GENERAL OF SUBSISTENCE.

WAR DEPARTMENT,
OFFICE COMMISSARY-GENERAL OF SUBSISTENCE,
Washington, D. C., October 1, 1896.

SIR: I have the honor to submit the following report of the operations of the Subsistence Department for the fiscal year ending June 30, 1896:

RESOURCES AND EXPENDITURES.

The following statement exhibits the aggregate fiscal resources and expenditures of the Department for the year mentioned, and the balances at the close of the fiscal year:

RESOURCES.

Amounts in the Treasury to the credit of appropriations of the Subsistence Department on June 30, 1895, as follows:		
Subsistence of the Army, certified claims, act August 23, 1894	$0.09	
Subsistence of the Army, 1894	36,093.06	
Subsistence of the Army, 1895	13,782.56	
Commutation of rations to prisoners of war in rebel States and soldiers on furlough—		
Certified claims, acts March 2, 1889, and April 4, 1890	2,117.91	
Certified claims, 1894, act March 3, 1893	20,358.68	
Certified claims, 1895, act August 18, 1894	10,486.50	
Claims for quartermaster's stores and commissary supplies, acts July 4, 1864, and March 2, 1895	.08	
		$82,838.88
Amounts to the credit of officers of the Subsistence Department, and of officers doing duty in the Subsistence Department, with the Treasurer, assistant treasurers, and designated depositaries, and in their personal possession, on June 30, 1895, as follows:		
Subsistence of the Army, 1894	246.60	
Subsistence of the Army, 1895	106,374.24	
Commutation of rations to prisoners of war in rebel States and soldiers on furlough—		
Certified claims, 1895, act August 18, 1894	65.85	
		106,686.69
Amounts appropriated for the Subsistence Department for the fiscal year ending June 30, 1896, as follows:		
Subsistence of the Army, 1896, act of February 12, 1895	1,650,000.00	
Subsistence of the Army, certified claims, act of June 8, 1896	665.33	
Commutation of rations to prisoners of war in rebel States and soldiers on furlough—		
Certified claims, 1896, act of March 2, 1895	10,000.00	
Certified claims, act of June 8, 1896	59.00	
		1,660,724.33

Amounts collected from various sources and refunded to the appropriations of the Subsistence Department on the books of the Treasury during the fiscal year 1896, as follows:		
Subsistence of the Army, 1893, and prior years	$143.44	
Subsistence of the Army, 1893, and prior years, transfer account	5.75	
Subsistence of the Army, 1894	101.89	
Subsistence of the Army, 1895	1,355.39	
Subsistence of the Army, 1896	541.93	
		$2,148.
Amounts received by officers of the Subsistence Department and by officers doing duty in the Subsistence Department from sales of subsistence stores to the following purchasers during the fiscal year 1896, and taken up for immediate disbursement under the following appropriations:		
Subsistence of the Army, 1895: Sales to enlisted men	1,847.44	
Subsistence of the Army, 1896: Sales to officers, $255,354.66; to enlisted men, companies, detachments, and hospitals, $328,961.86; to post exchanges, $29,347.89; to civilian employees, $10,818.09; to Quartermaster's Department, $16.95; to Indians, $534.52; to Indian agents and employees, $1,799.66; to Indian boarding school, $15.50; to Headquarters of the Army, $5.45; to Mexican Boundary Commission, $43.91; to circuit court commission, $101.45; of surplus and condemned stores and property at auction, $980.29; of boxes, barrels, etc., $97	628,077.23	
		629,924.
Amounts taken up by officers doing duty in the Subsistence Department on account of reclamations for stores lost, damaged, etc., and in correction of errors in their accounts, etc., during the fiscal year 1896:		
Subsistence of the Army, 1895	9.37	
Subsistence of the Army, 1896	805.20	
		814.5
Amounts charged against officers still in the service on account of funds and stores alleged to have been lost by theft, etc., for which relief can only be obtained in Court of Claims under sections 1059 and 1062, Revised Statutes, or from Congress, as follows:		
Subsistence of the Army, 1880	75.92	
Subsistence of the Army, 1886	2,455.82	
Subsistence of the Army, 1889	24.04	
		2,555.7
Total resources		2,485,693.3

EXPENDITURES.

Amounts expended on the books of the Treasury from the appropriations of the Subsistence Department during the fiscal year 1896, as follows:		
Subsistence of the Army, 1894	$282.62	
Subsistence of the Army, 1895	375.56	
Subsistence of the Army, 1896	486.91	
Subsistence of the Army, certified claims, act June 8, 1896	658.21	
Commutation of rations to prisoners of war in rebel States and soldiers on furlough—		
Certified claims, acts March 2, 1889, and April 4, 1890	73.80	
Certified claims, 1895, act August 18, 1894	11.25	
Certified claims, 1896, act March 2, 1895	13.75	
Certified claims, act June 8, 1896	59.00	
		1,961.10

Amounts disbursed by officers of the Subsistence Department, and officers doing duty in the Subsistence Department during the fiscal year 1896, as follows:		
Subsistence of the Army, 1894	$246.60	
Subsistence of the Army, 1895	101,683.52	
Subsistence of the Army, 1896	2,003,758.30	
Commutation of rations to prisoners of war in rebel States and soldiers on furlough—		
Certified claims, 1895, act August 18, 1894	368.00	
Certified claims, 1896, act March 2, 1895	2,243.43	
		$2,108,299.85
Amounts dropped by officers doing duty in the Subsistence Department in correction of errors in their accounts during the fiscal year 1896:		
Subsistence of the Army, 1895	.14	
Subsistence of the Army, 1896	87.54	
		87.68
Amount transferred on the books of the Treasury, act March 3, 1875 (18 Stat. L., 418):		
Subsistence of the Army, 1893, and prior years, transfer account		5.75
Amount directed to be credited to officer on account of charge for shortage of subsistence stores at his post, act June 11, 1896:		
Subsistence of the Army, 1886		2,455.82
Amount dropped, balance due by deceased officer, uncollectible:		
Subsistence of the Army, 1896		460.24
Amounts carried to the surplus fund on June 29, 1895, and June 30, 1896:		
Subsistence of the Army, certified claims, act August 23, 1894	$0.09	
Subsistence of the Army, 1893, and prior years	143.44	
Subsistence of the Army, 1894	35,912.33	
Commutation of rations to prisoners of war in rebel States and soldiers on furlough—		
Certified claims, 1894, act March 3, 1893	20,358.68	
		56,414.54
Total expenditures		2,169,684.98

BALANCES.

Amounts in the Treasury to the credit of the appropriations of the Subsistence Department on June 30, 1896, as follows:		
Subsistence of the Army, 1895	$21,309.78	
Subsistence of the Army, 1896	154,881.64	
Subsistence of the Army, certified claims, act June 8, 1896	7.12	
Commutation of rations to prisoners of war in rebel States and soldiers on furlough—		
Certified claims, acts March 2, 1889, and April 4, 1890	2,044.11	
Certified claims, 1895, act August 18, 1894	9,975.25	
Certified claims, 1896, act March 2, 1895	6,986.25	
Claims for quartermaster's stores and commissary supplies, acts July 4, 1864, and March 2, 1895	.08	
		195,204.23
Amounts to the credit of officers of the Subsistence Department, and of officers doing duty in the Subsistence Department, with the Treasurer, assistant treasurers, and designated depositaries, and in their personal possession, on June 30, 1896, as follows:		
Subsistence of the Army, 1896	107,796.26	
Commutation of rations to prisoners of war in rebel States and soldiers on furlough—		
Certified claims, 1895, act August 18, 1894	197.85	
Certified claims, 1896, act March 2, 1895	756.57	
		108,750.68
Amounts refunded to the Treasury near close of fiscal year 1896, but not carried to the credit of the appropriations by June 30, 1896, as follows:		
Subsistence of the Army, 1896		11,953.47

Amounts charged against officers still in the service on account of funds and stores alleged to have been lost by theft, etc., for which relief can only be obtained in Court of Claims under sections 1059 and 1062, Revised Statutes, or from Congress, as follows:		
Subsistence of the Army, 1880	$75.92	
Subsistence of the Army, 1889	24.04	
		$99.96
Total balances		316,008.34

DISCONTINUANCE OF PURCHASING STATIONS.

The enactment of the provision of the act of Congress of February 12, 1895, which fixed the number of officers of the grade of commissary of subsistence with the rank of captain at eight, caused the discontinuance of the purchasing stations of the Subsistence Department in the following cities on the dates mentioned, viz: Washington, D. C., March 31, 1895; Cincinnati, Ohio, October 20, 1895; Baltimore, Md., October 31, 1895; Los Angeles, Cal., April 30, 1896.

ISSUES TO INDIANS.

The following issues not chargeable to the Indian Bureau were made during the year:

To whom made.	Value of issues.
Apache Indian prisoners at Fort Sill, Okla. (Army appropriation act, February 12, 1895)	$8,821.90
Indians visiting military posts (Rev. Stat., 2110)	155.06
Total	8,976.96

MISCELLANEOUS ISSUES AND EXPENDITURES.

Destitute citizens were supplied to the extent of 244 incomplete rations at a few military posts during the year upon orders of the commanding officers.

Fourteen days' rations were furnished, by direction of the Secretary of War, on requests of the Department of State, to J. W. Sparks, United States consul at Piedras Negras, Mexico, for distribution by him to a number of colored persons, citizens of the United States, near that place, who were returning in a destitute condition from Mexico to their homes in Alabama. The value of these issues amounted to $440.08.

For liquid coffee there was expended $3,008.40, a decrease from previous year of $4,734.81; for extra-duty service, $20,181.39, a decrease of $76.11; for advertising, $4,578.67, a decrease of $1,726.89; for meals for recruits and recruiting parties, $43,463.67, a decrease of $7,252.01.

LOSSES OF STORES AND PROPERTY.

The value of the stores lost by accident, by wastage in transportation, while in store, etc., during the year, for which no one was held responsible, was $2,403.25, being less by $1,775.49 than that of similar losses of previous year.

Supplies lost during the year for which the responsibility was fixed amounted to $654.27, of which but a small amount has been collected. The greater part of the loss occurred so near the close of the fiscal year that collection could not be made within that year.

SALE OF CONDEMNED AND OBSOLETE STORES.

	Subsistence stores.		
	Condemned.	Obsolete.	Total.
Original cost	$2,945.62	$2,066.89	$5,012.51
Amounts realized from sales	223.92	554.88	778.80
Loss	2,721.70	1,512.01	4,233.71

A decrease from previous year in the value of the stores condemned of $1,144.55, and in obsolete stores of $106.05. From the sale of condemned subsistence property there was realized the sum of $201.49.

CREDIT SALES.

Sales to officers reported as credit sales and deducted on pay accounts amounted to $71.78; the sales to enlisted men on credit amounted to $8,276.34, and the collections from enlisted men during the year on muster and pay rolls on account of credit sales in the current and previous fiscal years amounted to $8,131.78.

EMERGENCY RATION.

The reports from the boards of officers convened in the eight departments of the Army to examine into the propriety of establishing a ration to be carried on the person of the soldier on emergent occasions where transportation is limited or not available, together with my report on the subject, were sent to the Adjutant-General of the Army on November 25, 1895. The boards represented the Medical and Subsistence Departments as well as 18 regiments of the line, and their reports indicated intelligent and painstaking labor. On the 28th of March, 1896, the Secretary of War (by S. O. 74, H. Q. A., 1896) appointed a board of officers to examine these reports and such views and suggestions as the Major-General Commanding the Army and the Commissary-General of Subsistence might lay before it. This board concluded its labors on the 5th of May, 1896, and submitted its report to the Secretary of War, with whom it at present rests.[1]

RATIONS FOR OFFICERS AND THEIR SERVANTS ACCOMPANYING THEM WHILE SERVING IN THE FIELD OR ON TRANSPORTS.

I renew my recommendation of last year that there be added to the clause of the act making appropriation for subsistence of the Army, a proviso in the following form, viz:

Provided, That hereafter each officer serving in the field or on transports shall be entitled, while so serving, to draw one ration per day for himself and one ration per day for one servant actually accompanying him, and that the commanding officer of a separate command numbering not less than four companies shall be entitled, while so serving, to draw an additional ration per day for an additional servant actually accompanying him.

ARMY COOKS AND BAKERS.

I also renew my recommendation of last year that cooks and bakers be enlisted, the pay of chief cook and chief baker to be $30 per month each; that of cook, $25; that of assistant baker, $18; that of assistant cook, $16.

[1] The recommendations of the eight departmental boards, and the proceedings and recommendations of the board appointed March 28, 1896, with the subsequent action of the War Department thereon, are shown in the appendix hereto.

There should be a cook and assistant cook for each company, and at each post at which a general mess is established a chief cook and one baker and assistant baker, with additional assistant bakers, not exceeding one for every 200 rations of bread baked per day in excess of 300.

SALES OF SUBSISTENCE STORES TO OFFICERS AND ENLISTED MEN.

At the request of this office the matter of the repeal of sections 1299 and 1300, Revised Statutes, and the amendment of section 1144, was specially brought last session to the attention of the Committees on Military Affairs of the House and Senate by the Secretary of War, who approved the measure proposed. A bill was introduced in the Senate (S. 2009) and one in the House (H. R. 6352) embodying the repeal and the amendment literally as proposed, and both committees reported the measure favorably. These bills were not reached in either House before adjournment, and hence did not become law. I hope that the needed legislation will be obtained at the coming session. The proposed legislation was as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That sections twelve hundred and ninety-nine and thirteen hundred of the Revised Statutes of the United States, be, and the same are hereby, repealed, and that section eleven hundred and forty-four of those statutes be, and the same is hereby, amended, so as to read as follows:

"SEC. 1144. The officers of the Subsistence Department shall procure and keep for sale to officers and enlisted men, at cost prices for cash, such articles as may from time to time be designated by the Secretary of War: *Provided,* That sales of such stores on credit shall be made only to officers and enlisted men who have not been regularly paid, or who are in the field where it is impracticable to procure funds, and to recruits during their first month of enlistment, the amounts due therefor to be charged on the pay accounts of officers and on the muster and pay rolls of enlisted men next after the date of purchase and deducted from the payments made upon such pay accounts or muster and pay rolls by the Pay Department."

MANUAL FOR ARMY COOKS.

An edition of 1,000 copies of the Manual for Army Cooks has been printed and distributed, as authorized by the Army appropriation act of February 12, 1895 (28 Stat. L., 658). An additional 1,000 have also, been ordered; and under the Army appropriation act of March 16, 1896 (29 Stat. L., 64), an edition of 3,000 copies is now in course of preparation, from which officers of the National Guard of the several States and Territories applying for them through the adjutants-general of the States and Territories can be supplied.

HANDBOOK OF SUBSISTENCE STORES.

There were prepared, in the years 1893 and 1894, by officers of the Subsistence Department, upon requests from this Office, monographs giving descriptions and hints regarding the selection of the principal subsistence stores purchased for the use of and for sales to the officers and enlisted men of the Army. These papers, after being consolidated in this office, were referred to an officer of the Department of high rank and great experience, with instructions to verify the statements contained in them, and with authority to add to or omit such portions of the matter as might in his judgment be deemed judicious. An appropriation was obtained in the deficiency act of June 8, 1896 (29 Stat. L., 300), for the publication of these papers under the name of Manual of Subsistence Stores, but the word "Manual" having been appropriated for two other publications of the Subsistence Department, the name of

the volume has been changed to Handbook of Subsistence Stores, of which an edition of 600 copies is now in course of publication. The book will be found useful in the hands of all officers intrusted with the duty of purchasing subsistence stores for the Army, and will be distributed in a short time.

COMMISSARY SERGEANTS.

The number of commissary sergeants in service at the commencement of the fiscal year was 90. During the year 9 new commissary sergeants were appointed, 1 died, 2 were discharged, and 6 were retired. The number in service at the close of the fiscal year was 90.

CLERICAL FORCE, OFFICE COMMISSARY-GENERAL OF SUBSISTENCE.

With regard to the clerical force, I desire to invite attention to my recommendation made in the annual estimate for salaries in this office for the fiscal year ending June 30, 1898 (see Book of Estimates, fiscal year 1898), and to urgently request that the rearrangement of the clerical force in accordance with the items embraced in that estimate be authorized by Congress at its next session, so that the classification shall be as follows:

Chief clerk	$2,000
Two clerks of class 4	3,600
Two clerks of class 3	3,200
Four clerks of class 2	5,600
Thirteen clerks of class 1	15,600
Ten clerks, at $1,000 each	10,000
Two assistant messengers, at $720 each	1,440
Two laborers, at $660 each	1,320
Total	42,760

This proposed rearrangement has heretofore met the approval of the Secretary of War, and does not increase the amount to be appropriated for the clerical force over the amount annually appropriated for a number of years past.

CLERICAL WORK OF THE OFFICE OF THE COMMISSARY-GENERAL OF SUBSISTENCE.

	Accounts current.	Returns of subsistence stores.	Returns of subsistence property.	Total.
On hand June 30, 1895	5	73	1	79
Received during the fiscal year 1896	1,798	1,352	469	3,619
Total	1,803	1,425	470	3,698
Examined during the year	1,790	1,367	468	3,625
On hand June 30, 1896	13	58	2	73

The examination of the accounts current required the verification of 34,153 vouchers; the returns of subsistence stores, 22,743 vouchers; and the returns of subsistence property, 1,097 vouchers.

In the examinations 2,368 postal cards were used, 2,196 letters and 2,264 indorsements written and recorded, and 216 papers copied.

Certificates for services as acting commissary and certificates of non-indebtedness to the number of 512 were issued.

The accounts and returns were rendered by 253 officers.

	Claims for commutation of rations while held as prisoners of war in rebel States.	Claims for commutation of rations while on furlough, and miscellaneous claims.	Total.
There were on hand June 30, 1895	17	17	34
Received during the fiscal year	213	218	431
Total	230	235	465
Disposed of during year	213	205	418
On hand June 30, 1896	17	30	47

The number of communications in connection with the above claims sent out during the year was 1,682.

DUTIES AND STATIONS OF OFFICERS OF THE SUBSISTENCE DEPARTMENT.

A roster of the officers of the Subsistence Department on June 30, 1896, showing their duties and stations on that date, and the duration of their present assignments, is hereto appended.

Very respectfully,

M. R. MORGAN,
Commissary-General of Subsistence.

DANIEL S. LAMONT,
Secretary of War.

Roster of the Subsistence Department, United States Army, June 30, 1896.

Name and rank.	Duty and station.	Assigned to present station.
COMMISSARY-GENERAL OF SUBSISTENCE.		
Brigadier-general.		
Michael R. Morgan	Commissary-General of Subsistence, Washington, D. C.	Oct. 8, 1894
ASSISTANT COMMISSARIES-GENERAL OF SUBSISTENCE.		
Colonels.		
Thomas C. Sullivan	Principal assistant to the Commissary-General of Subsistence, Washington, D. C.	May 18, 1896
William H. Bell	Under orders for duty as chief commissary, Department of the Colorado, Denver, Colo.	
Lieutenant-colonels.		
Samuel T. Cushing	Assistant to the Commissary-General of Subsistence, Washington, D. C.	May 3, 1894
William A. Elderkin	Chief commissary, Department of the Missouri, Chicago, Ill.	May 9, 1896
William H. Nash	Chief commissary, Department of the Columbia, and purchasing commissary, Vancouver Barracks, Wash.	Jan. 1, 1890

Roster of the Subsistence Department, United States Army, June 30, 1896—Continued.

Name and rank.	Duty and station.	Assigned to present station.
COMMISSARIES OF SUBSISTENCE.		
Majors.		
Charles P. Eagan	Purchasing commissary, 36 New Montgomery street, San Francisco, Cal.; also acting chief commissary, Department of California, after June 30, 1896.	Apr. 1, 1894
John F. Weston	Purchasing commissary, New York City	May 29, 1896
Charles A. Woodruff	Chief commissary, Department of the East, Governors Island, New York City.	May 27, 1896
John J. Clague	Chief commissary, Department of Dakota, and purchasing commissary, St. Paul, Minn.	Feb. 8, 1892
Wells Willard	Assistant to the purchasing commissary, Army Building, New York City.	Apr. 18, 1895
Henry G. Sharpe	Purchasing commissary, old Custom House Building, St. Louis. Mo.	Jan. 21, 1893
Frank E. Nye	Chief commissary, Department of the Platte, and purchasing commissary, Omaha, Nebr.	Apr. 25, 1894
William L. Alexander	Purchasing commissary, Equitable Building, Denver, Colo.	Mar. 26, 1894
Captains.		
Henry B. Osgood	Purchasing commissary, 159 High street, Boston, Mass.	July 20, 1893
Oskaloosa M. Smith	Purchasing commissary, 250 Illinois street, Chicago, Ill.	Oct. 31, 1895
Edward E. Dravo	Under orders for duty as chief commissary, Department of Texas, and purchasing commissary, San Antonio, Tex.	
Abiel L. Smith	Purchasing commissary, 716 New York Life Building, Kansas City, Mo.	June 30, 1893
Tasker H. Bliss	On duty in Adjutant General's Office, Washington, D. C.	Dec. 23, 1892
James N. Allison	Purchasing commissary, 1201 Prytania street, New Orleans, La.	Oct. 25, 1895
Vacancy, June 10, 1896		
Do		

During the last fiscal year the following casualties occurred in the Subsistence Department:

Maj. Charles B. Penrose, commissary of subsistence, purchasing commissary, Baltimore, Md., died at Carlisle, Pa., September 18, 1895.

Lieut. Col. Jeremiah H. Gilman, assistant commissary-general of subsistence, chief commissary, Department of the Missouri, Chicago, Ill., retired November 11, 1895, by operation of law (sec. 1, act of June 30, 1882).

Col. J. W. Barriger, assistant commissary-general of subsistence, chief commissary, Department of the East, New York, N. Y., retired at his own request June 1, 1896, being over 62 years of age (sec. 1244, Rev. Stat.).

Col. Thomas Wilson, assistant commissary-general of subsistence, purchasing commissary, New York, N. Y., retired June 10, 1896, by operation of law (sec. 1, act of June 30, 1882).

Capt. Douglas M. Scott, commissary of subsistence, retired June 10, 1896, for disability, under the act of October 1, 1890, with the rank of major.

APPENDIX.

THE EMERGENCY RATION.

On the 17th of April, 1895, the Commissary-General of Subsistence addressed a communication to the Adjutant-General of the Army on the subject of an emergency ration, in which he said:

While no army in the world is so well supplied with food as is ours, there is believed to be still wanting in our service a special and distinctive ration (for use in substitution of the ordinary ration), to be carried on the person of the soldier on emergent occasions where transportation is limited or is not available. Such a ration should combine the qualities of wholesomeness, palatability, proper nutritive value and portability, and should, in addition, possess good keeping qualities.

The subject has been for some time under consideration in this office, but before being willing to make any definite recommendation as to the form and character of the ration which should be officially adopted, I would wish that the officers of the line—those who command troops and who know intimately their wants—should become interested in the matter and their aid and cooperation in making choice of such a ration secured.

With this object in view, therefore, I would respectfully recommend that the several department commanders may each be instructed to convene a board, to consist of one officer of the Subsistence Department, one officer of the Medical Department, and three officers of the line, to consider and recommend a proper ration for troops operating in emergencies, and that, for the sake of uniformity of action, these several boards should be directed to give consideration to the following points, viz:

(1) The component parts of the ration, selected with reference to wholesomeness and proper nutritive values and to the portability of the ration as a whole.
(2) Acceptability to taste.
(3) Keeping qualities.
(4) Weight of each ration and the kind, size, and form of package in which put up for convenience of use and of carriage on the person.
(5) Directions for use by the soldier.
(6) Number of rations to be carried on the person and the maximum number that may be so carried.
(7) Whether to be habitually carried by the soldier as a part of his outfit or to be issued out only for emergent occasions.

If, after the reports have been received by the Commanding General, it should be found that there are material differences of opinion, it is suggested that a board of officers be convened at Washington to reconcile these differences if practicable.

I also recommend that a sum not exceeding $100 from subsistence funds may be assigned to each board to meet the expenses of materials and preparation thereof in the experiments necessary to be made by it.

This communication was submitted to the Secretary of War by the Lieutenant-General, by indorsement of April 24, 1895, "recommending favorable action. The subject is one of great importance." The Secretary of War approved the recommendation May 6, 1896, and an official copy of the letter and indorsements was referred by the Adjutant-General to the commanding generals of the eight military departments on May 11, 1895, with instructions to convene boards in their respective

departments, to consist in each of one officer of the Subsistence Department, one of the Medical Department, and three of the line, to consider and recommend a proper ration for troops operating in emergencies, and directing them to instruct such boards to give consideration to the points mentioned in the Commissary-General's letter. The reports of the boards were required to be forwarded to the Adjutant-General, with such remarks or suggestions by department commanders as they might desire to make.

On May 25, 1895, the Commissary-General of Subsistence sent the following letter of instructions to all purchasing commissaries, viz:

The commanding general of each military department having been directed to convene a board of officers "*to consider and recommend a proper ration for troops operating in emergencies;* and that, for the sake of uniformity of action, these several boards should be directed to give consideration to the following points, viz: (1) The component parts of the ration, selected with reference to wholesomeness and proper nutritive values, and to the portability of the ration as a whole. (2) Acceptability to taste. (3) Keeping qualities. (4) Weight of each ration, and the kind, size, and form of package in which put up for convenience of use and of carriage on the person. (5) Directions for use by the soldier. (6) Number of rations to be carried on the person, and the maximum number that may be so carried. (7) Whether to be habitually carried by the soldier as a part of his outfit, or to be issued out only for emergent occasions * * *"—you are requested to communicate any information you may think pertinent to the subject to this office or to such of the boards as you think best.

It frequently happens that the inventors or manufacturers of concentrated foods, portable packages, etc., desire to have their goods tested by this Department, and as your duties often bring you in contact with them, it is suggested that they be advised that this is their opportunity and they may accomplish their desires by communicating with one or more of these boards.

APPOINTMENTS OF BOARDS.

In pursuance of the instructions of the Adjutant-General of May 11, 1895, boards of officers were convened in all the military departments by the commanding generals thereof. These boards consisted of the following officers:

In the Department of the East, under Special Orders, No. 114, Headquarters Department of the East, May 13, 1895: Col. J. W. Barriger, Assistant Commissary-General of Subsistence, president; Maj. John Van R. Hoff, Surgeon; Maj. E. P. Ewers, Ninth Infantry; Capt. Frederick H. E. Ebstein, Twenty-first Infantry, and Capt. James Fornance, Thirteenth Infantry.

In the Department of the Missouri, under Special Orders, No. 79, Headquarters Department of the Missouri, May 28, 1895: Lieut. Col. Jeremiah H. Gilman, Assistant Commissary-General of Subsistence, president; Capt. Wilson T. Hartz, Fifteenth Infantry; Capt. Henry R. Brinkerhoff, Fifteenth Infantry; Capt. Stephen R. Stafford, Fifteenth Infantry, and Capt. Charles E. Woodruff, Assistant Surgeon.

In the Department of Dakota, under Special Orders, No. 74, Headquarters Department of Dakota, May 15, 1895: Lieut. Col. Edward Moale, Third Infantry, president; Maj. John J. Clague, Commissary of Subsistence; Capt. Joseph Hale, Third Infantry; Capt. William C. Borden, Assistant Surgeon, and First Lieut. John H. Beacom, Third Infantry.

In the Department of the Platte, under Special Orders, No. 66, Headquarters Department of the Platte, May 17, 1895: Lieut. Col. George M. Randall, Eighth Infantry; Maj. John V. Lauderdale, Medical Department; Maj. Adna R. Chaffee, Ninth Cavalry; Capt. Frank E. Nye, Commissary of Subsistence, and First Lieut. Julius A. Penn, Second Infantry.

In the Department of Texas, under Special Orders, No. 64, Headquarters Department of Texas, May 20, 1895: Lieut. Col. Guy V. Henry, Fifth Cavalry, president; Maj. John F. Weston, Commissary of Subsistence; Maj. Louis M. Maus, Surgeon; Capt. William T. Wood, Eighteenth Infantry, and First Lieut. John D. C. Hoskins, Third Artillery.

In the Department of the Colorado, under Special Orders, Nos. 38 and 43, Headquarters Department of the Colorado, June 17 and July 6, 1895: Lieut. Col. William H. Powell, Eleventh Infantry, president; Capt. Edward S. Godfrey, Seventh Cavalry; Capt. Louis A. La Garde, Assistant Surgeon; Capt. Edward E. Dravo, Commissary of Subsistence, and Capt. Edward E. Hardin, Seventh Infantry (relieved by Capt. George S. Young, Seventh Infantry, July 6, 1895).

In the Department of California, under Special Orders, No. 68, Headquarters Department of California, May 27, 1895: Lieut. Col. Francis L. Guenther, Fifth Artillery, president; Lieut. Col. Evan Miles, Twentieth Infantry; Lieut. Col. William H. Bell, Assistant Commissary-General of Subsistence; Lieut. Col. Johnson V. D. Middleton, Deputy Surgeon-General, and Capt. George H. G. Gale, Fourth Cavalry.

In the Department of the Columbia, under Special Orders, Nos. 73 and 109, Headquarters Department of the Columbia, May 20 and July 29, 1895: Lieut. Col. W. D. Wolverton, Deputy Surgeon-General, president; Maj. W. H. Nash, Commissary of Subsistence; Maj. J. W. French, Fourteenth Infantry (relieved by Capt. Frank Taylor, Fourteenth Infantry, July 29, 1895); Capt. John Murphy, Fourteenth Infantry, and First Lieut. John Little, Fourteenth Infantry.

PAPERS REFERRED TO BOARDS.

In May and June, 1895, the Commissary-General of Subsistence caused a letter[1] of the following purport to be sent to all officers of the Subsistence Department serving on the emergency ration boards in the various departments, viz:

I am directed by the Commissary-General of Subsistence to send, for your information, an article by Maj. Charles Smart, surgeon, U. S. A.

The tables may be of assistance to you and save a great deal of research. Their authorship is sufficient guarantee of their correctness.

I also inclose copy of a letter from Maj. William Ludlow, United States Engineers.

Copies of Army and Navy Register of dates May 11 and 25, containing articles upon the subject of "Rations of foreign armies," have been recently mailed to you.

The principles obtained by the experiments of chemists and scientists, established and published in various works upon the subject, notably Parke, Pavy, Hammond, and others, give generally all that is *known* in this office.

It was to determine the application of these principles and to decide what articles will be best for the purpose by the soldiers of the United States that decided the Commissary-General of Subsistence to call for the boards.

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[1] The article by Maj. Charles Smart, Surgeon, referred to in the above letter, was a portion of his paper entitled "The relation of concentrated foods to active service demands," read by him at the annual convention of the Military Surgeons' Association at Buffalo, N. Y., in May, 1895. The letter of Maj. William Ludlow, Corps of Engineers, referred to was a letter addressed by him to the Adjutant-General from the United States embassy at London, on April 12, 1895, conveying information as to the emergency ration in the British service, in answer to a request of Capt. Charles E. Woodruff, Assistant Surgeon, of date February 19, 1895.

In addition to the inclosures enumerated in the letter, there was sent to Lieut. Col. W. H. Bell, Assistant Commissary-General of Subsistence, on June 6, 1895, and to Capt. Edward E. Dravo, Commissary of Subsistence, on June 28, 1895, a copy of the Army and Navy Register of June 1, 1895. To the latter was also sent on June 28, 1895, a copy of a paper on emergency rations, read by Capt. Charles E. Woodruff, Assistant Surgeon, before the officers' lyceum at Fort Sheridan, Ill., May 7, 1895.

The desire to have a ration of this character came from the line of the Army, and it was thought best to obtain the recommendations of those who wished the ration before making any recommendations from this office.

It may be possible to devise one theoretically correct without obtaining any advice, but to satisfy the soldier it is best to know his wishes.

With this view of the subject it is not considered advisable for this office to express any opinion until it has an opportunity to examine the recommendations made by the separate boards ordered in different sections of the country, and each of which may make recommendations suitable for different localities.

PROCEEDINGS AND RECOMMENDATIONS OF BOARDS.

BOARD IN THE DEPARTMENT OF THE PLATTE.

This board was convened at Omaha, Nebr., on the 20th of May, 1895, and adjourned May 31, 1895. Its recommendations and the action of the Department Commander, the Lieutenant-General, and the Secretary of War thereon were as follows:

The board visited the leading wholesale grocers, coffee dealers, etc., of Omaha, and the Cudahy Packing Company, in South Omaha, and ordered and examined samples of all kinds of concentrated foods obtainable in this market; also endeavored to obtain samples of certain foods from Eastern markets.

The following articles were submitted to or purchased by the board for trial:

HARD BREADS.

American Biscuit Company, Omaha, Nebr., samples of crackers:
Sample 1. Oatmeal 3 parts, wheat flour 25 parts, square.
Sample 2. Oatmeal 3 parts, wheat flour 25 parts, round.
Sample 3. Oatmeal 7 parts, wheat flour 25 parts, square.
Sample 4. Oatmeal 7 parts, wheat flour 25 parts, round.
Sample 5. Oatmeal 40 per cent, 9 crackers to the pound, square.
Sample 6. Oatmeal 40 per cent, 14 crackers to the pound, square.

COFFEE.

Sample 1. "Crown Liquid" coffee, from McCord, Brady & Co., made by Crown Liquid Coffee Company, Boston, Mass.

Sample 2. George Hummel's essence coffee, P. W. Daisy, 248 North Third street, Philadelphia. Submitted by Steele-Smith Grocery Company, Omaha.

Sample 3. "Best Essence Coffee," P. C. Thompson, Philadelphia, by Steele-Smith Grocery Company, Omaha.

Sample 4. Coffee tablets or paste, by Consolidated Coffee Company, Omaha.

Sample 5. Same, with sugar added, from same company. The board also examined other essences and extracts of coffee.

Sample 6. Mixture of ground coffee and sugar, pressed, submitted by Major Chaffee, Ninth Cavalry.

MEATS.

Sample 1. All the brands of potted and tinned meats of the Cudahy Packing Company.

Sample 2. Beef extract, Cudahy Packing Company, in jars and in gelatine capsules.

Sample 3. Cudahy's Beef Nutritive, in bottles.

Sample 4. Cudahy's Beef Nutritive, in 4-ounce tins.

Sample 5. Powdered beef, Cudahy Packing Company.

Sample 6. Brawn, special make, one-half pork, one-half beef (Cudahy).

Sample 7. (Commercial) brawn, 75 per cent pork, 25 per cent beef (Cudahy).

Sample 8. Special smoked beef, Acme brand, in tin, J. W. Beardsley & Sons, 179–180 West street, New York, from McCord, Brady & Co., Omaha.

Sample 9. Cudahy's summer sausage.

Sample 10. Meat and potato compound, by Cudahy Packing Company.

Sample 11. Cunningham's desiccated egg food, by Steele-Smith Grocery Company, Omaha.

SOUPS.

Sample 1. Kopf's pea soup, 4-ounce paper packages, C. W. Kopf & Co., New York, by Pundt, grocer, Omaha.

Sample 2. Edwards's desiccated soups in lever-top 4-ounce tins, Frederick King & Co., limited, Belfast, from Hobart Williams, grocer, Omaha.

Sample 3. Solidified soup, square, prepared by E. Lazenby & Son, 18 Trinity street, London, S. E., by Hobart Williams, grocer, Omaha.

The board made special but unsuccessful effort to obtain samples of Weidner's soup tablets, which were highly recommended to the board by officers who had used them. They were sold originally by the American Ready Food Company, Chicago, Ill. The Cudahy Packing Company claimed to be able to make a pea-meal sausage, but could not submit sample of the same owing to the illness of the employee who was familiar with its component parts and manufacture.

After careful examination and tests of the samples submitted, and consideration of the question of an emergency ration, the board recommends that the component parts of the emergency ration be as follows:

Components.	Net weight.	Gross weight.
	Ounces.	*Ounces.*
Hard bread	9	9
Meat	7	*a* 9
Soup cake, pea or bean, 2 cakes, at 2½ ounces each	5	5
Sugar, 1 ounce Coffee, 1.25 ounces	2.25	2.25
Pepper, one-sixteenth ounce	.0625	.0625
Salt	1	1
	24.3125	26.3125
Add for paper wrappers for soup cake, coffee, etc		2.6875
Total gross weight		29

a About.

DETAIL.

HARD BREAD.—Sixteen to the pound, square, each side 3½ inches.

In the opinion of the board the hard bread can be improved by using 20 per cent oatmeal to 80 per cent wheat flour instead of using wheat flour alone. The board can not state whether this introduction of oatmeal would injuriously affect the keeping qualities of the hard bread. This can only be determined by months of trial. In the opinion of the board the nutritive value would be increased. Atwater, in Century, May, 1887, quoted by Surgeon Waters in Journal M. S. I., No. 46, page 704, says:

	Protein.	Fats.	Carbohydrates.	Mineral.
Wheat flour	8.7	2	55.3	1.3
Oatmeal	15	7	68.4	2

Surgeon Woodhull, Military Hygiene, pages 60–61: "Oatmeal carefully cooked is very nutritious, developing, ounce for ounce, 130 foot-tons of potential energy against 87.5 for bread. It keeps well, is easily cooked, and while it lacks adhesiveness for making large loaves, small flat cakes can be preserved. This is good military food."

COFFEE.—The board examined a number of coffee extracts, liquid coffees, etc., but found all more or less adulterated, and some to be even without a trace of pure coffee. For an emergency ration, pure coffee alone should be used. No adulteration should be allowed other than that mentioned below. The board is of the opinion that a suitable coffee cake containing one day's ration of pure ground coffee, 1.25 ounces, can be made. The Consolidated Coffee Company of Omaha submitted, on request of the board, two samples of coffee cakes, or paste; the first containing about 20 per cent glycerin, to give adhesiveness to the mass; the second containing in addition one day's sugar ration, 2 ounces. Both samples were tested, and gave excellent results. The second being too sweet, the amount of sugar should be reduced one-half. Both samples contained, besides the glycerin, a small quantity of what the chemist of the firm called a "preservative." This he assured the board was entirely harmless, and the board could discover in the tests no injurious effects, but he wished to retain the name of the "preservative" used as a trade secret. The coffee was of good quality, well browned and ground before being mixed with the glycerin. On account of short time allowed the firm and their lack of proper machinery, it was impossible to reduce the coffee to its smallest compass. It was in the form of an

almost solid paste, covered with an outer covering of paraffin paper. This should be further covered with tin foil, and then an outer paper cover, with plain directions as to time for boiling. It makes a fairly good coffee when boiling water is poured on it, but is better if allowed to boil a few minutes. The coffee, being ground fine, requires but a few minutes' boiling. The small package containing one ration of coffee (1.25 ounces) and sugar (1 ounce) is recommended. The packages should be packed in hermetically sealed tins, 50 or 100 rations to a tin, for transportation to a base and storage.

The chemist assured the board of the keeping quality of the package if inclosed in hermetically sealed tins. The great use of adulterants in the coffee trade and in browned coffees leads the board to recommend the preparing of the coffee cake either at a Government laboratory or under the strictest surveillance if done by a private firm.

MEATS.—The board tested a number of beef extracts, beef nutritives, etc. Beef extract is merely a stimulant. Beef nutritive is beef extract with powdered beef added, giving some nutrition.

The board is of the opinion that neither extracts nor nutritives are acceptable to the taste, and in the opinion of some of the members of the board it is not considered as affording a sufficient quantity of solid matter for the man's stomach. The Cudahy Packing Company, of South Omaha, Nebr., submitted a mixture of meat and potatoes—about 80 per cent meat to 20 per cent potatoes—a sample of which is inclosed. It was impossible to determine the nutritive value of this compound. The board tested the mixture and found it nutritious and palatable; the objection being that the mixture requires cooking. The board was assured of the keeping qualities of the same, samples having been kept for over a year by the Packing Company. Three ounces put into 11 ounces boiling water and cooked twenty minutes made a nutritious dish.

The board recommends a meat compound composed of one part pork and three parts corned beef, the latter of full nutritive value if possible; no extracts taken out other than may be necessary during cooking.

This compound is similar to what is known commercially as "brawn," except that instead of having 75 per cent pork and 25 per cent beef, the percentage should be as stated above—25 per cent pork and 75 per cent beef; to be put up in tins containing 7 ounces net. Tins to be of the same cross section as hard bread, square, 3½ inches each side, for convenience in packing. Sample submitted was spiced and very palatable. It was spiced with mustard, salt, and pepper. Patent key for opening. (Sample of corned beef, Rex brand, put up by the Cudahy Canning Company, South Omaha, Nebr.)

SOUP CAKE.—The board recommends a soup cake composed of 2½ ounces of pea or bean meal, seasoned with salt and pepper, and containing a small quantity of bacon, similar to Lazenby's solidified soup. Square; sample inclosed.

It is believed that an American-made tablet, or cake, can be obtained answering the conditions given. Should be of general form of packages submitted. The board has made most excellent soup from Kopf's pea meal, introducing a little bacon fat.

In the opinion of the board, a man being on reduced rations—in cases of emergency—should be allowed two soup cakes per day. Each soup cake will make a cup of good soup when boiled about ten minutes. The weight of the tablet or cake is so slight, and the soup is considered such an important addition to a soldier's food when on reduced rations, that the board urgently recommends two cakes per day as the soup ration. It is recommended that equal quantities of pea and bean cakes be provided.

SALT AND PEPPER.—The board recommends that one ounce of salt and one-sixteenth of an ounce of pepper be put up in separate packages of strong paper.

Acceptability to taste.—All articles recommended are believed to be satisfactory in this particular.

Keeping qualities.—In the opinion of the board, the articles recommended will keep for a year.

Weight of each ration, etc.—Weight, net 24.3125 ounces, gross 29 ounces. As these articles come from various manufacturers, the board does not recommend that the component parts be assembled in one-ration packages. It does recommend that the hard bread be placed in 9-ounce packages. For carrying in haversack, the meat to be placed at the bottom and the package of hard bread on the top of it. The smaller packages the soldier will store away in the most available place, and the board does not consider it necessary to recommend special manner for carrying said packages.

Directions for use by the soldier.—With the exception of the soup and coffee cakes, no directions are necessary. The directions on the latter package need state merely time of boiling, ten minutes, and even these directions are not considered absolutely necessary.

Number of rations to be carried on the person, etc.—Maximum number that may be carried, four days.

To be habitually carried on the person of the soldier.—None

To be issued only for emergent occasions.

There being no further business before it, the board, at 12 m., May 31, 1895, adjourned sine die.

GEO. M. RANDALL,
Lieutenant-Colonel, Eighth Infantry.
J. V. LAUDERDALE,
Major and Surgeon, U. S. A.
ADNA R. CHAFFEE,
Major, Ninth Cavalry.
F. E. NYE,
Captain and Commissary of Subsistence.
JULIUS A. PENN,
First Lieutenant, Second Infantry.

NOTE 1.—The board based its work largely upon the following definition of an emergency ration:

"A military emergency ration is the smallest nutritive equivalent which will maintain a soldier, for forced exertion, for one day, without serious impairment of vigor, and for a further calculated expenditure of the same energy with the repetition of the same ration for a period not exceeding seven days. The ration should be compact in form, resist climatic or intrinsic chemical change for one year, should be palatable, cooked or uncooked, and not cause digestive disturbance." This was submitted by Colonel Bache, the medical director of the Department of the Platte. Four instead of seven days was considered by the board as the maximum time.

NOTE 2.—In the consideration of the question of an emergency ration, the board was in session from May 20 to 24, inclusive, and from May 27 to 31, inclusive, from 10.30 a. m. to 4 p. m.—upon May 29 to 6 p. m. Considerable extra time was devoted by members to visiting manufacturers, securing samples, etc. The board consulted many of the officers stationed in this vicinity, and referred to or studied the following works on the subject:

Woodhull's Military Hygiene.
Sharpe's Art of Subsisting Armies in War.
Major Schwan's Report on the Organization of the German Army.
War Provisions.—Boniva. Journal M. S. I., No. 21.
Proper Diet of the Soldier.—Waters. Journal M. S. I., No. 46.
Report of Surgeon Joseph R. Smith, United States Army. Pamphlet.
Army and Navy Register of May 11 and May 25, 1895.
Manual of Practical Hygiene. (Parkes.) Two volumes.
Food and Dietetics. (Pavy.)
Reference Handbook of the Medical Sciences, volume III.
Treatise on Hygiene, by Stevenson and Murphy, volumes I and II.
Manual of Dietetics. (Fothergill.)

NOTE 3.—Meat sample: Cudahy & Co., South Omaha, Nebr., have made, upon request of the board, sample cans of corned beef and brawn which are forwarded in separate package.

Sample tins, brawn, marked "B" on top. Weight, gross, 10¼ ounces; weight, net, 7 ounces. The brawn contains 75 per cent corned beef and 25 per cent pork. The pork used is taken almost entirely from the head of the hog. Tests of this meat compound were satisfactory. The meat is well spiced and is more palatable than corned beef. The sample tins are about 1½ ounces heavier than the board estimated, and are not made with patent key opener as the board requested. The Cudahy company, however, would place this patent key opener upon the cans if a large quantity were ordered. The expense was too great to admit of this being done on the few samples made. It is thought possible also to do away with part, at least, of the rim, which apparently adds to the weight of tin and takes up space in packing.

Samples marked "C" on top contain corned beef, gross weight, 10¼ to 10½ ounces; net weight, 7 ounces. Sample sent for purposes of comparison with sample of brawn.

NOTE 4.—Coffee samples: The coffee and sugar tablet submitted by the Consolidated Coffee Company, of Omaha, Nebr., upon request of the board, is not in the form in which the board wished it to be. Samples inclosed in separate package. The samples contain 1¼ ounces coffee and 1 ounce sugar, some glycerin, and the preservative heretofore mentioned.

Due to lack of proper machinery, the firm did not succeed in making as solid a tablet as the board desired, and from inability to secure tin foil and paper for wrapping of suitable kind, the packages are not satisfactory. They are inclosed, however, to show to a certain extent the ideas of the board in regard to a coffee tablet.

NOTE 5.—Since the adjournment of the board, a member has received and tested a sample of Borden's Extract of Coffee. While an improvement upon the extracts

previously tested, it is not considered by the recorder of the board as equal to the coffee tablet. * *

NOTE 6.—Hard bread: The American Biscuit Company, Omaha, Nebr., submitted a sample of crackers, which are forwarded in separate package. The crackers contain 33⅓ per cent oatmeal to 66⅔ per cent wheat flour. The cracker recommended as a possible substitute for the hard bread should contain but 20 per cent of oatmeal.

NOTE 7.—The ration of salt recommended—1 ounce—is larger than most authorities would allow, but it is well to provide the soldier with the means of utilizing any accidental addition to his ration in the way of fresh meat.

NOTE 8.—Samples of Weidner's soups were received after adjournment of the board and were tested and found to give very satisfactory results. Samples of Weidner's bean soups forwarded in separate package.

NOTE 9.—As the different firms had not been able to submit samples according to the board's specifications at the time of the adjournment of the board, the samples referred to in these notes have been collected and these notes made by the recorder of the board.

JULIUS A. PENN,
First Lieutenant, Second Infantry.

HEADQUARTERS DEPARTMENT OF THE PLATTE,
Omaha, Nebr., June 17, 1895.

Approved. The board seems to have worked faithfully and well in its efforts to accomplish the matter in hand, but was somewhat hampered by the difficulty of obtaining sufficient supplies of desirable samples and materials to work with.

The inclosed report is valuable, but, in my judgment, more time and many tests will be needed before it is possible to determine the most desirable component parts of the emergency ration.

J. J. COPPINGER,
Brigadier-General, Commanding.

[First indorsement.]

ADJUTANT-GENERAL'S OFFICE, *June 24, 1895.*

Respectfully submitted to the Lieutenant-General.

H. C. CORBIN,
Assistant Adjutant-General.

[Second indorsement.]

HEADQUARTERS OF THE ARMY,
Washington, June 25, 1895.

Desired by the Lieutenant-General that these reports as received be referred to the Commissary-General of Subsistence for his remarks on the subject after all the reports shall have been considered by him. Thereafter the Lieutenant-General will extend his final consideration.

THOMAS M. VINCENT,
Assistant Adjutant-General.

[Third indorsement.]

ADJUTANT-GENERAL'S OFFICE,
Washington, June 27, 1895.

Respectfully referred to the Commissary-General of Subsistence, United States Army, for his remarks on the subject after all the reports shall have been received by him.

By order of the Acting Secretary of War:

H. C. CORBIN,
Assistant Adjutant-General.

Box with samples accompanying.

THE BOARD IN THE DEPARTMENT OF THE EAST.

This board convened on May 28, 1895, and held meetings on May 29, June 3, 4, 5, 6, 7, 10, August 6, 7, 8, 9, 12, 13, 14, 15, 19, 21, and 22. It appointed committees to report upon—first, the tea, coffee, cocoa, and salt components; second, the bread; third, the meats; fourth, the vegetables.

It made food tests of the following materials:

Date.	Article.	Manufacturer.
1895.		
Aug. 8	Special ration: Mutton and vegetables (potatoes, cabbage, onions, and turnips).	Maconochie Bros., London, England.
8	Oxford roast: Mutton	Burnham & Morrill Co., Portland, Me.
9	Special ration Beef and vegetables (potatoes, cabbage, onions, and turnips).	Maconochie Bros , London, England.
9	Oxford roast: Beef	Burnham & Morrill Co , Portland, Me.
9	Patent ration: Beef and vegetables (potatoes, cabbage, onions, and turnips).	Maconochie Bros , London, England.
9	Patent ration: Mutton and vegetables (potatoes, cabbage, onions, and turnips).	Do
9	Pemmican: Packed for Greely Relief Expedition (U. S. S. *Bear*).	Kemp, Day & Co , New York, N. Y.
9	No. 1, Army ration: Beef and vegetables (potatoes, onions, pease, and carrots).	Armour & Co., Chicago, Ill.
9	No. 2, Army ration	Do.
9	No. 3, Army ration	Do.
12	No. 2, Army ration: Beef and vegetables (potatoes, onions, turnips, pease, and carrots).	Do.
12	No. 3, Army ration: Beef and vegetables (potatoes, onions, and carrots).	Do.
12	No. 1, Army ration: Beef, potatoes, onions, pease, and carrots.	Do.
12	Bean soup	C. H. Knorr, Heilbronn, Germany.
12	Pea soup	California Desiccated Food Co.
12	Bean soup	Do.
12	Potato soup	C. H. Knorr, Heilbronn, Germany.
12	Pea soup	Do.
12	Pea soup: Erbswurst	Do.
12	Kola	Johnson & Johnson, New Brunswick, N. J.
13	Barley-flour soup	C. H. Knorr, Heilbronn, Germany.
13	Gravina	Fred'k King & Co., London.
13	Brown soup	Do.
13	White vegetable soup	Do.
13	Tomato soup	Do.
13	Bouillon capsules	Auker Bouillon Capsule Co., New York.
13	Beef capsules	C. G. Bacon & Co., New York.
13	Bovril tablets	Bovril, Limited, London, England.
13	Condensed coffee	Condensed Coffee Co., New-York.
13	Extract of coffee (Borden's)	New York Condensed Milk Co.
13	Condensed coffee	Chase & Sanborn, Boston.
13	Coffee balls	Cahill, New York.
13	Tea essence	Do.
13	Tea tablets (tea, 30 grs.; sac., $\frac{3}{4}$ gr.)	Parke, Davis & Co., Detroit, Mich.
13	Tea tablets (tea, 20 grs.; sac., $\frac{1}{2}$ gr.)	Do.
13	Tea tablets (tea, 20 grs.)	Do.
13	Tea balls	Cahill, New York.
13	Vino kolafra	Johnson & Johnson, New Brunswick, N. J.
13	Tea tablets (tea, 50 grs.; sac., $\frac{1}{2}$ gr.; water, 18 oz.)	Parke, Davis & Co., Detroit, Mich.
13	Tea tablets (tea, 70 grs; sac., $\frac{1}{2}$ gr.; water, 18 oz)	Do.
13	Tea tablets (tea, 90 grs; sac., $\frac{1}{4}$ gr.; water, 18 oz)	Do.
13	Gluten wafer	Sanitarium Health Food Co., Battle Creek, Mich.
13	Sweet potatoes (canned)	Diamond Packing Co., Bridgeton, N. J.
14	Sliced smoked beef	J. W. Beardsley's Son, New York, N. Y.
15	Zwiebach	
15	Hard bread	Holmes & Coutts, New York.
15	Cracker dust, compressed in cake	
15	Cracker dust, compressed in tablets	
15	Hard bread, compressed in tablets	
22	Compressed coffee tablets	Fraser Tablet Manufacturing Co., New York.

The recommendations of the board and the action of the department commander were as follows:

The board having made tests of all articles suitable for a ration for emergencies obtainable by it, and taken into consideration that, other things being equal, the ideal cover for an emergency ration is one that, itself practically indestructible, will preserve its contents fit for use for a period certainly not less than three years, then proceeded to investigate the question of package.

The art of preserving food has reached such a high state of perfection that the

board naturally inquired into the means adopted to this end, and found that, while with practically all preserved-food products a germless (aseptic) surrounding medium is absolutely essential, in a large proportion of cases this seems to have been best accomplished through the germ-free atmosphere of a hermetically sealed tin.

Having determined, as above set forth, that some practicable form of those universally recognized and acceptable staple foods which constitute our "daily bread"—beef, bread, a vegetable, and a stimulant—should constitute our emergency ration, and having after careful consideration and experiment also determined upon their form and the form of package, a description of these is herewith set forth in the points to which the board is directed to give its consideration, as follows, viz:

First. The component parts of the ration to be 8 ounces dried chipped (smoked) beef, 8 ounces hard bread, 8 ounces pea soup (C. H. Knorr's pea sausage, sample herewith), 140 grains of tea (in four tablets each of 35 grains of black tea and 1 grain of saccharin).

It is selected with reference to wholesomeness for such limited time as a ration of this kind should be used.

Its nutritive value is as follows:

	Protein.	Fat.	Carbohydrates.	Fuel value (calories).
Soup	0.068	0.033	0.573	1,200
Meat	.145	.022	.071	373
Bread	.098	.136	.07	2,050
	.311	.190	.714	3,623

which is considered ample for the short time it should be necessary to use this ration.

It is considered portable as a whole.

Second. As a ration for emergent occasions it is acceptable to the taste. (The sample beef presented is considered too salty.)

Third. Its keeping qualities are excellent.

Fourth. The ration weighs 24.33 ounces.

The experience of many years has taught that there are four ways in which a soldier carries the material necessary to his efficiency, viz, on the back, in a knapsack, suspended from one shoulder or the other, as the haversack and canteen, and suspended from the belt, as the cartridge-box. Still another method much in vogue among untrained troops is across the shoulders, as the so-called blanket roll. As all of these methods will probably continue to be used by our future armies, the board endeavored to devise a form of package which might be safely carried in any of the approved ways. The results of their efforts in this direction are herewith submitted, and may be described as follows:

(1) A water-proof canvas bag, 6½ by 5½ by 2 inches, inside measurement, with shoulder strap; the components of the ration to be packed as follows: The meat in an hermetically sealed tin box, 6 by 2 by 1 inches, to open on one side by means of a strip and key, so arranged that the top may be replaced; the bread to be tied in a strong parchment-paper parcel, 6½ by 3 by 2 inches; the soup to be in two packages, each 2¾ by 2 by 1½ inches, and wrapped in parchment paper; the tea to be in a tin box, 1 by 1 by 2 inches, in tablets, as already stated; to be arranged in the canvas bag with the meat at one end, the hard bread in the middle, the soup at the other end, the tea immediately over the soup on the upper end; the whole to be carried over the shoulder, on the pack or other place as may be found most convenient to the soldier.

The outside bag to be made with a tightly sewed flap at the top, which is only to be opened when so ordered. The total weight is 2 pounds.

(2) A box of tin, shaped somewhat like an opera-glass case, except that the top and bottom are of the same dimensions, measuring 5¾ by 3 by 4½ inches, and consisting of two parts, first a cover with sides 3 inches deep, into which fits the hard bread, cut into pieces of the desired shape; outside on top is fastened a key to open the box when it is hermetically sealed; the cover fits over the lower part one-half inch; second, a lower part or box proper, which is 2 inches deep, and is divided by a partition of tin into two unequal compartments, the larger containing one-half pound of pea meal, divided into three equal packets, each wrapped in paraffin paper and tin foil, and tied; the other compartment containing one-half pound of dried chipped beef covered with paraffin paper and tin foil. The pea meal is compressed into cakes of the desired shape under a pressure of 5 tons. Upon the meal lies a small tin case just large enough to contain four tea tablets; one-half inch below the free edge of the (lower part of the) box runs a narrow bead, upon which the cover rests and is soldered. The box and contents complete weigh 2½ pounds. To absolutely insure the contents against contamination the box when packed should

be submitted to the usual process of sterilization, after which it is believed the ration will continue fit for use for an indefinite period.

Should it be concluded that this box is most conveniently carried suspended by a strap across either shoulder, two metal loops can be placed at each end, through which the strap will pass; or should it be found that it can more conveniently be carried attached to the back of the knapsack, loops can be placed on the back of the box.

And, finally, the box may be attached to the belt by a strap, or rolled in a blanket.

It is believed that the cost of the box when made in large quantities will be trivial.

The contents are not to be considered as exactly representing the ideas of the board as to quality (which is certainly not of the highest in every particular, especially as to the hard bread), but more particularly as to form, with view to its package in tin.

Samples of both packages accompany proceedings.

Fifth. Each package of component of the ration to have directions for use attached. Directions for opening exterior covering to be affixed to the outside, together with instructions, "To be opened only when so ordered."

Sixth. Number of rations to be carried on the person, one. Maximum number that may be so carried, two.

Seventh. One of these rations for each man to be kept in the possession of the company to be issued and carried whenever the field outfit is worn, to be returned to the possession of the company if not used, and to be consumed once each year, preferably on practice marches or field exercises, and a new supply obtained.

The other ration to be kept in store by the commissary of the command, and issued only on the order of the commanding officer.

There being no further business before it, the board adjourned sine die.

J. W. BARRIGER,
Colonel and Assistant Commissary-General of Subsistence.

JOHN VAN R. HOFF,
Major and Surgeon, U. S. A.

E. P. EWERS,
Major, Ninth Infantry.

FRED'K H. E. EBSTEIN,
Captain, Twenty-first Infantry.

JAMES FORNANCE,
Captain, Thirteenth Infantry.

[First indorsement.]

HEADQUARTERS DEPARTMENT OF THE EAST,
Governor's Island, N. Y., September 20, 1895.

Respectfully forwarded to the Adjutant-General, U. S. A., together with the samples, etc., examined by the board, and also with an extract of letter of August 22, 1895, from Lieut. T. J. Clay, U. S. A., retired (Lexington, Ky.), on similar subject.

NELSON A. MILES,
Major-General, United States Army.

ADJUTANT-GENERAL'S OFFICE, *September 24, 1895.*

For the Commissary-General of Subsistence, United States Army.

BOARD IN THE DEPARTMENT OF THE MISSOURI.

This board convened at Fort Sheridan, Ill., on June 3, 1895, and subsequently met regularly at that post one day in each week, several times twice a week, and on one occasion in Chicago.

It addressed circular letters to all food manufacturers who would be likely to have or to make suitable articles, in which they were requested "to bring before this board samples of such concentrated foods as may be in your [their] line, and such information pertaining thereto as you [they] may deem of service to the board."

It also addressed a circular letter to certain firms engaged in bread making, desiring to know whether they could devise an article such as the hard bread or hard-tack referred to in a paper on emergency rations by Capt. Charles E. Woodruff, assistant surgeon, or the new "war bread" (pain de guerre) adopted by the French army; and also whether

they could make a hard bread less bulky than that usually made for military purposes.

The persons and firms who corresponded with the board in answer to its circulars were:

Fairbank Canning Co.; Armour & Co.; Louis Weidner; Libby, McNeill & Libby; E. L. Prussing & Co.; The Tanty Canning Co.; Sprague, Warner & Co.; Cheltenham Food Co.; Sanitarium Health Food Co.; The Wm. Schmidt Baking Co.; The New York Biscuit Co.; The Searle & Hereth Co.; The Franco-American Food Co.; Swift & Co.; The California Desiccated Food Co.; Austin & Graves; Maconochie Brothers, London; James Gray, London; Frederick I. King, London; American Biscuit and Manufacturing Co.; Armour Packing Co.; The Central Commercial Co.; The New York Condensed Milk Co.; American Grocery Co.

The firms whose representatives appeared before the board were the following:

E. L. Prussing & Co.; The Tanty Canning Co.; Fairbank Canning Co.; The Sanitarium Health Food Co.; Armour & Co.; Armour Packing Co.

Individual members of the board made visits of inspection to many Chicago firms from whom information or samples could be expected. The persons and firms visited were the following:

Durand & Kasper Co.; Fairbank Canning Co.; Armour & Co.; Louis Weidner; E. L. Prussing & Co.; The Tanty Canning Co.; The Wm. Schmidt Baking Co.; The Searle & Hereth Co.; The New York Condensed Milk Co.; Chase & Sanborn; The Central Commercial Co.

Numerous wholesale grocery firms were also visited in search of information.

The results of the investigations of the board are grouped under two principal headings in their report, as follows:

PART I.—PRELIMINARY INVESTIGATIONS.

DEFINITIONS.

The Army has three uses for prepared foods, and these three objects have been kept in mind in the discussion of each article presented to the board:

(1) As the proper food of man consists of bread, fresh meat, fresh vegetables, and fresh fruit, with the alternation of dried or otherwise prepared bread, meat, vegetables, and fruits, in suitable amounts and proportions, it is presumed that in future wars the soldier in the field will, as a rule, be thus supplied by reason of the practicable improvements in transportation, cold storage, and the transportation of cold-storage cars, boats, etc. In other words, it is presumed that efforts will be made to feed the field army exactly as the garrisoned army, and that when such foods are restricted or are not available by reason of the exigencies of war, efforts will be made to supply prepared foods which nearest approach the fresh. Such articles are called field rations in this report. Field rations are concentrated by excluding indigestible or other waste portions, and sometimes by dehydration.

(2) It is presumed that the above can not, by reason of weight and bulk, be carried by the soldier, and that if, for several days, he is to be separated from other means of transportation, or if the transportation is to be extremely limited, as in rapid movements of detached bodies, the above field rations will have to be condensed and compressed as much as possible. Such articles will be called emergency rations. They are still further condensed than field rations by more or less complete dehydration, and perhaps artificial digestion.

(3) For the occasional emergencies happening to a whole army or large part of it, where the separation from supplies is of very short duration, caused, for instance, by short delay of wagons, which emergencies may not be foreseen, the soldier may carry a very short ration in the form of the most concentrated, most nutritious, perhaps partly digested and perhaps stimulating, articles. Such articles will be called reserve rations. In all circumstances they are reserved until other food is unattainable.

CLASSIFICATION OF ARTICLES INVESTIGATED.

A short account of each article investigated will first be given, with the sphere of its usefulness. The items will be grouped under the heads of bread; meat; meat and vegetables: meat, vegetables and cereals; vegetables; stimulants; condiments; and soups.

BREAD.

There should be some form of wheat bread in each kind of ration. With minor exceptions all civilized nations use wheat or rye as a daily food, as it is the most suitable. To substitute any other cereal would be to upset the experience gained by thousands of generations, and would not be acceptable to taste. In addition to this, oat or corn meal is liable to cause digestive troubles in those unaccustomed to such food if it is consumed many days. For a short period this objection does not hold. Neither oatmeal nor cornmeal can be made into a suitable biscuit hard enough to stand rough transportation without the addition of considerable wheat flour to make the meal adhere. A hard bread of oatmeal with 10 per cent of wheat flour and 10 per cent of lard was obtained and examined, and though of good taste it presented a rather rough appearance and was considered in every respect inferior to the ordinary hard bread. The baker assured the board that if a hard bread is to be kept a long time it must not contain fat, which will surely become rancid in time. Suet was considered worse than lard or butter. Such rancidity is due to a change of the fats into fatty acids, and not only destroys in great part the nutritive value of the fats, but the acids formed are irritants to the stomach. Durand & Kasper Co., 19-25 Market street, Chicago, presented a hard bread made of one-third oatmeal and two-thirds wheat flour. It was an excellent article, palatable and suitable, but it presented no advantages over plain wheat bread sufficient to recommend it for a special emergency food.

Nothing has resulted from the efforts made to secure specimens of the new pain de guerre which is said to have replaced hard bread in the French army.

The American Biscuit and Manufacturing Company, West Twelfth street, New York City, and Bethune, N. Y., submitted a "somatose biscuit" having the following composition: Wheat flour, 50; somatose, 5; powdered kola nut, 5; sugar, 15; butter, 7½; chocolate cocoa, 2½; eggs, 5; milk, 5; other ingredients, 5; total, 100.

Somatose is a mixture of various substances like hemi-albuminose, resulting from the partial digestion of meat. The biscuit is no doubt highly nutritious and palatable, and though its present objectionable sweetness could be remedied, the high cost of the product, 60 cents per half-pound box, places it beyond reach. In addition to this, its poor keeping qualities render it useless for rations.

For the above reasons there does not seem to be available anything better than the ordinary hard bread for emergencies in which bread baked from "sponge" can not be procured.

MEATS.

Corned beef in cans was submitted by several large packing companies and firms. It was excellent of its kind and could be made to serve as a reserve ration or as an emergency or field ration alternating with other things, but it should not be used to the exclusion of other meats for any prolonged period. Its saltiness is an objection. In addition, the process of curing damages its digestibility to some extent. As other meats are more suitable, corned beef in cans is not recommended except in the limited way above described. A sample can put up for the German army accompanies this report. It weighs 10¾ ounces, contains 7 ounces (200 grams) beef, and has the shape of the frustum of a pyramid, 2½ inches high, base 2⅜ by 3½, top 2 by 3¼.

Canned boiled beef and canned roast beef, from several Chicago companies, were tested. These articles are quite excellent for any form of ration, though they have a few minor objections. They sometimes taste of the can, and the prolonged heat to which they are subjected in the "processing" is believed to harden or coagulate the fiber sufficiently to render much of it indigestible. The meat often resembles "soup meat" which has been boiled a long time. It is stringy and much of it would undoubtedly pass through the intestine unchanged.

It contains from 35 to 65 per cent of moisture, a reduction from the raw beef. This article can be made still more dry (18 per cent) but the meat is correspondingly stringy and uninviting. In addition to this there is but little jelly in such dry specimens. Though the small amount of gelatin thus excluded does not contain much nourishment, it is a loss which, in the eyes of practical canners, is very deplorable. They do not recommend anything drier than 35 per cent.

The canners assert that their most moist specimens of canned meat are so condensed by the processing, boiling, and compression, that 10 ounces are equivalent to about 20 ounces of issue beef, or about 17 ounces of lean meat.

The condensation makes the article quite suitable for an emergency ration. Notwithstanding its minor defects it stands the test of practice, and very much meat "conserve" is used in European armies for iron, emergency, or field rations. The following-sized cans used abroad were examined: 200 grams net (3 inches diameter, 2½ inches long), 600 grams net (3 inches diameter, 6 inches long), 1 kilogram net (4½ by 3¾ inches kidney shaped and 5 inches long). The commercial can containing 1 pound net is 4¼ inches diameter and 2½ inches long.

Dried beef as usually cured with salt is not any more condensed than the canned meats above mentioned, and whether in bulk or "chipped" and packed in cans it is entirely too salty for use in reserve or emergency rations. It contains nearly 60 per cent of moisture.

Powdered dried beef.—Lean beef, either raw or boiled, which is dried and then powdered, is condensed so that 1 ounce is equivalent in nutriment to 4½ ounces raw beef, or about 5 ounces including bone. In this shape it is digestible and wholesome if eaten with bread, but it has such a disgusting odor and bad taste, both in the powdered form and when boiled, that it is entirely unsuitable. It must be mixed with other things in one of the ways mentioned below. In the Australian pemmican, or concentrated beef, prepared by Dr. J. Bancroft, and now a part of the British iron ration, the beef is mixed with fats to the extent of 30 to 40 per cent, and with extract of beef to give a better flavor. In this form 4 or 5 ounces equal 1 pound of beefsteak. Its composition is about as follows: Moisture, 2.95; fat, 32 to 42.25; albuminoids, 42.25; other nitrogen bodies, 12 to 5.20; ash, 3.22.

Though it is seasoned, and both raw and cooked is digestible and wholesome when used with bread, it is not palatable. Its odor is unpleasant and its flavor also. This preparation is said to keep indefinitely, even after free exposure to the air, and samples twenty years old are said to have been good. These statements are no doubt true as regards the meat ingredient of the pemmican, which is in such a dry condition that it can not decay, and the oldest specimens never have a putrid odor. But it is an axiom of chemistry that scarcely any animal fat will keep when exposed to the air. They all become rancid, i. e., are changed into fatty acids, which may not only be indigestible but actually irritating. The nutritive value of this pemmican then lessens with time. The sample on hand was analyzed by an able chemist. He extracted the fat, which was probably a lard, but which had a very rancid odor, resembling an old dirty lard can. He believed it was almost entirely changed into fatty acids. Lard is probably used in the manufacture of this pemmican, because it does not turn rancid as soon as suet. These facts agree perfectly with the statements of the baking company relative to the introduction of any fat into crackers or hard bread.

In its present shape, therefore, this preparation is not as good as others to be mentioned, and though it would serve as part of a reserve or emergency ration very well, it is not recommended. It is certainly not very palatable.

Spiced beef powder is better than the pure beef, but is not recommended, as there are better forms below mentioned. The mixture is in about the following proportions: Powdered beef, 120; cloves, 1; pepper, 4; salt, 20.

Spiced mixtures of beef, peptone, and extract of beef have been prepared by Professor Manns, of Armour & Co. The peptone is the result of the digestion of beef, and all of it is absorbed into the circulation. Theoretically, 1 pound of peptone should be derived from 5 pounds of lean beef, but in the laboratory or factory it takes 6 pounds of the beef. Stomach digestion is never perfect on account of inherent defects of the stomach or improper cooking, so that ordinarily we do not absorb 1 pound of peptone from less than 6 to 8 pounds of lean beef. Peptone is, then, the most highly concentrated digested beef, but is too bitter to be used except in small quantities and disguised by other things. The mixture suggested by Professor Manns is: Extract of beef, 30; peptone, 30; powdered beef, 60; cloves, 1; pepper, 4; salt, 20.

This can be eaten spread upon bread or boiled into a good soup or broth. If any vegetables are handy, it makes a good soup, or it can of course be thickened with hard bread. About 4 ounces of it are equivalent to 1 pound of lean beefsteak, including bone. If fat is added in proportion of 35 per cent, in imitation of the English ration, its taste is not altered and it has about the same nourishment as the English emergency ration.

So far as the board has learned, the combination without the fat is the best form of beef for a reserve ration. It should be not more than 4 ounces net and free from fat. It may be freely exposed to the air indefinitely.

Various other mixtures containing more beef, some with, others without, fat, were tried, but were not as palatable as the above and were decidedly objectionable.

All the other preparations containing beef powder, peptone, and extract used for soups are subsequently described under that head.

Bacon.—As the fats can not be introduced into the bread or meat portions of the ration, it must be hermetically sealed in cans. The most convenient form of fat is bacon, and this article is part of several European iron rations, and has stood the test as a field ration for a long time. Armour & Co. exhibited a can of cooked (processed) bacon which had been put up for the East Indian trade. The can was three years old and when opened the bacon was fresh, good, and sweet. The Armour Packing Co., of Kansas City, Mo., exhibited a new brand of sliced breakfast bacon in 14-ounce flat tin cans, which they think will keep at least six months, and probably much longer. The bacon is sliced, ready for cooking, packed in the cans, and the air withdrawn by vacuum pumps or some similar method. The actual process

is a trade secret, but has been witnessed by Capt. A. L. Smith, commissary of subsistence. The ordinary "processing" can not be used, as the fats would melt and the bacon present an unsightly appearance soaked in a fluid oil. The ordinary commercial cans were certainly very good and could be made suitable for the Army by making the slices thicker. The bacon is of the breakfast variety, well streaked with lean, and containing not more than 65 to 75 per cent of fat. Certain cans were subjected to temperatures of 170° and 212° F. for fifteen and five minutes, respectively, and though more oily were still very good, to all appearances. In other cans the bacon was subjected to 190° F. before canning, but appeared to be the same as above. These temperatures are sufficient to kill all trichinæ and render the bacon perfectly safe to be consumed in emergency without cooking.

In this form, whether sliced or not, the bacon is most excellent as a part of a reserve, emergency, or field ration. As it is almost devoid of moisture and the skin is removed, there is no waste nor shrinkage, and it is almost clear nutriment. It should be cut from dry, salt-cured meat (English belly), and in order to insure its being well streaked with lean should be from light-weight hogs, weighing not more than 150 pounds each. Though it costs considerably more than bacon in the piece, its real cost per ounce of nutriment is not great, considering the absence of waste and shrinkage.

MEAT AND VEGETABLES IN CANS.

There are numerous mixtures of cooked beef and vegetables resembling "stews," put up in tin cans, hermetically sealed, very palatable and nutritious, desirable for field rations, and to be recommended for that purpose not only in war but at the present time for all troops in the field, whether on practice marches or in active Indian service. The only objection to these goods for reserve or emergency rations is the fact that they contain quite a high per cent of moisture—probably 65 to 70 per cent. They can easily be made drier—say 55 per cent. Anything drier than this would lose decidedly in palatableness, and, indeed, even after great care it is difficult to get it drier than 25 per cent. The present-sized can, put up for foreign services by the Armour and Fairbank companies, under the name of "Army rations," is about 2½ pounds, approximately 1¾ pounds meat and three-fourths of a pound of vegetables. The cans are 5½ inches in diameter and 3 inches high. The combinations ordered by the French are beef and potatoes, with pease, or cabbage, or pudding, or rice. A small quantity of other vegetables, such as carrots, turnips, onions, etc., is also introduced. These rations, which have been made in Chicago for foreign armies for several years, are almost identical with Maconochie Brothers' patent ration, put up in London, in cans which are kidney-shaped, to fit on the belt. It contains three-fourths of a pound meat and one half of a pound vegetables and weighs 1¾ pounds, and is very highly spoken of in England. The "Army ration" put up in Chicago is perfectly adapted in its present shape as an emergency ration where there is some transportation, as on pack mules, but the can is too heavy for a reserve ration. It is also too large for one meal, but that left over after the evening meal can be used for a breakfast. None of these goods will keep after the can is once opened.

MEAT, VEGETABLES, AND CEREALS IN CANS.

By all odds the most palatable and delicious canned ration is that put up by The Tanty Canning Co., 3048 Lake Park avenue, Chicago, Ill. This ration was designed by Mr. Francois Tanty, a noted French chef, for the use of the Russian army, and it was used by the imperial headquarters and the ambulances in the Russo-Turkish war. It is based upon the Russian national dish—the tchy, or the French pot-au-feu.

The samples submitted to the board are based upon the "French allowance" of but 300 grams (10½ ounces) meat and are intended each can to constitute a day's ration for one man.

The tchy referred to above is the national dish of Russia and is a soup stock thickened with flour and containing cabbage and other vegetables and slices of boiled beef. It is eaten with bread or a cracked buckwheat porridge. The pot-au-feu is the national French dish, composed of soup stock with slices of bread and vegetables and beef. Very much bread is eaten with it.

"Tanty's Concentrated Military Soup" contains the essentials of a food, namely, protein, fats, and carbohydrates, but in what proportion is not known. There may be a defect in carbohydrates to be overcome by the use of hard bread. The defect is a minor one, and it is quite evident that the ration would keep a man in health for a period longer than any emergency liable to keep him from fresh supplies.

It contains considerable moisture which can be reduced somewhat, but any marked reduction will seriously damage the palatableness. It is claimed that it will keep several years, and that of 185,000 cans kept in the military stores at Lyons, France,

for two years but 20 cans were swollen or broken while handling. The ration can be eaten cold just as it is without further preparation, but when prepared by a few minutes boiling in two or three times its volume of water, it is a very palatable dish. The cans are 4¼ inches in diameter, and 2¼ inches high, weigh 1¼ pounds gross, and contain 10½ ounces boiled beef. The meat and cereals are in the proportion of seven-eighths to one-eighth. One can makes a hearty meal, and will answer as an emergency ration. With the addition of 6 ounces of hard bread it will be much better. As a field ration it is certainly excellent. It would barely suffice as a reserve ration.

VEGETABLES.

Desiccated vegetables.—The samples furnished the board were made by C. H. Knorr, of Germany (Meyer & Lange, agents, 195 Franklin street, New York). They are excellent articles, but are too bulky and contain too little nutriment for reserve rations and too difficult to prepare (forty-five minutes boiling) for reserve or emergency rations, though they are appropriate for field or garrison where fresh vegetables are not available. Equally as good as these are of course made in the United States. The California Desiccated Food Company, 103 Commercial street, San Francisco, Cal., does not recommend their vegetables for emergency purposes, though they speak very highly of their dessicated onion, 1 pound of which at 20 cents per pound is equivalent to 10 or 11 pounds of raw onions.

Desiccated potatoes were also furnished by Fred. King & Co., Belfast, Ireland.

The manner in which desiccated cooked vegetables can best be used in reserve or emergency rations is in the form of a mixture with beef powder, beef extract, and beef peptone, to be made into a soup. Pease, beans, and potatoes are the only three available. Lentils are said to be the best, but they are not yet grown in the United States in sufficient quantities. Where but one form can be chosen, beans are decidedly the best, not only being slightly more nutritious than pease but also approximating more to the nature of a national dish. In some companies pease are not eaten at all by the majority of the soldiers. Further description of the soup tablets in the market or designed by the members of the board is found below under the head of soups.

STIMULANTS.

A chemical substance which stimulates brain, nerves, and muscles, is a daily necessity and is used by every civilized nation. When there is fatigue and the food is diminished such a stimulant is indispensable, and must be an ingredient of every reserve and emergency ration. Even if every article of food value is discarded in reserve ration, the stimulant must be retained. A stimulant adds little to the weight habitually carried by the soldier and for this reason some officers consider it the ideal emergency ration, but as considerable nutriment can be added to the stimulant without adding materially to the weights, it is considered proper that though a stimulant should be an important part of the reserve ration it should not be the sole ingredient. The following stimulants have been investigated; they are arranged in the inverse order of their availability and importance, viz, extract of beef, kola nut, cocoa, tea, coffee.

Extract of beef.—When extract of beef is made into beef tea or bouillon it is a reliable stimulant and is in daily use as such. But small quantities of it are needed and it adds but little to the weight carried. It should undoubtedly enter into the reserve or emergency ration. As a beef tea it is not recommended, because it is too different from the usual food. In the form of capsules it belongs more properly in the medical stores; but the extract itself should be introduced in sufficient quantities in the meats or soups elsewhere described. In this way it could even replace the caffeine containing stimulants—cocoa, tea, and coffee—should these be lost through accident. The capsules submitted by William Shoemaker, 51 Franklin street, New York, are made of Johnson's fluid beef, which is said to contain some nourishment in addition to the stimulant. As this preparation has considerable moisture it has dissolved the gelatin of the capsules. No extract can be placed in gelatin capsules unless it is entirely freed of moisture. They usually collapse in time.

Kola nut.—The fresh kola nut, as far as known at present, is a powerful and safe stimulant, not accompanied by ill effects nor after depression. Its chief power is in allaying hunger and thirst, and in enabling much more muscular work to be performed. It is now used to a very great extent by bicycle riders and by other people who undergo tiresome exertion. The testimony is very strong to its good effects. in tropical America in some places it is used to the exclusion of coffee and for the Identical purposes for which we use coffee. Though it thus seems to fill the requirements for the stimulant of a reserve ration, its best field is for temporary issue when extraordinary exertions must be made, as by couriers carrying dispatches or in forced marches irrespective of the character of the ration. It is extremely difficult

to keep in its fresh state, and is impracticable in a reserve ration; in addition, no solid or fluid preparation now made is sufficiently guaranteed to serve our purpose. Finally, it is still in its experimental stage, and while it would be desirable to encourage extensive experiments in our Army to determine finally its exact powers and usefulness, it is not considered wise to adopt it at present.

Cocoa.—Cocoa is used in the English emergency or reserve ration, and has almost the same effect as coffee, but as it is not a national drink and is more expensive than tea or coffee it is not recommended. Should the preparations of tea and coffee now thought suitable for reserve or emergency rations subsequently prove to have bad keeping qualities or be impracticable from any other cause, then recourse may be had to cocoa in one of the many forms of cocoa paste now on the market, put up with sugar and milk like the specimen of condensed coffee subsequently mentioned. At present it seems more suitable for the medical stores of the ambulances or field hospitals.

Tea.—Tea can be compressed into tablets of any size. One that is $1\frac{1}{8}$ inches in diameter and three-eighths of an inch thick, weighing one-third of an ounce, is sufficient to make about 3 to 4 pints of strong tea. These tablets keep well, and for a reserve or emergency ration possess the advantage that they require but five minutes' boiling to get the whole strength. They are excellent as an ingredient of the reserve ration, and probably better than coffee for the field. They are not recommended for emergency rations because the American soldier, with but few exceptions, wants coffee, and plenty of it. He would be more contented with coffee than with tea, and, as in times of deprivation of his regular food there is apt to be great fatigue, depression, and, perhaps, discontent, anything which would lessen the depression should be adopted. The tea tablets are now used by the Northwestern Canadian mounted police and are entirely satisfactory, so far as known, but these people prefer tea to coffee.

Stanley's tea tablets are made in Chicago, at Armitage avenue and North Paulina street, by the Compressed Tea Tablet Company, the agent being the Central Commercial Company, 194 Randolph street. The tablets are about one-half of an inch in diameter, 53 to the ounce, two being required for a one-half pint cup of strong tea. Twelve to 16 of them would be necessary for the soldier's 3 or 4 pints of tea.

Coffee.—Coffee in liberal amounts should be a part of the emergency ration. Its valuable property of stimulating the mind, nerves, and muscles is just what is needed in these times of great fatigue and deficient food. For this reason very much attention has been paid to coffee in an endeavor to get it into a form ready for use in emergency. The berry will have to be roasted, for there will be no chance to do this in emergency cases, and roasted coffee, whether ground or not, will keep but a short period unless it is hermetically sealed. This deterioration results from the evaporation of the aromatic substances. Various firms have compressed the ground coffee into cubes for military purposes, but the product must be used in two or three weeks. This information is derived from Fahlberg, List & Co., Salbke-Westerhusen a. E., Germany, makers of saccharin, who communicated with the makers of the tablets in question. It also transpires that neither they nor any other maker of coffee tablets kept the articles in stock on account of this deterioration.

It is said that such cubes are still used in the Germany army, but in civil life compressed coffee, as far as learned, has been a failure. There is said to be one form put up by the military equipment stores, 61 Pall Mall, London, by what is known as the Martin-de Rosier process, which will keep indefinitely, being hermetically sealed in small packets, each large enough to make one large cup of coffee. Efforts to obtain samples to test have failed. If the claims for this article are correct, it is exactly what is needed for an individual reserve or emergency ration. It could be duplicated in this country if a specimen were examined by any maker of such articles.

At the request of the board, various experiments have been made in compressed coffee by the Searle & Hereth Company, manufacturing pharmacists, corner North Wells and Illinois streets, Chicago. They have roasted and ground the coffee, compressed it into tablets, which were then sugar coated, hermetically sealing the contents. As sugar-coated pills retain their volatile ingredients almost indefinitely, it is believed that such coffee tablets will preserve their virtues a long time.

A difficulty was encountered in making the tablets adhere sufficiently to stand the process of sugar coating. After incorporating sugar, tragacanth, and acacia, respectively, the product was so friable as to break down. Better results were obtained by using a small quantity of glucose and sugar. The difficulty was due in part to the machinery which is not constructed for such heavy work, and would not be encountered if a demand for the tablets would warrant the construction of more powerful machines. The tablets are also very small, as the machines are designed to make small medicinal tablets. It takes eight to make a pint of coffee. A tablet containing as much as these eight is entirely feasible. It will of course take time to determine whether the sugar coating successfully retains the aroma of the coffee, and the

tablets are forwarded to be kept on hand a sufficient time to determine this point. It has been attempted to cover the tablets with gelatin or isinglass instead of sugar, but a preliminary experiment in this direction shows that the isinglass cracks upon drying, and allows the aroma to escape, and the result is not as good as sugar coating. The sugar coating also gives enough sweetening for practical purposes. The coffee ration is so small that the weight and bulk are immaterial. It makes little difference as to bulk whether the coffee is compressed or not. With ordinary machines the coffee can be compressed into two-thirds of its original bulk. With more powerful machines, perhaps, a saving of one-half may be reached, but this is so trifling a saving that it can be neglected. Hence if sugar-coated coffee tablets are unsuccessful the coffee may be placed in hermetically sealed thin tin cans similar to the ordinary condensed-milk can but of smaller dimensions.

It has been stated by coffee experts that roasted coffee, especially when ground, will not keep in any method of preparation known. Even hermetically sealing is not a perfect means of preserving it, and firms dealing in this article have stated that in the course of a few months the coffee deteriorates or "sours," the ground coffee sooner than the unground. They state that the total exclusion of air being impossible without ruining the coffee in the processing, the sealing of the package excluding more air from entering only delays the deterioration a few months. It could not be elicited how soon the deterioration is noticeable, and the time is not long enough to determine this point by experiment. It may subsequently transpire that the deterioration in twelve months is not enough to cause the product to be distasteful, and, in that case, sealed ground coffee, compressed or not, may be suitable. The samples forwarded with the report may subsequently prove acceptable.

Extracts of coffee.—The trifling saving of weight by using extract of coffee is of little consequence. The article possesses a decided advantage, in that it can be used with hot or cold water, and is therefore available in the rare occasions when fires can not be made. It does not require boiling and "settling."

Fluid coffee extracts now on the market are sold in screw-top bottles, in which they will keep good a long time. They are not hermetically sealed. The glass bottle is not advisable.

The board have been unable to obtain any sample of *solid extract of coffee.* The only one heard of was one examined several years ago by one of the members of the board. It made a very bad-tasted coffee, and it is presumed from the absence of such solid extracts from the market that their preparation involves the destruction of the aromatic and other substances, and that such articles are failures.

Condensed coffee.—The only successful coffee preparation examined was the condensed coffee, with sugar and condensed milk, put up by "The New York Condensed Milk Co." (makers of the Gail Borden Eagle Brand of condensed milk). All that is needed to prepare a cup of coffee is to add a dessertspoonful to hot or cold water. There is no waste and there is in addition a small amount of nutriment. It is warranted to keep in any climate. As this article is commercially successful it is immediately available. The trade cans are 1 pound each and are too large, being 2¾ inches high and 2½ inches in diameter. An individual can 3 inches in diameter and three-fourths of an inch thick, containing enough (3 ounces) to make 1½ quarts coffee, would be suitable for a reserve or emergency ration. The sample tested was very good, but had an objectionable condensed-milk taste.

SALT, PEPPER, SUGAR, AND SACCHARIN.

Salt and pepper should be included in the meat or soup portion of the ration to avoid a multiplicity of packages.

Sugar is useful merely to sweeten the tea or coffee. The small amount used contain so little nutriment that it can be discarded, but the extra bulk and weight saved on the other hand are too little to be of much advantage. Though sugar has a tendency to produce flatulence, the small amount in the ration is ordinarily perfectly harmless. Yet the use of condensed foods is reported to be followed by flatulence and diarrhea, and everything which would even remotely favor these conditions should be avoided if possible. Hence the sugar is preferably replaced by saccharin, a few grains of which will give the necessary sweetness and also act as an antiseptic and combat diarrhea. Experiments prove that saccharin administered to men and lower animals for many years, to the exclusion of all sugar, does not produce any deleterious effects.

If ground, roasted coffee, hermetically sealed, is found successful, the package should contain a sufficient number of tablets of saccharin, which can be easily removed by those who do not use sweetening. The tea tablet also should contain saccharin tablets.

SOUPS.

Weidner's soup tablets.—The tablets formerly made by Mr. Louis Weidner (1017 Seminary avenue, Chicago, Ill.) are the same as those made by Knorr, of Germany,

and furnished to the German army, Mr. Weidner having been employed in Knorr's factory previous to coming to this country. The only forms useful for military purposes are lentil, bean, and pea soups. Specimens of the potato soup brought to this post became putrid. On the other hand, a sample of bean soup at least two and one-half years old was found to be excellent. They are well seasoned with herbs, pepper, and salt, are palatable and well liked. They are made stimulating by large quantities of beef extract. They are 2¾ inches square, one-half or three-fourths inch thick, and weigh nearly 4 ounces, but the machinery is capable of making tablets larger or smaller. Mr. Weidner still has the machinery and can make any desired tablet on thirty or sixty days' notice. He states that he can easily incorporate beef fiber powdered in the tablet if required. Though the tablets are entirely suitable for emergency or field rations, better forms for reserve rations are mentioned below.

Edward's desiccated soups, and Lazenby's soups, though excellent articles for an officer's mess, are not suitable for rations, being either difficult to prepare or lacking in nutriment. In addition they are not made in this country, and are therefore passed over.

Soup tablets of the California Desiccated Food Company (103 Commercial street, San Francisco, Cal.).—As far as learned these tablets are the only ones now made in America. They contain beef fiber, beef extract, and a vegetable—bean or pea being the only suitable ones tested. They are seasoned and very palatable. They are reported to have been used in the Japanese army in the late war with China. The tablets are rather small for emergency rations, weighing less than 3 ounces. Being commercial articles now on the market, they have been earnestly considered as a part of the proposed emergency ration. The bean soup is recommended, though the makers recommend the pea soup for military purposes.

The tablets intended for commercial use are reported to have the following composition: Water, 8.05; protein, 24.79; fat, 12.22; carbohydrates, 29.55; mineral salts, 3.21.

The company presented another kind containing more beef, and tasting more of the beef; its ingredients are unknown, but it is said to have the following composition on analysis: Protein, 47.22; fat, 11.11; carbohydrates, 20.7; salts, 11.11. This would be suitable for a reserve ration.

Bovril cartridges.—The cartridges made by the London Bovril Company prove on testing to be palatable and suitable for reserve or emergency rations. They are said to be composed of from one-third to one-half beef, and the remainder of pease or potatoes. While the former makes a soup, the latter makes a palatable hash when mixed with double the quantity of hot water. Each double ration weighs 8 ounces. It will not be made in this country by the Bovril Company, but if it is needed it can be duplicated by Mr. William Shoemaker, of the Cheltenham Food Company, 51 Franklin street, New York, who has handled Bovril goods in America. They are not recommended, as other forms made in Ameriea are quite as desirable.

Experiments in soup mixtures.—Numerous mixtures have been suggested, then prepared and tested. When powdered beef was mixed with beef extract and powdered cooked pease, beans, or potatoes, we obtained results almost the same as the soup tablets already on the market, and nothing more need be said on this point. The only improvement we could suggest was the addition of peptone powder to make the mixture more highly concentrated. We have used as a basis the mixture suggested by Professor Manns, of Armour & Co., as above described; that is, powdered beef, 150; extract of beef, 50; peptone, 50. This we will call beef peptone-extract mixture or simply beef mixture. When desiccated potatoes were used the results were excellent, but as the experience with Weidner's soup tablets shows the potato form to be the easiest to spoil and the most difficult to prepare, this vegetable has been discarded. Mr. Weidner, after years of practical experience in preparing the potato into soup tablets, announces it the most difficult, and it is perhaps impracticable.

The following are the formulæ tested:

(1) Beef mixture, 120 parts; bean meal, 70 parts; pepper, 3 parts; salt, 18 parts.

(2) Same as above with addition of fat, 31 parts.

The bean meal used was the partly cooked article sold by the New York Health Food Company, 61 Fifth avenue (Chicago office 1601 Wabash avenue).

These mixtures on testing proved to be excellent; the addition of fat did not seem to make any marked change in the resulting soup.

In place of beans there was also tried a preparation called *granola*, consisting of partly cooked wheat and oats, and sold by the Sanitarium Health Food Company, of Battle Creek, Mich. It made a good soup when mixed with the above beef mixture. It was tried with beans in one case and with desiccated potatoes in another. In each case it was palatable.

In all the experiments with *beef powder* as a basis, unless beef extract was used and the product was highly seasoned, there was a glue-like odor and a disagreeable taste of the beef. In all cases of the beef mixture with vegetables, the less the percentage of vegetables the more did the resulting soup lose the odor and taste of a

vegetable soup and resemble in taste and odor the ordinary beef tea. Hence the addition of beans in large or small quantities may serve two distinct purposes. When a large percentage of beans is used we have a bean soup, suitable for an emergency ration into which other forms of meat can be introduced, but when a small percentage is used to help disguise the odor and taste of the beef and peptone it makes a preparation of high meat value useful in a reserve ration where other forms of meat are not available.

GENERAL CONCLUSIONS.

(1) As previously stated, there are two kinds of emergencies in the field in which the soldier is separated from food supplies and must subsist on food he carries on his person: (*a*) Unforeseen emergencies, lasting usually not more than twenty-four hours, such as delay of wagons; (*b*) foreseen emergencies, caused by direction of the commanding officer, such as the detachment of troops.

(2) These two emergencies require distinct forms of prepared foods.

(3) The unforeseen emergency lasts but a few hours, and the ration carried for this purpose need be but small in bulk and weight. It should allay hunger, should sustain and nourish, and, as the occasions are apt to be ones of great fatigue, it should also stimulate. As the times for carrying it may extend over considerable periods, its weight should be limited to the least amount which will fulfill the above conditions.

The ration which will fulfill these conditions is called a reserve ration, and is described below.

(4) Foreseen emergencies, made by order of the commanding officer, may last for the extreme limit of time for which the soldier can carry food. The ration in this case must not only serve the purposes of the reserve ration, but must contain at least the minimum amount of nutriment which will suffice for the period. As the commanding officer may desire this period to be as long as possible, the ration must contain as much nutriment as the weight will permit.

The ration which will fulfill these conditions is called an emergency ration, and is described below.

HOT PREPARATIONS, BOILED WATER, ETC.

There are several reasons why the food of a man should, as far as possible, be heated just before it is eaten and consumed while still hot:

(1) The food and water, if raised to the boiling point of water for a few minutes, are sterilized as far as disease germs are concerned.

(2) Cold food is apt to produce derangements of the stomach and interference with digestion, which do not result if the food is slightly warmer than the stomach.

(3) Hot foods are decidedly comforting, conducing to rest and sleep.

(4) Hot foods are actually stimulating, and in conditions of exhaustion are quite necessary.

(5) There is an actual economy which, though so slight as to be neglected ordinarily, is sufficient to be of value when foods are restricted in amount. Liquids can be taken at as high a temperature as 155° F., and as they are reduced to the body heat of about 100° they give up considerable heat which serves the same purpose as that derived from oxidation of the foods. On the other hand cold foods must be warmed up in the stomach, using heat generated by the combustion of other foods. It can be mathematically stated as follows: Supposing that 2 pounds of solid food and 2 quarts of water are consumed at 40° or at 155° The saving in the latter case, considering the whole mixture of 6 pounds to have the specific heat of water, will be 172 calories of heat (1 calorie being the heat necessary to raise 1 pound of water 4° F.). This is equivalent to about 1¾ ounces of ordinary hard bread.

All the above reasons apply with greatly increased force in the case of emergency or reserve rations. It is necessary to give the soldier foods which can be taken hot and which will permit of his consuming the maximum amount of boiled or sterilized water, as the danger of infection from drinking unboiled water in a strange country is very great. The more fluids taken with the soups and coffee the less temptation is there of drinking water not boiled. In the emergency of fatigue and restricted food, the comfort and stimulation of hot food can not be ignored, nor can the small economy above mentioned. For these reasons also the beverages, tea, coffee, etc., can be considered indispensable. It should then be considered an axiom that in reserve or emergency rations there should be some cooked dry preparation which can be quickly made into a hot soup, stew, or other hot fluid dish whenever it is practicable, and then when a fire is not practicable such an article can be eaten cold, either just as it is or mixed with water.

Finally, the increased bulk given to the foods distends the stomach and thus aids digestion, while at the same time it increases the feeling of comfort and satisfaction. The same foods eaten in the concentrated form are not nearly as satisfying, comforting, nor digestible.

PART II.—RECOMMENDATIONS.

THE RESERVE RATION.

The board recommends for the reserve ration the following articles:

Components.	Ounces.
Tea tablet, 1⅛ inches diameter by ⅜ inch thick, containing six ½-grain tablets of saccharin	⅓
Hard bread	8
Soup mixture	5
Total	13⅓

The *tea* tablet is sufficient to make 2 quarts of strong tea. It is recommended in place of coffee by reason of its small size and convenience of packing. It fits into the depression in the top of the can as per accompanying sample.

The *hard bread* is 3 inches in diameter and about 16 to the pound. It is essential for this ration as it necessitates mastication and thus avoids the evils of a meal consisting solely of fluids.

The *soup* mixture consists of the following ingredients:

Components.	Per cent.	Ounces.
Beef extract	15	¾
Peptone	15	¾
Beef powder	30	1½
Cooked bean meal (free of all refuse)	30	1½
Pepper	1¼	6/80
Salt	8¾	2 6/80
Total	100	5

This is essentially a highly condensed lean beef, the partly cooked bean meal being added to make the soup more palatable and less like beef tea. Fat is omitted, as it will become rancid in the long time which may elapse before the article is used.

Nutritive value of ration.—The following table is assumed to be very nearly correct. From it are calculated the nutritive values.

Percentage composition.

	Water.	Protein.	Fat.	Carbohydrates.	Salts.	Calories, per pound.
Hard bread	4	13	2	80½	½	1,825
Cooked beans	5	24	3	66	2	1,800
Lean beef	76	20	3	.....	1	500

Food value.

	Ounces.	Grams.				Calories.
		Protein.	Fat.	Carbohydrates.	Salts.	
Hard bread	8	29.4	4.5	182.7	1.0	912
Lean beef	6.8	38.6	5.8	.....	2.0	212
Peptone	.75	21.0	.....	.....	.....	86
Beans	1.50	10.3	1.3	28.5	.9	171
Salt	.33	.....	.....	.....	11.5	.....
Total	.....	99.3	11.6	211.2	15.4	1,381

The nutritive value of the beef powder is calculated as follows: One part of this powder is prepared from 4½ parts of lean beef, and the 43 grams are therefore equivalent to 193½ grams (6.8 ounces) lean beef. The peptone is taken as pure protein, 21 grams (0.75 ounce). One part represents the protein of about 5 parts of

lean beef, but in the factory it takes 6 pounds of beef to make 1 pound of peptone, owing perhaps to difficulty of digesting all the beef fiber.

The peptone is entirely absorbed in the stomach and intestine, but all the lean beef eaten is not digested and absorbed ordinarily, owing to improper cooking and defective digestion. The amount utilized varies from 92 per cent in supposedly perfect digestion down to 75 per cent, or even less. The 21 grams peptone therefore give as much nutriment as would ordinarily be obtained from six times its weight of beef, or 126 grams.

In the same way the beef powder is more digestible than beef usually eaten, the 193½ grams probably being equivalent to 215 grams, so that the beef of the soup mixture yields as much nourishment as can be absorbed usually from 12 ounces of lean beef, or 14 ounces of lean beef with bone. Including the beans it is as valuable as food as about 1 pound of ordinary lean beefsteak. It could be made more valuable as food by the introduction of fat, but this would detract from its keeping qualities. It contains the protein of about 14½ ounces beef as issued, or as much as is usually digested from about 16 or 17 ounces of issue beef. Making these allowances, the reserve ration is as valuable as ordinary food containing the following:

Protein.	Fat.	Carbohydrates.	Calories.
114	11.6	211.2	1,440

Roughly speaking, this is about equal to 1 pound lean beef and three-fourths of a pound fresh bread.

In addition the soup contains the stimulating extract of about 2½ pounds of meat.

WEIGHT OF THE RATION—KIND, SIZE, AND FORM OF PACKAGE.

As the ration may be carried a long time before it is used, it should be inclosed in tin. The package recommended is 3½ inches in diameter and 6¼ inches long, weighing 6¼ ounces. The hard bread occupies 5 inches of the length. It is to be carried in a haversack or food bag, or it may be rolled in the blanket, the cylindrical form of the package being recommended for convenience of packing. The net weight is 13½ ounces, the gross weight 19⅜ ounces. It is believed that such a weight being on the belt would quickly become intolerable.

The weights have been reduced to the lowest practicable quantity to relieve the soldier of any unnecessary burden, and it is believed that, though this adds 1¼ pounds to the present equipment, it could be compensated by substituting an aluminum alloy for other metals where possible and by other possible reductions in weights of equipments.

DIRECTIONS FOR USE BY THE SOLDIER.

Place one-third of the *tea tablet* in a cup containing 1 pint of boiling water. Let it stand ten minutes. One or two saccharin tablets will sweeten it.

Mix the *soup powder* with very little water into a thick, smooth paste, then add water, hot or cold, in proportion to the quantity of the soup powder used, and boil from fifteen to twenty minutes. Hard bread should be broken up in it afterwards. The contents of the box will make from 3 to 4 pints of soup. When there are no cooking facilities the preparation may be eaten as it is, mixed with a little water into a paste and spread on the bread. As the powder is highly concentrated, not more than one-half of it should be used at one meal.

NUMBER OF RATIONS TO BE CARRIED.

One ration to be habitually carried by each man as a part of his outfit during an active campaign. The maximum number which may be carried is two, but more than one is not considered advisable except in extreme cases, as such concentrated food soon produces digestive disorders.

EMERGENCY RATIONS.

The board recommends for the emergency ration the following articles:

Components.	Ounces.
Hard bread	12
Bacon (canned)	8
Soup mixture	4
Compressed roasted and ground coffee, with nine ¼-grain saccharin tablets	1½
Total	25½

The *hard bread* should be thoroughly dried and of a size which will conform to the bacon can, to make a package convenient for carriage. The size desired is 3 by 5 inches, and 12 ounces of this will make a package 3 by 5 by 4¼ inches.

The *bacon* should be in one piece, dry salt cure (English belly), from hogs weighing not more than 150 pounds each, properly processed at boiling temperature.

The board is favorably impressed with the sliced breakfast bacon put up in hermetically sealed cans and subjected to a temperature of 212° F., as described in Part I of this report, and if it proves to have proper keeping qualities, would recommend it in preference to the bacon in one piece.

As a substitute for bacon, the board is favorably impressed with the *canned roast or boiled beef*, such as is now put up by Chicago packers, taking the same amount (8 ounces) as of the bacon.

Coffee.—The board recommends the sealed roasted and ground coffee, but is favorably impressed with sugar-coated tablets, three of which containing 1½ ounces coffee can be packed in a slightly larger space than the above. If after proper lapse of time both of the above prove not to have good keeping qualities, the board recommends one-third ounce tea in tablets with saccharin. Condensed coffee with sugar and milk is not recommended, as its taste of condensed milk is objectionable to many persons.

The *soup mixture* has approximately the following ingredients:

Components.	Per cent.	Ounces.
Peptone (or beef powder)	12	½
Beef extract	12	½
Cooked beans (freed of hulls)	67	2⅔
Pepper	1	1/25
Salt	8	⅓
Total	100	4

This is a stimulating, seasoned bean soup. It will make 2 to 3 pints of soup, which is preferable boiled fifteen to twenty minutes. Fat is omitted to enhance its keeping qualities. The peptone or beef powder, though desirable, may be omitted, as there is a meat component of the ration. In that case the soup would be essentially the same as Weidner's, which is well seasoned with herbs in addition. Weidner's tablets of 4-ounce size may be adopted in lieu of the above. The tablets of the California Desiccated Food Company are also suitable, either pea or bean, but preferably the latter. The commercial variety will do just as well as his special military soup with more beef. The tablet weighs about 3 ounces.

Nutritive value of the ration with bacon.—The composition of the bacon is assumed as follows:

	Water.	Protein.	Fat.	Salts.
Bacon	10	15	72	3

An actual analysis shows it to be one-fourth meat and three-fourths fat, with very little moisture.

Components.	Ounces.	Grams.			Calories.
		Protein.	Fat.	Carbohydrates.	
Hard bread	12	44.3	6.8	274	1,369
Bacon	8	34	163.5	.....	1,659
Peptone	½	14.1	.....	.....	58
Beans	2⅔	15.8	2	44	264
Total	.....	108.3	172.3	318	3,350

The substitution of Weidner's or the California soup tablets does not alter the above to any material extent and is not calculated.

Nutritive value of ration with canned beef.—The percentage composition of the beef is assumed as follows:

	Water.	Protein.	Fat.	Carbohydrates.	Salts.
Canned beef	63	30	4	.....	3

Components.	Ounces.	Grams.			Calories.
		Protein.	Fat.	Carbohydrates.	
Hard bread	12	44.3	6.8	274	1,369
Beef	8	68	9	.....	363
Peptone	½	14.1	.....	.....	58
Beans	2⅔	15.8	2	44	264
Total	.....	142.2	17.8	318	2,054

The ration with the beef will serve every purpose of the economy for a limited time. Its defect is the absence of fats. The combination with bacon is considered the best, as it has a much larger percentage of fats—the most economical fuel—and, in addition, it contains a fair amount of protein, not enough for prolonged use, but suitable for a short emergency. If more heat value were needed it could be obtained in more bacon, but it is believed that the amount recommended is large enough except in very cold weather, when extra bacon can be carried without any special wrappings.

WEIGHT OF THE RATION—KIND, SIZE, AND FORM OF PACKAGE.

The *bacon* is in a tin can 3 by 5 by 1¼ inches, weighing 4¾ ounces, opened by key and strap.

The *coffee* is hermetically sealed in a tin box 3 by 2¼ by ½ inches, weighing three-fourths of an ounce.

The *soup* is compressed into a tablet 3 inches square and 1½ inches thick, and is wrapped in strong paper.

The coffee can and soup tablet are placed on top of the bacon can.

The *hard bread* is placed over the soup tablet and coffee can, and the whole secured with strong paper.

The net weight is 25½ ounces, the gross weight 32¼ ounces, the dimensions being 3 by 5 by 6 inches.

If the separate packages of the above ration were made larger, so as to hold enough for two days, there would be a saving of cost—a saving of 3½ ounces weight of tin, and a saving of about 10 cubic inches of space.

Such packages would necessitate the men messing in squads and would hamper the issue of rations for an odd number of days. Such inconveniences, it is thought, are so serious that the extra 1½ ounces per ration in the single form can well be tolerated for the advantage of having each man totally independent of others as far as his food is concerned, and for the advantage of issuing the emergency ration for any required number of days.

DIRECTIONS FOR USE BY THE SOLDIER.

The soup tablet is best made into a hot soup. Rub it up in a little water to crush lumps, add 2 to 3 pints of water, and boil twenty minutes. Chopped bacon and hard bread may be added.

One-third of the ground *coffee* will make 1 pint of liquid coffee. One saccharin tablet is equal to 1 teaspoonful of sugar.

NUMBER OF RATIONS TO BE CARRIED.

As the emergency ration is to be issued only on emergent occasions, the number to be carried depends upon the circumstances of the emergency and the plans of the commanding officer—ordinarily but one or two, the maximum number being four, which, with the reserve ration also carried, will enable the men to subsist for five days.

METHOD OF CARRYING.

The emergency ration can not be carried conveniently in any way except in a haversack or ration bag. The present haversack, measuring 10 by 8 by 2¾ inches, can carry, by crowding, two of the emergency rations and one reserve ration.

The clothing bag issued to recruits is much lighter and a more convenient shape for packing rations. It measures 10 by 11 by 4½ inches and will hold four emergency rations, making a bulk 3½ by 10 by 12 inches.

For the conditions named the above rations are wholesome, palatable, of proper nutritive value, are portable, and possess good keeping qualities.

There being no further business before it, the board adjourned sine die.

J. H. GILMAN,
Lieutenant-Colonel, Assistant Commissary-General of Subsistence, President.
W. T. HARTZ,
Captain, Fifteenth Infantry, Member.
H. R. BRINKERHOFF,
Captain, Fifteenth Infantry, Member.
S. R. STAFFORD,
Captain, Fifteenth Infantry, Member.
CHAS. E. WOODRUFF,
Captain and Assistant Surgeon, Recorder

SUPPLEMENT.

Subsequent to the adjournment of the board it was discovered that the report failed to notice two preparations which had been tested—*canned brawn* and Kopf's pea soup (English Erbswurst). The *brawn*, consisting of pork and beef, was too different from the ordinary food and was not recommended. The Kopf's soup was not considered as good as Weidner's or the California brand, and was not favorably looked upon, as it is not made in the United States.

CHAS. E. WOODRUFF,
Captain and Assistant Surgeon, U. S. A., Recorder.

[First indorsement.]

HEADQUARTERS DEPARTMENT OF THE MISSOURI,
Chicago, Ill., September 27, 1895.

Respectfully forwarded to the Adjutant-General, United States Army. The report seems to be complete, and the recommendations are worthy of consideration.

W. MERRITT,
Major-General, Commanding.

ADJUTANT-GENERAL'S OFFICE,
September 30, 1895.

For the Commissary-General of Subsistence, United States Army.

THE BOARD IN THE DEPARTMENT OF DAKOTA.

This board convened at Fort Snelling, Minn., on May 20, 1895, and held meetings on June 10 and August 27. The reasons for the lapses of time between meetings are given in the proceedings, which are as follows:

At the meeting of May 20, 1895—

the board considered the suggestions of the Commissary-General of Subsistence, United States Army, in his letter of April 17, 1895. The recorder was directed to communicate with the commanding officers of the various posts in the Department of Dakota for the purpose of eliciting correspondence on this subject from any officers in this department that had given the subject any special attention. He was also directed to communicate with the Commissary-General of Subsistence, United States Army, Surgeon Smart and Assistant Surgeon Woodruff, United States Army, with a view to procuring important data for the future consideration of the board.

The board then adjourned to meet at Fort Snelling, Minn., at 11 o'clock, a. m. June 10, 1895.

The board met at Fort Snelling, Minn., June 10, 1895, pursuant to adjournment, all the members being present.

Replies had been received from all parties to whom letters had been addressed with the exception of the commanding officer, Fort Meade, S. Dak., and these replies were read and discussed at length. For the purpose of affording the individual members of the board time for a further consideration of this data, the board adjourned to meet June 20, 1895, it being agreed that at that meeting each member should state in writing what in his opinion should be the component parts of the ration.

The board met at Fort Snelling, Minn., August 27, 1895, at the call of the president, all the members being present.

No meeting had been held since June 10 owing to the departure on June 20 of a portion of the Fort Snelling garrison for duty in the field with the National Guard of Minnesota and of Wisconsin, thus separating the various members of the board and rendering experiments or consultation impossible.

At this meeting each member, as agreed upon at the last meeting, submitted a list of the articles that in his opinion should constitute the emergency ration. The resultant ration adopted by the board as a basis for further consideration is as follows:

Meat	Preserved cooked beef, to weigh when ready for the can 12 ounces, 4 ounces of which shall be fat.
Bread	16 ounces of hard bread. The size and shape of the biscuit to be determined.
Soup	A compressed bean soup tablet, sufficient to make 1 pint of good soup.
Coffee	1½ ounces of coffee. Sweetening material and form of package to be determined.
Pepper and salt	Amount to depend upon the amount in other parts of the ration.

It was further agreed that the several parts of the ration should be assembled in such fashion as to constitute a single package, its form to be determined later.

The recorder was directed to procure sample packages of these various articles if any could be found that had been put up with special reference to the requirements of emergency service, also samples of other articles that had been considered by the board but had not been adopted. He was further directed to procure data concerning the suitability of various materials for cases in which to pack the ration and to have experimental cases fabricated.

The board then adjourned to meet at the call of the president.

The board met at Fort Snelling, Minn., September 20, 1895, at the call of the president. Present: Lieut. Col. Edward Moale, Third Infantry; Maj. John J. Clague, commissary of subsistence; Capt. William C. Borden, assistant surgeon. Absent: Capt. Joseph Hale, Third Infantry, on leave of absence; First Lieut. John H. Beacom, Third Infantry, on general court-martial duty.

The board inspected the samples of foods and packages procured since the last meeting, and read over the correspondence relating to the same; but owing to the absence of two members no definite action was taken. It being very desirable to have all the members present before deciding on several points under consideration, and at the same time to close the proceedings as soon as possible, it was decided that the president should call a meeting as soon as all the members were available.

The board met at Fort Snelling, Minn., October 4, 1895, at the call of the president, all the members being present.

The board, after settling some undetermined questions relating to the component parts of the ration, proceeded to consider the various ways that had been proposed for packing it. The conclusions reached are as follows:

Meat, 12 ounces	Cooked preserved beef, to weigh after processing 12 ounces, 4 of which shall be fat.
Hard bread, 16 ounces	16 ounces of hard bread of the quality of that now issued to troops, made into 6 biscuits of the shape indicated in sample package.
Soup	One tablet of bean soup, sufficient to make 1 pint of good soup.
Coffee, 1½ ounces	1½ ounces, roasted and ground, and sweetened with saccharin.
Pepper and salt	Quantity to depend upon the amount already in the component parts of the ration.

The package to be made of aluminum; to consist of a can for the meat and another to contain the bread, soup, coffee, and the pepper and salt; the two to be rigidly united so as to form a single package; both to be hermetically sealed and to be opened along the line indicated on the model by means of an ordinary key; to have attachments for fastening it to the belt when necessary, as indicated on the model.

Our reasons for selecting the above articles as component parts of an emergency ration are, briefly, as follows:

No radical departure should be made from the accustomed food of the soldier, either in quantity or character, lest the system become deranged by the sudden change. Some reduction must, however, be made in the weight and bulk of the food ordinarily consumed, in order that the soldier may not be overburdened when compelled to carry a few days' rations in addition to his regular equipment. The keeping qualities required of an emergency ration place further limitation on its composition.

Guided by these considerations the board concluded that a vegetable element is not necessary. The nutrient value of the ordinary vegetables, considering weight and bulk, is low, and for the few days that troops will be required to depend entirely on the emergency ration there will be no need of vegetable foods solely on account of their antiscorbutic properties.

The kola nut, and the preparations made from it, and stimulants of a like nature may have their place in the medicine chest, but it is not deemed advisable to incorporate them in the ration.

Having eliminated what we denominated the non-essentials, we proceeded to select what in our opinion are the essentials.

The American people are heavy meat eaters, and it was decided to allow a liberal meat portion. Beef was selected as being the meat most generally used, and to preserve uniformity and to meet the conditions usually to be encountered in emergencies it was decided that one-third of this should be fat. This, according to the best authorities, represents about 24 ounces of green meat, 50 per cent being lost in cooking and processing.

Bread in some form is another essential, and the board selected a hard bread made of wheat flour. The various products made from other cereals may appear under chemical analysis to possess equally as good or even better qualities as a food, but the board knows of no method of preparation that would render them acceptable to the American soldier. Sixteen ounces is a liberal allowance, and it certainly adds greatly to the bulk of the ration, but the common notion that almost unlimited condensation of the materials for food is possible is erroneous, and it is doubtful whether a greater reduction in the bulk of the ration would be advisable even if possible. To reduce the space required for the hard bread we would have the ration consist of but six biscuits, and we are informed on good authority that these can be made to possess the same consistency and the same keeping qualities as those now in use.

The soup tablets that have been on the markets for several years give general satisfaction, and the board is of the opinion that a small tablet of bean soup (that being the one most generally used and possessing great nutritive value) would be a valuable component of the ration.

The common beverage of the American people is coffee. While not so nutritious as chocolate, nor as stimulating perhaps as tea, it is of universal use in the Army, and is found to be very satisfying. The board therefore includes this in the ration. As a part of an emergency ration it should be in such shape as to require little time or trouble for its preparation; therefore it must be roasted and ground; and to make it the more palatable it should be sweetened. Saccharin was chosen instead of sugar because of the consequent saving in weight and bulk. In order to prevent coffee from deteriorating when once roasted and ground it is necessary to hermetically seal it in metal cases. Various other means have been tried, but none so far as known have been successful. It is the intention of the board to have it thus cased in aluminum and packed as shown in the package submitted herewith.

Salt and pepper (the ordinary condiments) may be added to the meat, bread, and soup portions of the ration by the manufacturer, but not in such quantities as to suit the various tastes; and simply to gratify these various tastes, the board recommends that additional salt and pepper be put in a suitable receptacle. This increases the bulk and weight of the ration slightly and adds nothing to its nutrient value, but the increased palatability justifies the addition.

It is believed that this ration contains all the essential food elements in sufficient quantity to enable a man in good physical condition to perform arduous labor for several consecutive days, and without other nourishment and without drawing too heavily on his reserve energies. An emergency ration is one that is to be depended upon occasionally, and then only for a short time. It is therefore not necessary that such a ration should supply all food stuffs required to sustain life for an indefinite period of time, but it should contain sufficient nitrogenous and carbon compounds to supply force and tissue waste in such quantities as to enable the system to continue in efficient working order for a limited period. It is believed that this ration fulfills these conditions. It consists, moreover, of articles of ordinary consumption, and is on the whole very palatable. Its keeping qualities are such that it need not be renewed, it is believed, oftener than once a year, and this can be done without much loss, as it can be issued to troops, its component parts taking the place of the corresponding components of the regulation ration.

The package submitted with this report is intended as an approximate expression

of our idea on this subject. It is not made of the material recommended, and we can not determine the exact dimensions nor the exact weight. We recommend that it be made of aluminum, because of the lightness of that metal. Owing to the higher price of the material and the difficulties of manipulation the cost will be considerably more than if tin were used, but its advantages offset this increase in cost.

The points in favor of the style of package submitted with this report are the following: The can containing the meat is separate and distinct from that containing the other articles. This is necessary, because the meat can must be subjected to a high temperature under modern canning processes, and also because the people who would contract for the meat are not manufacturers of the other articles. Various firms might furnish the different articles, and these could all be assembled under Government direction. The articles in the larger compartment can easily be removed and the can used for the preparation of soup or coffee. If only a portion of the contents have been consumed the cans may be repacked and reassembled, and owing to the mutual support the two compartments give each other, the package will be almost intact and can again be attached to the belt and carried on the march. The belt attachments are so arranged as not to lessen the compactness of the package. None of the cans submitted by the firms in correspondence with the board were of suitable form, and all showed that little consideration had been given to that part of the subject, the question of economy having governed in the construction of all of them. That submitted by an American firm that puts up a ration for the British army, for example, was of inconvenient form, and the nature of the contents was such that whenever opened the entire ration must be consumed—at least the can could not be reclosed and carried farther without much damage to the contents.

The cases for the coffee, and the soup, and the salt and pepper, may be made very light, as all are placed within this outer case and thus protected from abrasion and moisture.

The entire ration is a simple one requiring no special directions for use, except for the soup, and these can be put on each package.

The number of such rations that should accompany a command and the number to be carried on the person of the soldier should be left to the discretion of the commanding officer, as the probability of such an emergency arising as to require the use of this ration and the probable duration of such emergency should govern in determining the number of rations to be carried. A supply of such rations should be kept in each company when in garrison ready for immediate issue in the event of the troops being ordered to carry them.

The board is under obligations to Armour & Co., Chicago; the Fairbanks Canning Company, Chicago; E. T. Prussing & Co., Chicago; the California Desiccated Food Company, San Francisco; Frederick Stearns & Co., Detroit; the Pure Aluminum Company, Lemont, Ill.; the Commissary-General of Subsistence, United States Army; the Bureau of Information, United States Army; Surgeon Smart and Assistant Surgeon Woodruff, United States Army; the post commanders in the Department of Dakota, and to many others, for aid extended in various ways.

EDWD. MOALE,
Lieutenant-Colonel, Third Infantry.

JNO. J. CLAGUE,
Major and Commissary of Subsistence, United States Army.

JOS. HALE,
Captain, Third Infantry.

W. C. BORDEN,
Captain and Assistant Surgeon, United States Army.

JOHN H. BEACOM,
First Lieutenant, Third Infantry, Recorder.

[First indorsement.]

HEADQUARTERS DEPARTMENT OF DAKOTA,
St. Paul, Minn., October 12, 1895.

Respectfully forwarded to the Adjutant-General United States Army, in connection with indorsement of May 11, 1895, on letter of Commissary-General of Subsistence dated April 17, 1895, on the subject of emergency ration. It appears to me that the board has carefully considered the subject and that its recommendations are good. The majority of the board are officers of a great deal of experience and are known to me to be close observers in such matters, and I accept their conclusions and suggest that their recommendations be given a practical trial.

JOHN R. BROOKE,
Brigadier-General, Commanding.

ADJUTANT-GENERAL'S OFFICE, *October 15, 1895.*

For the Commissary-General of Subsistence, United States Army.

BOARD IN THE DEPARTMENT OF TEXAS.

This board convened at San Antonio, Tex., on May 27, 1895. It met again on June 7 and 13, 1895. It called upon the Commissary-General of Subsistence for samples of the compressed rations used in foreign armies, but these not being in the possession of the Commissary-General, and he deeming it not expedient to procure them, were not furnished. A member of the board addressed a circular letter to certain food companies and individuals requesting them to "prepare and submit to the board one or more compressed meat, or meat and vegetable, rations," but no satisfactory replies to this letter were received.

On June 13, 1895, each member, in pursuance of a previous agreement of the board, submitted a paper containing his views on emergency rations for the consideration of the board.

The recommendations of the board, formulated by it on June 13, 1895, and the action of the department commander thereon, were as follows:

The board proceeded to a careful consideration of the several rations proposed and to a comparison of their respective merits, and after maturely considering the selection of a ration for troops operating in an emergency, the board recommends that it consist of the following articles: Bacon, 8 ounces; peas or beans, 4 ounces; hard bread, 8 ounces; coffee, 1½ ounces, or tea, one-half ounce; sugar, one-half ounce.

The bacon with the peas or beans to be properly prepared for eating and suitably put up together in one daily ration.

The hard bread to be four crackers of 2 ounces each.

The coffee or its equivalent extract, solid or fluid, into tablets or tubes, preferably the latter, of one daily ration.

The tea, in tablets or packages of one daily ration.

The sugar, in tablets of one-fourth ounce each.

The gross weight of the ration will be about 25 ounces when prepared in cans or packages for the field.

The board is of the opinion that this ration in case of an extraordinary emergency may, on account of its nutritive qualities, be made to last two days, since its calories being 2,849, two of them possess three and one-half times the potential energy of one German "iron ration;" also, that it will meet all the requirements of an emergency ration, as set forth in the letter from the Commissary General—thus:

First. Its component parts embrace wholesomeness, nutrition, and portability.

Second. This suggested ration being based upon the present Government ration, will be equally as acceptable to the taste.

Third. Its several parts if properly prepared will remain intact under any circumstances of climate or ordinary length of time, thus making no limit to their keeping qualities.

Fourth. It may be carried on the person of the soldier when other transportation is not available; the form of packages used to be those found most suitable by the manufacturer preparing the articles.

Fifth. No special directions for the use of its parts will be required.

Sixth. The number of rations carried to be limited by the number of days required; the maximum number would be three days for infantry, and five days for cavalry and field artillery.

Seventh. This ration is not to be issued to the soldier, but kept in the commissary department at all posts so as to [be] available when an emergency arises.

The absence of the board from a point having proper facilities for making desirable experiments prevents it from submitting practically its theoretical recommendations.

There being no further business before it, the board, at 12.50 o'cock p. m., adjourned sine die.

GUY V. HENRY,
Lieutenant-Colonel, Fifth Cavalry, Brevet Brigadier-General, President.

J. F. WESTON,
Major, Subsistence Department, Member.

L. M. MAUS,
Major and Surgeon, U. S. A., Member.

W. T. WOOD,
Captain, Eighteenth Infantry, Member.

J. D. C. HOSKINS,
First Lieutenant Third Artillery Member.

[First indorsement.]

HEADQUARTERS DEPARTMENT OF TEXAS,
San Antonio, June 27, 1895

Respectfully forwarded to the Adjutant-General of the Army, approved.

Z. R. BLISS,
Brigadier-General, Commanding.

ADJUTANT-GENERAL'S OFFICE, *July 1, 1895.*

For the Commissary-General of Subsistence, United States Army.

BOARD IN THE DEPARTMENT OF THE COLORADO.

This board met at Fort Logan, Colo., on June 24, 1895, with all the members present and continued its sessions from time to time to test and experiment with various articles called for by and submitted to them from different manufacturers. From these the board, on August 9, 1895, selected and recommended the following as an emergency ration for one day:

Soup.—One 2½-ounce compressed package of beans or pease submitted by the California Consolidated Food Company, No. 103 Commercial street, San Francisco, Cal. This preparation was tested by two soldiers who did not understand the principles of cooking. The board had these men proceed to a suitable point outside the post, and in its presence a small fire was kindled, by which, with their tin cups of cold water, the soldiers prepared in fifteen minutes 1 quart each of delicious bean and pea soup, well flavored and extremely palatable, from a single package of each of the articles mentioned.

Although the firm was written to asking for a report of the constituent parts of the above-named packages, it was unable to obtain the desired information; but, in consequence of their superior quality, the board has no hesitation in recommending the same as part of the ration. Sample packages are herewith transmitted. No price quoted.

Meat.—One can, containing 12 ounces of bacon. At the request of the board this was prepared by Messrs. Armour & Co., of Chicago. The can containing the bacon was opened in the presence of the board and the bacon was found to be in an excellent state of preservation and was prepared for keeping at least one year. This bacon was kept exposed to the open air for six days and then fried and tested by the members of the board, who found it to be perfectly sweet and in apparently as good condition as when originally packed. A sample can is herewith submitted. Price quoted, 20 cents per pound.

After the experience of years in the field under trying circumstances by the members of the board, they believe there is no kind of meat that can supply the place of bacon, and their object has been to secure it in such manner as not only to preserve its quality and freshness, but to prevent the grease from escaping, thereby preserving the nutritious value of the meat and cleanliness of equipments.

Bread.—Three cakes, 4 ounces each, of compressed crackers, manufactured, at the suggestion of the board, by the Colorado Breakfast Food Company of Denver, under the supervision of the chief commissary of the Department of the Colorado, Captain Dravo. In making these crackers the wheat is first boiled to relieve it of its siliceous coating, it is then forced through small orifices coming out in threads. In this shape it is dried, then broken into very short threads and toasted, thus insuring the baking of every particle. With this is mixed a very small portion of the untoasted threads, and this mixture is compressed and baked. Samples in two stages of compression are submitted herewith, the one of least compression being recommended by the board. These samples, being experimental, are heavier than the size recommended for adoption. No price has yet been quoted the board on this form of bread. Sample of the "food" from which it is made is also submitted herewith.[1]

Coffee.—Parke, Davis & Co., chemists of Detroit, were communicated with regarding coffee capsules and tablets, and they willingly undertook the experiments and furnished the board with two different samples of capsules and a sample of tablets. On testing these samples, the board found that the larger capsule, marked No. 2, made

[1] The board omitted to state, in connection with the bread ration recommended, that the compressed cakes can be dissolved in water and used as a breakfast food in the same manner as though it had not been compressed, and as cracked wheat or oatmeal. The shreds separate thoroughly, and, when warm water is used, very quickly. [*Appendix D, with report of the Board.*]

a pint of fair coffee; sample No. 1, a smaller capsule, made a pint of a better quality; four of the small tablets made a pint of very good coffee, the only objection being the proportion of sugar (one-seventh) was only about half the quanity that it should contain. It is believed by the board that the tablet form is more advisable for use in the emergency ration, and that the tablets should be manufactured so that each should contain four times the quantity shown in the sample, and that the proportion of coffee and sugar should be three of coffee and one of sugar. Coffee is made by dropping the tablet in boiling water and being allowed to boil for three or four minutes. Samples of each submitted herewith.

The prices quoted are as follows: No. 1, $5.25 per hundred; No. 2, $1.75 per hundred; No. 3, 26 cents per hundred, or, as recommended by the board, $1.04 per hundred.

The entire ration for one day would consist in weight of—

Components.	Ounces, net.	Ounces, gross.
Meat	12	15
Bread	12	12
Soup	2½	2½
Coffee	½	1
Total	27½	30½

The board has no means available of arriving at the food value of the ration recommended, but from their knowledge of its constituents, believes it to be very high.

The board believes that the prices quoted herein will be greatly reduced should these articles be supplied on a large scale.

A "pemmican" ration weighing 10 ounces, consisting of 6 ounces of "jerked" beef, 2 ounces of beef fat, 2 ounces of bacon, and one-fourth ounce of salt is recommended for trial as a meat ration in place of the bacon.

The jerked beef is pounded or crushed; the beef fat and bacon are ground or chopped to break up the fiber, and then cooked with the rations of salt and pepper; the hot fat is then poured over the pounded dried beef. The whole packed in a tin can similar to the bacon can.

A sample prepared by Capt. E. S. Godfrey, Seventh Cavalry, is submitted, and is part of a quantity which was made from 30 ounces of fresh beef, 4 ounces of beef fat, and 4 ounces of bacon. The 30 ounces of fresh beef dried to 9½ ounces; one-half ounce of salt and two rations of pepper were put in the cooked fat. * * *

The board having completed the duties assigned it, adjourned sine die, at 12 m. (noon) August 9, 1895.

WM. H. POWELL,
Lieutenant-Colonel, Eleventh Infantry, President.
E. S. GODFREY,
Captain, Seventh Cavalry, Member.
LOUIS A. LA GARDE,
Captain and Assistant Surgeon, U. S. A., Member.
EDWD. E. DRAVO,
Captain and Commissary of Subsistence, U. S. A., Member.
GEO. S. YOUNG,
Captain, Seventh Infantry, Recorder.

The recommendations of the board were forwarded by the department commander with the following indorsement:

[First indorsement.]

HEADQUARTERS DEPARTMENT OF THE COLORADO,
Denver, Colo., August 15, 1895.

Respectfully forwarded to the Adjutant-General of the Army.

The members of this board have displayed commendable zeal and interest in their efforts to solve the problem of furnishing the Army a suitable emergency ration, and I consider their report most interesting and valuable. Their proceedings would have been concluded at a much earlier date but for the delay attending the preparation of coffee capsules and tablets by Parke, Davis & Co., chemists, Detroit, Mich.

FRANK WHEATON,
Brigadier-General, Commanding.

ADJUTANT-GENERAL'S OFFICE, *August 20, 1895.*

For the Commissary-General of Subsistence, United States Army.

[Third indorsement.]

WAR DEPARTMENT, OFFICE COMMISSARY-GENERAL OF SUBSISTENCE,
Washington, August 21, 1895.

Respectfully returned to the Adjutant-General of the Army.

If the board considered the fifth, sixth, and seventh points mentioned in letter from this office dated April 17, 1895, their conclusions are not recorded herein. I therefore respectfully recommend that these proceedings be returned to the board for report upon these points.

M. R. MORGAN,
Commissary-General of Subsistence.

[Fourth indorsement.]

ADJUTANT-GENERAL'S OFFICE,
Washington, August 24, 1895.

Respectfully returned to the commanding general, Department of the Colorado, who will reconvene a board on an emergency ration, to consist of Captain La Garde, assistant surgeon, Captain Dravo, commissary of subsistence, and Captain Hardin, Seventh Infantry, to consider and report upon the points referred to in the third indorsement hereon.

If any action be necessary by Lieutenant-Colonel Powell and Captain Godfrey it will be had by correspondence.

By command of Lieutenant-General Schofield:

THOMAS M. VINCENT,
Acting Adjutant-General.

[Fifth indorsement.]

HEADQUARTERS DEPARTMENT OF THE COLORADO,
Denver, Colo., August 31, 1895.

Respectfully referred to Capt. L. A. La Garde, assistant surgeon. Captain La Garde, assistant surgeon; Capt. E. E. Dravo, commissary of subsistence, chief commissary of subsistence, and Capt. E. E. Hardin, Seventy Infantry, members of the emergency ration board as originally constituted, will reassemble for the purpose indicated in third indorsement. Fourth indorsement will also be complied with as regards correspondence with Lieutenant-Colonel Powell and Captain Godfrey, if necessary.

By command of Brigadier-General Wheaton:

JOHN S. MALLORY,
Aide-de-Camp, Acting Assistant Adjutant-General.

The board consequently reassembled, but with Capt. George S. Young, Seventh Infantry, as a member in place of Capt. E. E. Hardin, Seventh Infantry, who was absent from the post, and on September 6, 1895, the board completed its recommendations as follows:

Fourth. "Weight of each ration, and the kinds, size, and form of package in which put up, for convenience of use and of carriage on the person."

The gross weight of the ration recommended is 30¼ ounces. It is not believed by the board that this ration in its entirety should be put up in any kind of permanent package, but that for keeping in store, ready for convenient issue, each complete ration should be wrapped in a paper parcel. This parcel when issued to the soldier can be opened by him and the components thereof be distributed about his person or equipment to the best advantage for carrying. The complete ration for one day forms a package 7 inches long, 4¼ inches wide, and 2 inches thick. Several packages of such a size would be inconvenient to carry upon the person, but broken up and parts properly distributed they could be conveniently and easily carried.

Fifth. "Directions for use by the soldier."

It is contemplated by the board that the ration will form two substantial meals and one lunch for the soldier as follows: For supper, coffee, one-half ration of bacon, and one wheat biscuit For breakfast, same as for supper. For lunch, 1 quart of bean soup, and one wheat biscuit.

The coffee is prepared by the soldier bringing water to a boil in his quart cup and then dropping in the coffee tablet, and allowing it to further boil about three or four minutes.

The soup is prepared by breaking up the tablet and mixing it in a small quantity of cold water in the quart cup. The cup is then filled with water, stirring at the same time, and brought to a boil for about ten minutes. The wheat biscuit may be

eaten dry as issued, or it will disintegrate easily in the coffee or soup and make a palatable dish.

The bacon may be sliced and fried in the meat-ration can or broiled on the coals.

Sixth. "Number of rations to be carried on the person, and the maximum that may be so carried."

As the ration weighs a little less than 2 pounds, the item of weight would seem to indicate ten rations as the maximum weight to be so carried.

Seventh. "Whether to be habitually carried by the soldier as a part of his outfit, or to be issued out for emergency occasions."

It is believed by the board that this ration should not be habitually carried by the soldier as part of his outfit, but that the issue could be ordered by the commanding officer in his discretion.

The board has not found it necessary to communicate with either Lieutenant-Colonel Powell or Captain Godfrey, as all these points were thoroughly discussed and agreed upon by the full board, but its conclusions were inadvertently omitted from its proceedings.

The board having completed the business assigned it, adjourned sine die.

LOUIS A. LA GARDE,
Captain and Assistant Surgeon, U. S. A., President.
EDWARD E. DRAVO,
Captain and Commissary of Subsistence, U. S. A., Member.
GEO. S. YOUNG,
Captain, Seventh Infantry, Recorder.

[Sixth indorsement.]

HEADQUARTERS DEPARTMENT OF THE COLORADO,
Denver, Colo., September 9, 1895.

Respectfully returned to the Adjutant-General of the Army, with proceedings of reconvened board attached.

FRANK WHEATON,
Brigadier-General, Commanding.

ADJUTANT-GENERAL'S OFFICE, *September 16, 1895.*

For the Commissary-General of Subsistence, United States Army.

THE BOARD IN THE DEPARTMENT OF CALIFORNIA.

This board convened at San Francisco, Cal., on June 3, 1895. On August 31, 1895, it submitted its report, the following extract from which shows the character of its investigations and the recommendations adopted by it, and the action of the Department Commander:

The initial meeting of the board was on June 3, 1895, at which time the letter of instructions hereto prefixed was read and discussed, and the board adjourned, pending the acquisition by the members of literature on the subject of emergency rations, and also to allow time to procure samples of condensed foods, etc., which might be procured in the San Francisco markets.

After adjournment of the first meeting the board has reconvened from time to time, holding in all six sessions, and has examined and considered a large number of samples of condensed foods, both of American and foreign manufacture. Unfortunately, it appears that this matter has received but little attention on this side of the water, and by far the largest number of samples has come from abroad. Also, the board has been debarred from considering a large number of highly desirable articles, due to the impossibility of procuring samples in the markets at hand.

On mature consideration of the subject, the board has the honor to unanimously recommend the following as an emergency ration:

Sixteen ounces hard bread, 8 ounces breakfast bacon, 3 ounces pea soup, in tablet form, $1\frac{7}{8}$ ounces coffee, roasted and ground, with three 2-grain saccharin tablets, or in lieu thereof three sweetened coffee tablets.

Experience has shown that the bread, meat, and coffee portion of this ration is most acceptable to the American soldier. The soup tablets afford something over a quart of highly palatable soup, which, with a proportionate amount of hard bread, furnishes a wholesome and nutritious meal.

It is recommended that the hard bread baked for the emergency ration shall be entirely free from lard or any other oily substance and shall be made of flour, salt, and water alone, thus possessing greater cohesive strength, and reducing the waste to a minimum; that it should be wrapped in packages of oiled or waxed paper,

each package to contain not more than two biscuits, the package to be held closed by bands of thread rubber No. 18, Goodyear's patent.

That the bacon be put up in an oil-skin bag with drawing-string, the bag to be made long enough to allow the top to be folded over, so that the drawing-string may be wrapped around the package.

That the packages of pea soup, which are 3 inches long, 1¾ inches wide, and 1⅛ inches thick, should be put up in oiled paper and carried in the haversack, in looped packets similar to those of the cartridge belt.

That the coffee, if in tablets, should be kept in packets similar to those for the pea soup, and if roasted and ground, in round tin cases, with screw tops, loose in the haversack. The saccharin to be in a paper package inside the coffee can.

These articles are all believed to possess excellent keeping qualities. The weight of the ration, not including the cases, is 28$\frac{7}{8}$ ounces. It is believed that if the coffee tablet is used, the total weight of the packed ration can be placed at a maximum of 30 ounces. The board was, however, unable to procure any samples of coffee tablets, and in consequence recommends their use only provisionally. Should the roasted and ground coffee be used, the weight of the packed ration would consequently be increased by that of the tin case.

It is believed that should the component parts of the ration, as above recommended, be issued separately, they can be more conveniently carried by the soldier than if inclosed in a single package.

Directions for use should be as few and simple as possible. The packages of pea meal and the coffee tablets always contain the necessary instructions, and the intelligent soldier will lose no time in learning to make the most of his ration.

Regarding the number of rations to be carried on the person, it does not appear that any definite rule can be laid down. This is a matter to be governed solely by circumstances, and depends entirely upon the commander, who knows the capabilities of his men and the work he has in hand.

The board is, however, of the opinion that in order to economize rations and to minimize the burden of the soldier, the ration or its component parts should never, under any circumstances, be put up in portions of more than one day's ration, as a package, once broken, deteriorates in quality, and if turned in is practically unfit for reissue.

It being understood that the emergency ration is intended only for the use of troops separated from their ordinary means of transportation, as in the case of raids, picket duty, and the like, the board believes that it should not be habitually carried by the soldier, but should be carried in the wagon train and put up in such a fashion as to allow of its speedy issue when required. To this end it is recommended that whatever the form or size of package adopted for shipping rations in bulk, the complete ration, or its component parts, be put up in packages of fifty portions. This is practically a day's ration for a company, and can be issued, like ammunition, as fast as the men can pass the place of issue in column of files.

The packages of pea meal recommended above were furnished by the California Desiccated Food Company, 103 Commercial street, San Francisco, Cal., through the courtesy of whose manager the recorder of the board was enabled to make a most satisfactory test of its products during the recent encampment at Monterey, Cal. The absolute value of the soups as a food could not of course be accurately determined, but they were pronounced by all who tried them to be palatable and nutritious.

F. L. GUENTHER,
Lieutenant-Colonel, Fifth Artillery, President.

EVAN MILES,
Lieutenant-Colonel, Twentieth Infantry.

W. H. BELL,
Lieutenant-Colonel, Assistant Commissary-General of Subsistence.

J. V. D. MIDDLETON,
Lieutenant-Colonel, Deputy Surgeon-General.

G. H. G. GALE,
Captain, Fourth Cavalry, Recorder.

[First indorsement.]

HEADQUARTERS DEPARTMENT OF CALIFORNIA,
San Francisco, Cal., September 3, 1895.

Respectfully forwarded to the Adjutant-General of the Army, inviting attention to the within report of the board.

JAMES W. FORSYTH,
Brigadier-General, Commanding.

ADJUTANT-GENERAL'S OFFICE,
September 10, 1895.

For the Commissary-General of Subsistence, United States Army.

THE BOARD IN THE DEPARTMENT OF THE COLUMBIA.

This board convened at Vancouver Barracks, Wash., on May 23, 1895, and directed the recorder to obtain small quantities of condensed meats, soups, coffees, and other articles of food largely condensed, with the view of having experiments conducted by the board to determine the suitableness of such articles for rations for troops operating in emergencies. The recorder proceeded to Portland, Oreg., the only probable market for such articles that he could visit, but found none there, and no laboratories for evaporating or condensing foods. He wrote to a number of manufacturers and dealers in New York, Chicago, San Francisco, and other cities, and a number of articles were thus obtained, including condensed soups, coffees, meats, vegetables, etc., which were all tested by the board, the proper apparatus for the purpose having been secured.

The board was favorably impressed with an emergency ration prepared for trial by Lieut. Col. W. D. Wolverton, deputy surgeon-general and president of the board, but was not prepared to recommend it for adoption. It, however, recommended it to the War Department for experimental purposes.

In concluding its report, the board says:

The board realizes the difficulties with which it has had to contend in this investigation, as there are neither laboratories nor preserved-food manufactories in this part of the country, and the practical tests of condensed foods have necessarily been limited to those compositions that could be obtained from manufactories in places remote from this place. But after making such tests as were possible, the board is of the opinion that a reduced ration of the articles usually carried in the field, viz, bacon, coffee, sugar, and hard bread, supplemented by soup tablets, and using condensed coffee, would be convenient, palatable, wholesome, and sufficiently nutritive.

The board therefore recommends the following as the ration best suited, in its opinion, for troops operating in emergencies, viz:

	Ounces.
Bacon (cooked)	8
Hard bread	10
Soup tablets	4
Sugar	2
Condensed coffee	1
Total	25

First. The component parts of this ration having been in use in our Army for many years, their wholesomeness is unquestioned; the "food value" is known, and shows sufficient nutritive value for the special object of this ration. The ration as a whole is easily portable.

Second. It is believed that the addition of the soup tablets will make it even more acceptable to the taste than our present field ration.

Third. The component parts of this ration, with the exception of the soup tablets and condensed coffee, have long been in use in our Army and are known to possess the requisite keeping qualities, and the board is satisfied that the soup and condensed coffee also possess these same qualities.

Fourth. The weight of each ration is 25 ounces; the bacon should be in one piece, whatever the number of rations carried; each of the other component parts should be put up in packages containing one day's allowance of each, except the condensed coffee, which is now put up in a small bottle containing at least four days' supply of coffee.

Fifth. No special directions for use will be necessary, as the soldier is familiar with the use of all these articles, except the soups and condensed coffee, and these are put up in packages containing full directions for use.

Sixth. Four rations should be carried in the haversack, and this is the maximum number that may be so carried.

Seventh. To be issued out only for emergent occasions.

The board recommends the bean and pea soup tablets manufactured by the "California Desiccated Food Company," of San Francisco, Cal.; and the condensed coffee put up by the "Condensed Coffee Company," of New York City.

In making this investigation the board has met from time to time from May 23 to September 9, inclusive, and at each meeting all the members were present.

There being no further business before it, the board, at 2 o'clock p. m., September 9, 1895, adjourned sine die.

W. D. WOLVERTON,
Lieutenant-Colonel and Deputy Surgeon-General, President.
W. H. NASH,
Major and Commissary of Subsistence, Member.
JOHN MURPHY,
Captain, Fourteenth Infantry, Member.
FRANK TAYLOR,
Captain, Fourteenth Infantry, Member.
JOHN LITTLE,
First Lieutenant, Fourteenth Infantry, Member and Recorder.

[First indorsement.]

HEADQUARTERS DEPARTMENT OF THE COLUMBIA,
Vancouver Barracks, Wash., September 12, 1895.

Respectfully forwarded to the Adjutant-General of the Army, in obedience to instructions from the headquarters of the Army of May 11 last.

E. S. OTIS,
Brigadier-General, Commanding.

ADJUTANT-GENERAL'S OFFICE, *September 20, 1895.*

For the Commissary-General of Subsistence, United States Army.

FINAL ACTION BY THE WAR DEPARTMENT.

WAR DEPARTMENT,
OFFICE COMMISSARY-GENERAL OF SUBSISTENCE,
Washington, D. C., November 25, 1895.

SIR: I have the honor to submit, for the information of the Secretary of War, the reports of the boards convened in the various military departments "to consider and recommend a proper ration for troops operating in emergencies," as recommended in a letter from this office dated April 17, 1895. (Copy inclosed, A.)

Upon notice reaching this office as to the personnel of the boards and places of meeting, the purchasing commissaries of subsistence at various stations were requested to cooperate with the boards and to solicit the assistance of inventors and manufacturers (see letter of May 25, 1895, copy inclosed, B), and a letter was addressed to the chief commissary of subsistence of each military department, each of whom had been detailed as a member of a board, suggesting sources of information as to foreign rations, etc. (See letter of May 28, 1895, copy inclosed C.)[1]

In the composition of the boards eighteen regiments of the line were represented, as well as the medical and subsistence departments.

The reports from the boards show that they availed themselves of all suggestions, and that they obtained useful information and samples from manufacturers and from others (officers and citizens) who became interested in the subject.

It is fair to assume that the reports submitted give the carefully considered, unbiased views of those most interested in the composition of the ration and of those who may have to use it. The reports indicate

[1] For the substance of these letters, see pages 323, 324, 325, and 326.

intelligent and painstaking labor, and the result is the compilation of much valuable information.

The recommendations as to the composition of the ration are as follows:

RATIONS RECOMMENDED BY DEPARTMENT BOARDS.

	Ounces.
(1) Department of the Platte:	
Hard bread (one-fifth oatmeal, four-fifths wheat)	9
Meat (one-fourth pork, three-fourths corned beef)	7
Soup cake, pea or bean	5
Sugar	1
Coffee	1.25
Pepper	.0625
Salt	1
Total, net	24.3125
Total, gross	29
Calories,——.	
(2) Department of Texas:	
Hard bread	8
Bacon	8
Pea or bean meal	4
Coffee	1.50
(Or tea one-half ounce.)	
Sugar	.50
Total, net	22
Total, gross	25
Calories, 2,849.	
(3) Deparment of California:	
Hard bread	16
Bacon, breakfast	8
Pea soup	3
Coffee	1.28
Saccharin 6 grains	.014
Total, net	28.294
Total, gross	30
Calories,——.	
(4) Department of the Columbia:	
Hard bread	10
Bacon (cooked)	8
Soup tablets	4
Sugar	2
Condensed coffee	1
Total, net	25
Total, gross	(?)
Calories,——.	
(5) Department of the Colorado:	
Bread, whole wheat	12
Bacon	12
Soup tablet	2.50
Coffee (one-fourth sugar, three-fourths coffee)	.75
Total net	27.25
Total gross	30.50
Calories, ——.	
(6) Department of Dakota:	
Hard bread	16
Meat, cooked beef, one-third fat	12
Soup tablet	2
Coffee	1.25
Pepper and salt	1
Total net	32.25
Total gross	(?)
Calories, ——.	

	Ounces.
(7) Department of the East:	
Hard bread	8
Dried (chipped smoked) beef	8
Soup tablet	8
Tea tablets	.33
Total net	24.33
Total gross	32 or 34
Calories, 3,623.	
(8) Department of the Missouri:	
Hard bread	12
Bacon	8
Soup tablet	4
Coffee and saccharin	1.50
Total net	25.50
Total gross	32.25
Calories, 3,350.	

Surg. Charles Smart, U. S. A., has kindly examined the suggested rations and gives as the result of his calculations the following table of their calories, or food value:

Department of—	
The Platte	2,134
Texas	2,699
California	3,382
The Columbia	3,052
The Colorado	3,526
Dakota	2,812
The East	2,686
The Missouri	3,032
	8)23,323
Average calories	2,815
Average net weight ..... ounces	26.11

A reference to the views as to the components of the ration will show the following recommendations as to quantities:

BREAD.

Department of—	Ounces.
The Platte, hard bread (one-fifth oatmeal, four-fifths wheat)	9
Texas, hard bread	8
California, hard bread	16
The Columbia, hard bread	10
The Colorado, hard bread (made from whole wheat)	12
The East, hard bread	8
Dakota, hard bread	16
The Missouri, hard bread	12
	8)91
Average	11.375

Six boards recommend ordinary hard bread. One recommends a bread made from one-fifth oatmeal and four-fifths wheat flour, and one recommends a bread made from the whole wheat by a peculiar process. This last bread was tried in a practice march by a company of the Seventh Infantry, the commanding officer and medical officer of the command having been members of the board that recommended it. The reports of these two officers accompany these papers and show that the trial was not satisfactory.

MEAT.

Department of—	Ounces.
The Platte, brawn (one-fourth pork, three-fourths corn beef)	7
Texas, bacon	8
California, bacon (breakfast)	8
The Columbia, bacon (cooked)	8
The Colorado, bacon (breakfast)	12
The East, dried beef, smoked and chipped	8
Dakota, beef (cooked)	12
The Missouri, bacon (breakfast)	8
	8)71
Average	8.875

Five boards recommend bacon and, of the other three, one recommends brawn, one dried beef, and the third cooked beef.

One board submitted a sample of "pemmican," and suggested a ration which would weigh 10 ounces (6 ounces "jerked" beef, 2 ounces beef fat, and 2 ounces bacon), and although it did not consider it as suitable to adopt, recommended it for trial in place of the bacon.

VEGETABLE, BEAN OR PEA MEAL, OR SOUP TABLET.

All the boards recommend some preparation of bean or pea meal for soup-making purposes, the average being 4.06 ounces.

Department of the Platte.—5 ounces bean or pea meal (one-half of each), seasoned with salt and pepper and containing a small quantity of bacon.

Department of Texas.—4 ounces bean or pea meal, with some bacon, properly prepared for eating.

Department of California.—3 ounces pea soup in tablet form (the one tested was California Desiccated Food Company's meal, fat, and seasoning).

Department of the Columbia.—4 ounces pea or bean meal soup tablet, two 2-ounce packages (California Desiccated Food Company's).

Department of the Colorado.—2½ ounces pea or bean meal soup tablet (California Desiccated Food Company's).

Department of Dakota.—One tablet bean soup, sufficient to make one pint of good soup.

Department of the East.—8 ounces pea soup (C. H. Knorr's pea sausage).

Department of the Missouri.—4 ounces soup mixture (beef extract, peptone, beef powder, cooked bean meal, pepper, salt).

STIMULANT.

Six boards recommend some form of coffee, one coffee or tea, and one tea.

	Ounces.
The average of coffee is	1.19
The average of tea is	.40

SWEETENING.

Four boards recommend sugar, an average of 0.92 ounce.

Four boards recommend saccharin or sulphinide, an average of about 4 grains.

Department of the Platte.—1.25 ounces coffee, roasted and ground and pressed in cake with 1 ounce sugar.

Department of Texas.—1½ ounces coffee, or its equivalent extract (fluid or solid, in tablets or tubes), or one-half ounce tea in tablets and one-half ounce sugar in two tablets.

Department of California.—1$\frac{7}{5}$ ounces coffee, roasted and ground, with three 2-grain saccharin tablets in tin can with screw top, or three sweetened coffee tablets in oiled paper.

Department of the Columbia.—1 ounce condensed coffee and 2 ounces sugar.
Department of the Colorado.—Three-fourths of an ounce of coffee tablets (75 per cent coffee, 25 per cent sugar).
Department of Dakota.—1¼ ounces coffee, roasted and ground, sweetened with saccharin.
Department of the East.—Four 35-grain tea tablets, each with one grain saccharin.
Department of the Missouri.—1½ ounces coffee, roasted and ground and compressed, and nine one-half grain saccharin tablets, or three one-half ounce sugar-coated tablets (sugar enough to be palatable).

KOLA NUT.

The kola nut has been suggested as a powerful and safe stimulant that would be of value in an emergency ration.

It was considered by three boards. One made no recommendation. One said "It is not considered wise to adopt it at present." Another, "It and stimulants of a like nature may have their place in the medicine chest, but it is not deemed advisable to incorporate them in the ration."

Its consideration is not recommended, as it is difficult to keep in its fresh state, is not good unless fresh, and its various preparations are in the experimental stage.

CONDIMENTS.

Two boards recommend 1 ounce pepper and salt.

GENERAL RESULTS.

The average weights recommended as a minimum allowance are:

	Ounces.
Bread	11.37
Meat	8.875
Vegetables	4.06
Coffee	1.19
Sugar	.92
Pepper and salt	1
Total	27.415

The weight of opinion seems to favor hard bread, bacon, bean meal soup (or tablets), and coffee, all of which, except soup tablets, are components of the present ration.

The general opinion is well expressed by a member of one of the boards, who says:

> To adopt any "iron ration," "blue cartridge," "sausage," or any foreign material used in those armies, would require the importation of stomachs to eat or relish the same.

As was to be expected, there were divergent views upon minor details as to the character of the bread, meat, packages for and character of soup, and of coffee and sugar.

As bacon and hard bread are part of the ordinary ration and are frequently renewed in store, insuring their freshness, it is not believed that there is any necessity for or wisdom in keeping a special quantity on hand especially for emergencies, nor is it believed that if bacon is packed in tins for each ration that it would be as portable and convenient as it would be if issued in bulk for distribution as each individual may desire. A soldier will soon find the most convenient way

to carry it, and it is not supposed that he will abandon or lose it, except under most pressing contingencies.

Fresh vegetables in the established ration are a preventive of scurvy, but it is not believed that a soup tablet will accomplish a similar result; nor is it thought necessary to provide in an emergency ration against the contingency of scurvy, as the soldier is generally protected by his constant use of fresh vegetables in his ordinary garrison food and can go without vegetables for a time without material detriment.

However, the beans or pease that form the recommended soup packages materially assist by replacing the nitrogenous diet lost by the absence of fresh meats and by supplying the deficiency in the nitrogenous qualities of bacon, which furnishes the required fat. The soup package will enable the soldier to prepare a hot meal, which is so comforting after a march. Such a package is more portable and easily cooked than the ordinary dried beans or pease.

This office is, therefore, of the opinion that some soup tablet should be made a component of the ration, to be issued when necessary, in lieu of dried and fresh vegetables.

The soup, to be wholesome and palatable, should not be eaten until it is thoroughly cooked, and if the cooking of the ingredients is not partially or wholly done before issue, it may be impracticable to completely cook them in the field. Inquiry is suggested as to the possibility of obtaining an article in solid form or as a soup that can be eaten either cold or hot.

In the opinion of this office, so important a part of the ration should not be a "proprietary" article nor an imported one, and it is believed that one could be compounded under the supervision of the Subsistence and Medical Departments of the Army (if a formula can be prescribed) of a quality equal to any of those submitted to the boards.

No portion of the ration is more acceptable to the soldier than coffee, and for the work expected of him during an emergency the quantity now established should not be reduced. The feasibility of providing it in a more convenient form than is now adopted may be made the subject of further experiments, and a character of package better suited for the purpose of transportation decided upon.

A small quantity of matches and of soap, in some convenient form, and an extra issue of tobacco might be made when troops are reduced to the minimum allowance. Tobacco allays hunger and is a solace to those addicted to its use, when the nerves are upon tension.

As regards the kind, size, and form of package in which the whole ration should be put up for convenience of use and of carriage on the person, three models of packages are submitted—two of tin and one of waterproof cloth.

The majority of the boards recommend that the rations be kept in store and issued by the orders of the commanding officer.

The maximum number of rations recommended to be carried upon the person, if any are to be so carried, varies from one to ten.

A ration bag similar to the one submitted by the Department of the East may be advisable, but the weight of opinion seems to be opposed to having any ration habitually carried on the person. A sufficient number of these bags might be kept in store for issue in any exceptional cases when they may be required, and returned when not needed for use. Actual experience in the field may suggest other patterns better suited for the purpose.

From careful consideration of the reports, it appears to me that if

suitable equivalents for the now prescribed components of the vegetable, sugar, coffee, and tea rations, especially for use in the field, can be determined upon and authorized, the matter of an emergency ration, if it is to be considered as "one suited to attending exceptional circumstances," will fix itself.

The troops would be enabled to leave the garrison fully supplied with food of suitable character for any kind of duty, and this would be renewed from time to time; then, should the whole command, or detachments or separate columns from the main command, be required at any time for exceptional service, the commanding officer, either of the entire command or the detachment directly responsible for the accomplishment of the particular duty, knowing the nature of the duty and all the circumstances of transportation, haste, etc., may direct what character and quantity of the full field ration available for issue shall be taken by each soldier and for what period they must last; full field rations will be issued, and such as are not taken on the especial service to be left with the company or at the commissary as savings, as are all the unconsumed portions of the regular ration (see A. R., 1376). The troops will not cheerfully give up any portion of their ration unless assured that they will have some benefit from what they can not use in kind.

Economy should not require the soldier to forfeit any portion of the food that has been decided as necessary for his subsistence when he is in barracks or on ordinary field service because he happens, by chance, to be ordered upon more arduous service. The soldier must be kept satisfied or the small amount issued to him will not accomplish the purpose. If a soldier feels that his comrade remaining in camp has full rations and he has not, he does not see the justice of it unless he has received some equivalent.

To guide in determining the smallest quantity that should be taken by a soldier, the results of the deliberations of the final board as regards the minimum necessary should, if approved, be published for the general information of the Army, and those who may direct issues should be advised not to vary the components of or to reduce the quantities as recommended by the board, except under the most critical circumstances, when the main object to be obtained justifies the imperiling of the health or lives of those engaged.

RECOMMENDATION.

I have the honor, therefore, to recommend that a board, to consist of five members, be convened to meet in this city to consider these reports, the suggestions herein, those in my letter of April 17, and such views as the Major-General Commanding the Army may lay before it during its session, and make final recommendations upon the general subject, particularly the minimum amount of articles that will sustain a soldier in health and activity while in active service in the field for a limited period, and that the sum of $150, subsistence funds, be allotted for experimental purposes.

Samples of the various articles adopted by the boards are in this office and at the service of the board.

Very respectfully,

M. R. MORGAN,
Commissary-General of Subsistence.

The ADJUTANT-GENERAL OF THE ARMY.

[First indorsement.]

ADJUTANT-GENERAL'S OFFICE,
November 26, 1895.

Respectfully submitted to the Major-General Commanding the Army.

J. C. GILMORE,
Assistant Adjutant-General.

[Second indorsement.]

HEADQUARTERS OF THE ARMY,
Washington, November 29, 1895.

The concluding recommendation of the Commissary-General of Subsistence is approved by the Major-General Commanding.

SAM'L BRECK,
Assistant Adjutant-General.

[Third indorsement.]

ADJUTANT-GENERAL'S OFFICE,
December 2, 1895.

Respectfully submitted to the Secretary of War, with memorandum inclosed.

THOMAS M. VINCENT,
Acting Adjutant-General.

[Fourth indorsement.]

WAR DEPARTMENT, *March 27, 1896.*

Let a board be appointed, as within recommended, to consist of Maj. C. A. Woodruff, Subsistence Department; Maj. C. Smart, Medical Department; Maj. E. A. Garlington, Inspector-General's Department; Capt. Louis A. Craig, Sixth Cavalry; and First Lieut. W. C. Brown, First Cavalry, United States Army.

By order of the Secretary of War:

JOHN TWEEDALE, *Chief Clerk.*

WAR DEPARTMENT,
ADJUTANT-GENERAL'S OFFICE,
Washington, March 31, 1896.

SIR: I have the honor to transmit herewith, by direction of the Secretary of War, the following described papers for the use of the board appointed by paragraph 3, Special Orders, No. 74, Headquarters of the Army, Adjutant-General's Office, March 28, 1896:

Reports of the boards convened in the several military departments.

Letter of the Commissary-General of Subsistence of November 25, 1895.

Two packages of papers belonging to the files of the office of the Commissary-General of Subsistence.

Very respectfully,

J. C. GILMORE,
Assistant Adjutant-General.

Maj. CHARLES SMART, *Surgeon,*
President of Emergency Ration Board,
Washington, D. C.

DAILY PROCEEDINGS OF A BOARD OF OFFICERS CONVENED BY SPECIAL ORDERS, NO. 74, ADJUTANT-GENERAL'S OFFICE, MARCH 28, 1896, "TO CONSIDER AND RECOMMEND A PROPER RATION FOR TROOPS OPERATING IN EMERGENCIES."

DAILY PROCEEDINGS OF A BOARD OF OFFICERS CONVENED BY THE FOLLOWING ORDER:

SPECIAL ORDERS, No. 74.

HEADQUARTERS OF THE ARMY, ADJUTANT-GENERAL'S OFFICE, *Washington, March 28, 1896.*

[Extract.]

* * * * * * *

3. By direction of the Secretary of War, a board of officers to consist of Maj. Charles Smart, surgeon; Maj. Charles A. Woodruff, commissary of subsistence; Maj. Ernest A. Garlington, inspector-general; Capt. Louis A. Craig, Sixth Cavalry, and First Lieut. William C. Brown, First Cavalry, is appointed to meet in this city March 31, 1896, or as soon thereafter as practicable, to examine the reports of the boards which were convened in the several military departments "to consider and recommend a proper ration for troops operating in emergencies," and such views and suggestions as the Major-General Commanding the Army and the Commissary-General of Subsistence may lay before it. The board will make recommendations upon the subject and will report upon the minimum amount of articles of food necessary to sustain a soldier in health and activity while in active service in the field for a limited period.

* * * * * * *

By command of Major-General Miles:

GEO. D. RUGGLES, *Adjutant-General.*

WASHINGTON, D. C., *March 31, 1896.*

The board met at 11 a. m., pursuant to the foregoing order:

Present: Maj. Charles Smart, surgeon; Maj. Charles A. Woodruff, commissary of subsistence; Capt. Louis H. Craig, Sixth Cavalry; Lieut. William C. Brown, First Cavalry. Absent: Maj. Ernest A. Garlington, inspector-general. Maj. Garlington was absent on temporary duty ordered by the Secretary of War.

The order convening the board, and the letter of March 31, 1896, Adjutant-General's Office, with its inclosures, were then laid before the board for its consideration.

After thorough discussion of the subject it was decided that all reports and correspondence submitted to the board should be carefully read by its members individually, in order that each should have a full understanding of the subject submitted to it before further proceedings were held.

It was also decided that application be made to the Adjutant-General of the Army for a room for the purpose of conducting such experiments as may be necessary, and for the arrangement of samples of emergency rations submitted by the Commissary-General of Subsistence.

The reports and correspondence above referred to were then distributed to members of the board.

The board then adjourned to meet at the call of the president.

WAR DEPARTMENT, *Washington, D. C., April 6, 1896.*

The board met at 11 o'clock a. m. Present, all the members.

The board then proceeded to discuss the number of rations which should be carried by the soldier and to examine samples of "Talley's

National Emergency Food," an article which had been sent in since the receipt of the reports of department boards.

The correspondence submitted to the board being quite voluminous, and several of the members having been unable to complete the reading of it, it was decided to adjourn until Friday, the 10th instant, in order that all correspondence might be read by each member.

It was also decided that at the next meeting each member should submit a memorandum expressing his views on what is to be understood as constituting an "emergency."

WAR DEPARTMENT,
Washington, D. C., April 10, 1896.

The board met, pursuant to adjournment, at 11 o'clock a. m. Present, all the members.

The memoranda from members of the board called for by its action at the last meeting were then read, thoroughly discussed, and are hereto appended, marked A^1, A^2, A^3, A^4, and A^5.

The board decided that "emergencies" are occasions on which from any cause the troops are mainly dependent on food carried on the person.

The emergency rations recommended by the department boards were then considered in connection with various articles of food supply submitted to this board as suggested components of an emergency ration, and with the various communications on these articles and on the general subject. It appears that of the eight boards six recommended a hard bread pure and simple, one a bread from whole wheat, and another a hard bread composed of one-fifth oatmeal and four-fifths wheat.

In the matter of meat, five of the boards recommended bacon, one dried (chipped smoked) beef, another a cooked beef, one-third of which should be fat, and a third board a meat compound composed of one part pork and three parts corned beef.

The reports of the department boards indicate a general belief that it would be unwise to select as the staples of an emergency ration any article of food with which the soldier is not familiar or which would make a material change in his dietary during the continuance of the emergency, for articles of known value will give greater satisfaction, other things being equal, than those of unknown or unusual character, and change of diet is to be deprecated at a time when the energies of the soldier have to be sustained under conditions of strain.

This board concurs in these views and therefore rejects the suggestion of a bread containing oatmeal which, although nutritious, palatable, and in other respects good, is open to the objection that while it may be satisfying to individuals the more familiar wheaten biscuit or hard bread is probably more acceptable to the majority of soldiers. It rejects also the bread made from whole wheat as known to be productive of diarrhea, and when tried, as was to be expected, it failed.

On similar grounds this board rejects all suggestions of pemmicans or meat pastes prepared from dried and powdered beef, although some of these make nutritious and palatable dishes when well spiced and highly flavored with extractives. It rejects the suggestion of corned beef and dried and smoked beef, because the extractives in great part are lost and the albuminoids hardened in their manufacture, and the suggestion of canned cooked beef, because such meats are acknowledged by the canners to be flavorless unless there is present at least 35 to 75 per cent of water, thus involving the transportation of that amount of

innutritious matter in the ration. Many of the canned samples submitted to this board of stews, roast and boiled meats, etc., although otherwise good, are objectionable on this ground. The suggestion of peptonized or partially predigested meat is wholly at variance with the object in view in carrying an emergency ration which is to furnish to sound digestions the materials to keep them in function.

As all the department boards reported favorably on some variety of compressed soup to furnish a highly nitrogenous staple of the ration, and as the documentary evidence is strongly in favor of such an article, and as moreover this board has satisfied itself by personal experiment with regard to the preparation, palatability, and keeping qualities of certain of the compressed soups submitted, it concurs in the unanimous opinion of the department boards.

It was therefore moved that the bread, meat, and vegetable components of the emergency ration to be recommended for adoption should in general terms consist of hard bread, bacon, and some variety of compressed soup.

The board then, at 12.30 p. m., adjourned to meet to-morrow at 10 a. m.

WAR DEPARTMENT,
Washington, D. C., April 11, 1896.

The board met at 10 a. m., pursuant to adjournment. Present, all the members.

The board then proceeded to consider the character of the hard wheaten bread to be recommended as a portion of the emergency ration. It rejected the suggestion that any substance of a fatty nature be incorporated in the bread, as the evidence showed that such additions detracted from the keeping qualities of the finished article, and as, moreover, the bacon already recommended as a staple of the ration would furnish the soldier with the needful fat to be used at his pleasure.

It examined certain samples of hard bread submitted to it, and concluded that the best sample was that which became soonest permeated when soaked in hot water. The sample which gave the best response to this test was one which was slightly aerated, its substance being evenly pervaded with minute or pin-point vacuolations. Its density was somewhat lessened by this porosity, so that, pound for pound, it would occupy somewhat more space than ordinary hard bread; but the board considered that this could be offset in great part by exposing the aerated hard bread to a higher degree of heat than is used in the baking of the ordinary bread. By this treatment weight would be lessened by getting rid of a small percentage of water, the percentage of the nutritive elements being thereby increased, while some of the starch would be converted into dextrine. The ready permeability of this biscuit would reduce to a minimum the number of cases of diarrhea that in field service so frequently originate in imperfectly softened and masticated hard bread. It was the unanimous opinion of the board that bread thus permeable and browned on the surface would be improved in its keeping and nutritious qualities, and be more acceptable to the men than the present issue.

In conclusion on this subject, the board decided to recommend, as the hard bread of the emergency ration, that quality of bread which should form at the time the regulation issue of the Subsistence Department. The board, however, in this connection desires to invite the attention of superior authority to the possibility of improving the quality of the ordinary hard-bread ration on the lines indicated above.

The character of the bacon of the emergency ration was then discussed to determine whether it should be cooked or raw, or partially cooked, i. e., sterilized, and whether it was advisable to have a selected bacon containing, for instance, a larger percentage of lean than is found in ordinary issues. As a result of a full discussion of these points, the board decided on recommending, as the bacon of the emergency ration, an uncooked bacon of the quality which at the time should form the regular issue of the Subsistence Department.

The board then proceeded to discuss the character of the soup-making material which it desired to recommend as a component of the emergency ration. On account of a deficiency of proteids in the hard bread and bacon already recommended, it was evident that this component should contain a large per cent of this proximate element. This could be done either by incorporating powdered beef, or by the use of pea or bean meal. As a matter of fact, one or other of these meals appeared to enter into the composition of most of the samples submitted to the board. Most of them purported to contain meat and some showed the presence of fragments suggestive of dried beef as a constituent; but the proteids in the analysis before the board were not materially in excess of that which would be present were pease or beans the only component. All the samples before the board made excellent soups, but some required to be boiled twenty-five minutes, which is longer than is desirable in an article intended for an emergency ration.

To enable the board to have a better understanding of this subject, the recorder was directed to communicate with the manufacturers (see Appendices B^1, B^2, and B^3), and it was also decided to conduct some microscopic examinations of various articles of food before the board.

The board then adjourned to meet at 10 a. m., April 14, 1896.

WAR DEPARTMENT,
Washington, D. C., April 14, 1896.

The board met at 10 a. m. Present, all the members.

As the data desired by the board for the further consideration of soup-making materials were not at hand, this subject was passed over for the present, and consideration was given to other propositions and particularly to those relating to articles usually classified under the heading of accessory foods, stimulants, and condiments.

Cheese, suggested as a desirable article on account of its high proteids and calorific value, was rejected after a full presentation of the arguments pro and con, and chiefly because it appeared from the evidence before the board that the Subsistence Department had already made an unsuccessful effort to introduce it as an article of food for our troops.

The advisability of including tobacco among the components of an emergency ration was then considered. It is true that tobacco is not a food, but it is used so generally by soldiers during campaigns for the restful feeling which it induces that many men would rather go short on food than be deprived of their tobacco. Moreover those habituated to its use suffer acutely from its deprivation, and as it is the object of an emergency ration to keep up the powers of the individual at their maximum for the time being on the smallest weight of food to be carried, it is argued that half an ounce of tobacco would conduce more to comfort, while on short rations, than would the addition to the ration

of an extra half ounce of bread or bacon. While men who use tobacco always endeavor to provide themselves with it, experience shows that it can not always be purchased during campaigns and particularly in emergencies; and to the argument that many do not use tobacco the reply is brought forward that no man will find difficulty in disposing of his portion to others for an equivalent in some other article of the ration. The board therefore decided on including tobacco in the ration.

In taking up the consideration of coffee as a part of the emergency ration the claims of chocolate as a palatable, highly nutritious, and easily prepared accessory were discussed, but on motion it was voted down as failing to give that general satisfaction which is known to be obtained from the coffee ration. From the records it appears that seven of the department boards recommended coffee as a part of the emergency ration. This board concurs in the recommendation, as it believes coffee to be preferred generally in the United States to any other dietetic stimulant. But inasmuch as tea is recommended by one board and as an alternative by another, as the leaves can be put up in a suitable form, have good keeping qualities, and are more grateful to some tastes than coffee, while the active principle and physiological action are the same in both, the board recommends that tea may, when called for, be substituted for coffee in the emergency ration.

The board considered the efforts at concentration in the case of coffee to be practically failures, the solid extracts having no taste of coffee, while the fluid extracts had more of the flavor of chicory than the aroma of coffee. It therefore decided on recommending that the coffee of the emergency ration consist of roasted and ground coffee berries.

Several preparations of the kola nut, with much manuscript and printed literature on the subject, including recent analyses made in the laboratory of the Surgeon-General's Office, were reviewed by the board; but it regards the whole of this subject as in the experimental stage and as such unfit for serious consideration in discussing the constituents of an army ration.

The question of sweetening the coffee or tea, as between saccharin or sugar, was then brought up for settlement. The department boards were divided on this subject. On behalf of sugar the evidence showed that besides its sweetening power it has a high calorific value. Against saccharin was its novelty; but on its behalf it was found that the practically immaterial weight of 3 grains possessed the sweetening power of 2 ounces of sugar, that it had been used for long periods in much larger quantities than would be needful in an emergency ration with no detrimental influence on health, and that its antiseptic property would tend to lessen the prevalence of diarrheas due to intestinal fermentations. After obtaining full information on these and other points connected with the subject, the board decided on recommending saccharin as the sweetening agent of the emergency ration. The main consideration which led to this decision was the desirability of having a nitrogenous proximate principle in each of the articles which contributed materially to the weight of the ration, and as sugar contains no nitrogen the ounces which would have to be carried for sweetening would be more efficient for the general purposes of the ration if they contained a percentage of proteids.

It was then decided that pepper and salt, in quantities to be determined later, be recommended as components of the emergency ration.

The board then, at 11.15 a. m., adjourned to meet at 10 a. m. on Friday, the 17th instant.

WAR DEPARTMENT,
Washington, D. C., April 17, 1896.

The board met at 10 a. m., pursuant to adjournment. Present, all the members.

The board then proceeded to discuss the amount or quantity of the ration as a whole and of its various components. For the convenience of its members in appreciating the value of propositions in this connection it prepared the following table as the basis of its calculations. The precise character of the soup packets being still sub judice, the proximate elements of pea or bean meal were accepted as representing those of the soup material to be recommended hereafter.

1 ounce of 437.5 grains.	Nitrogen.	Carbon.	Calories.	Protein.	Fat.	Starches.
	Grains.	*Grains.*		*Ounce.*	*Ounce.*	*Ounce.*
Biscuit	10.71	183.5	107	0.156	0.013	0.734
Beans	15.96	173.1	98	.232	.021	.574
Peas	15.13	161.6	92	.22	.0198	.529
Bacon	6.05	273.6	203	.088	.733	.....

The question whether the emergency ration should be a minimum or bare-subsistence dietary or one possessing a high potential energy was then discussed at length. In this discussion it became apparent that the board was unanimous in the opinion that when emergency rations are issued to troops it is to be expected that serious work is ahead of them, and that a ration of high calorific value is needful to sustain them under the conditions.

The board recognized that the difference in weight between that which is generally accepted as a standard diet for any ordinary man under ordinary conditions of labor and the ration which will sustain the soldier under emergency calls to unusual strain is only a few ounces, and the experience of its members authorized the belief that the high condition of the men resulting from full diet on such occasions would be bought cheaply by the carriage of the extra ounces on the person. Moreover, the board appreciated that if the emergency did not call for any unusual strain on the physical powers, or if from any cause it became needful to economize during the emergency, the extra ounces of a ration, based on a maximum requirement, could be withheld from consumption to constitute the ration of a period in excess of the face value of the emergency issue.

Guided chiefly by these considerations the board decided that the emergency ration should contain as much of the proximate principles of food as is necessary to sustain the soldier under the maximum of physical strain.

The board then adjourned to meet at 10 a. m. on Monday, the 20th instant.

WAR DEPARTMENT,
Washington, D. C., April 20, 1896.

The board met at 10 o'clock a. m., pursuant to adjournment. Present, all the members.

The members of the board each then submitted their opinions as to the constituents of the emergency ration. These memoranda are hereto annexed, marked C^1, C^2, C^3, and C^4.

On motion it was then decided that the weight of the emergency

ration should not exceed 34 ounces, and that the amounts of the various components should be as follows:

	Ounces.
Hard bread	16
Bacon	10
Pea soup with meat extract	4
Coffee, roasted and ground, with 4 grains saccharin (Or tea, ½ ounce, with 4 grains saccharin.)	2
Tobacco	.5
Salt (same as at present)	.64
Pepper (same as at present)	.04
Net weight, with coffee	33.18
Net weight, with tea	31.68

The nutritive value of this ration is as follows:

Constituent.	Protein.	Fats.	Carbohydrates.	Calories.
16 ounces hard bread	2.496	0.208	11.744	1,712
10 ounces bacon	.88	7.33	.....	2,030
4 ounces pea soup	.88	.0792	2.111	368
Total	4.256	7.6172	13.855	4,110

The reply to letter of the 11th instant to Mr. Louis Weidner was received, laid before the board, and is hereto appended, marked B[lx].

The board then adjourned to meet at 10 a. m. on Wednesday, the 22d instant.

WAR DEPARTMENT,
Washington, D. C., April 22, 1896.

The board met at 10 a. m., pursuant to adjournment. Present, all the members.

It was decided to be unnecessary to incorporate an antiscorbutic element in the emergency ration, as well-fed troops will not suffer from a temporary deprivation of fresh vegetables, and should never require the issue of vinegar, lime juice, or other articles of medicinal quality.

The form of package of the pea soup was then discussed and the conclusion arrived at that a cylindrical package would be most suitable as being less likely to become broken when carried in the saddlebags or haversack.

It was also decided to recommend that there be kept on hand in the Subsistence Department a tough paraffin paper for use in wrapping about bacon when carried on the person.

The board then at 11.30 a. m. adjourned to meet to-morrow, the 23d instant, at 10 a. m.

WAR DEPARTMENT,
Washington, D. C., April 23, 1896.

The board met at 10 o'clock a. m., pursuant to adjournment. Present, all the members.

Practical experiments were made in determination of the strength of coffee component of the ration, and it was considered that if the sol-

dier be allowed 3 quarts of coffee, 2 ounces is not too great an amount to be issued.

Experiment was also made with view to utilizing a small quantity of bacon, cut in small pieces, cooked with pea soup. This has the effect of making a richer and more palatable soup, and will be found an acceptable way of utilizing bacon by those to whom an excess of fats is more or less distasteful.

The carrying of the ration was next discussed, and effort made in a practical way to ascertain how many rations could be carried on the soldier.

The board then adjourned to meet to-morrow, the 24th instant, at 10 o'clock a. m.

WAR DEPARTMENT,
Washington, D. C., April 24, 1896.

The board met, pursuant to adjournment, at 10 o'clock a. m. Present, all the members.

It was decided by the board to recommend that five days' emergency rations be the maximum number to be carried by the soldier.

It was also decided to recommend that the Subsistence Department supply the pea soup in compressed form and in a cylindrical package.

As to "the minimum amount of articles of food necessary to sustain a soldier in health and activity while in active service in the field for a limited period," the board is of the opinion that half of the emergency ration adopted will suffice for this purpose; in fact, one of the considerations which has influenced the board in recommending a liberal emergency ration is the desirability of having it sufficiently large that when placed on half rations, in cases of emergency, troops will still have enough food to keep them for a limited period while in active service in the field in health and activity. The nutritive value of this ration will be as follows:

	Protein	Fats.	Carbohydrates.	Calories.
8 ounces hard bread	1.248	.104	5.872	856
5 ounces bacon	.44	3.665		1,015
2 ounces pea soup	.44	.0396	1.0555	184
Total	2.128	3.8086	6.9275	2,055

The board also recommends that suitable bags be prepared and supplied by the Subsistence Department in such numbers as may be necessary for carrying the roasted and ground coffee, salt, and pepper.

It was then decided that the president and the recorder should prepare from the foregoing record of proceedings a formal report containing a summary of all the experiments, conclusions, and recommendations of the board. This to be submitted at the next meeting.

The board then adjourned to meet at the call of the president.

WAR DEPARTMENT,
Washington, D. C., April 30, 1896.

The board met at the call of the president at 10 a. m. Present, all the members.

The board then proceeded to carefully review the summary of the foregoing record of proceedings, pending the completion of which it adjourned to meet to-morrow, the 1st proximo.

WAR DEPARTMENT,
Washington, D. C., May 1, 1896.

The board met, pursuant to adjournment, at 10.20 a. m. Present, all the members.

The board resumed and completed the review of the summary of record of proceedings and then adjourned until 10 a. m. the 4th instant, to enable the recorder to have it typewritten.

WAR DEPARTMENT,
Washington, D. C., May 4, 1896.

The board met, pursuant to adjournment, at 10 a. m. Present, all the members.

The board then read and approved the typewritten copy of the summary of the proceedings, which is submitted with this record.

The board also directed that a report of the results of practical tests of various articles of food suitable, to a greater or less extent, as components of an emergency ration, which were made from time to time by members of the board be transmitted herewith.

There being no further business before it, the board then adjourned sine die.

CH. SMART,
Major and Surgeon, President.
W. C. BROWN,
First Lieutenant, First Cavalry, Recorder.

A[1].

The order convening this board contains the clause, "a proper ration for troops operating in emergencies." I regard the word "emergencies" in this order as meaning, primarily, those occasions developed in the course of field service during which such service is required of the troops as will probably separate them for a time from their regular supplies. The emergency is the more or less sudden call to special activity.

On the other hand, an emergency may be constituted by the mere absence of the regular supplies, and even irrespective of any special call to activity on the part of the troops. Hence, I would define the word as occasions on which from any cause it is impossible to furnish the troops with their regular field rations.

Some of the emergencies may be foreseen and to some extent prepared for by special issues—emergency rations. Others can not be foreseen and must be prepared for by having a personal ration always carried by the soldier. Will one style of ration answer both purposes?

CH. SMART,
Major and Surgeon, U. S. A.

WASHINGTON, D. C., *April 10, 1896.*

A[2].

WASHINGTON, D. C., *April 10, 1896.*

The "emergencies" of this order (Special Order No. 74, Headquarters Army, March 28, 1896) are the same as those of letter of the Commissary-General of Subsistence of April 17, 1895, from which the word is quoted.

That letter said: "There is believed to be still wanting in our service a special and distinctive ration (for use in substitution of the ordinary ration) to be carried on the person of the soldier on emergent occasions where transportation is limited or is not available."

That is, the commissary provides for the ordinary exigencies, but must be provided with suitable material to meet the emergencies as they arise. The "emergencies" or

"emergent occasions," then, are where a part or the whole of a command, large or small, must largely or wholly depend upon food carried upon the person; hence, a ration that with the minimum of weight possesses the maximum of potential energy.

C. A. WOODRUFF,
Major and Commissary of Subsistence, United States Army.

A[3].

It seems to me that the emergency contemplated in the order convening this and the department boards is that which arises during the ordinary exigencies of service; that is, when troops are temporarily separated from their source of subsistence.

I take it that we are to provide a portable ration possessing the proper food value, and of such weight and volume that the soldier can carry at least five of them without discomfort.

Any idea of an "iron ration" to be carried on the person untouched for an indefinite period, in my opinion, should be dismissed; the American soldier is too self-reliant to admit the necessity of lugging around food, of a questionable kind too, for use a month, a year, hence or never.

Consequently I am in favor of adopting a liberal ration on the lines of our present ration, introducing a portable vegetable constituent.

E. A. GARLINGTON,
Major, Inspector-General.

A[4].

The Commissary-General of Subsistence suggested the need of a distinctive ration (for use in substitution of the ordinary ration) to be carried on the person of the soldier on emergent occasions, when transportation is limited or is not available.

"Emergent occasions" I would put under two general classes:

First. When food is required for future consumption, as when a command is ordered out suddenly for a forced march through a country not easily traversed by transportation, and when the trains are likely to be for a few days too far away to be depended upon.

Second. When food is required for immediate or almost immediate consumption by troops, as when a command is awakened unexpectedly and ordered to reenforce before daylight a weak portion of a line of battle, with no time to draw, cook, or otherwise prepare the regular ration. Similarly for troops doing picket, advance and rear guard duty, on occasions when impracticable to supply them cooked food from the main body.

To meet the "emergent occasion," the ration, or some part of it sufficient to sustain strength for short periods, should be easy to prepare from means at hand, and by men wounded, or separated, for any reason, from a command.

L. A. CRAIG,
Captain, Sixth Cavalry.

A[5].

WAR DEPARTMENT,
EMERGENCY RATION BOARD,
Washington, April 7, 1896.

GENTLEMEN: In pursuance of the resolution of the board, I have the honor to give as follows what in my opinion constitutes such an "emergency" as to require the carrying of an emergency ration.

First. In time of peace: On all marches, even practice marches, and changes of station by marching, troops should be provided with some means of allaying hunger in case of accident to the transportation. This should be in the shape of the compressed soup and coffee (or tea) component of the regular "emergency ration" such as is to be recommended by the board. This is to be used, however, only when ordered by the commanding officer.

Second. In time of war: All cavalry raids and all maneuver marches of all arms immediately preceding a battle are such emergencies as require from one to five emergency rations to be carried by the soldier. Cavalry and light artillery will of course be able to carry more than the infantry.

The number of rations to be carried should be prescribed by the officer directing the movements, who is the best judge of the time troops will probably be separated from their trains.

It is impossible to foresee all contingencies which may arise in service calling for the issuance of "emergency rations," but the cases cited are those which it is thought are most likely to occur.

Very respectfully,

W. C. BROWN,
First Lieutenant, First Cavalry.

The MEMBERS OF THE EMERGENCY RATION BOARD.

B[1].

WAR DEPARTMENT,
EMERGENCY RATION BOARD,
Washington, April 11, 1896.

DEAR SIR: I am directed by the board of officers convened by Special Orders, No. 74, c. s., A. G. O., (copy inclosed), to ask for such information as you may be willing to give us concerning the compressed soups, particularly the pea and bean soups, recently manufactured by you.

Information is desired covering, as far as possible, the following points:

First. The constituents of soups, with proportions of each constituent.

Second. Method of manufacture.

Third. Results of any tests as to keeping qualities of these soups.

Fourth. How do they differ, if at all, from the Erbswürste used in the German army?

Fifth. Is it practicable to so prepare your pea soup that it can, in emergencies, be eaten without being cooked?

Sixth. Is there in the United States any machinery for the manufacture of these soups. And if so, kindly give approximate cost.

Very truly, yours,

W. C. BROWN,
First Lieutenant, First Cavalry,
Recorder, Emergency Ration Board.

Mr. LOUIS WEIDNER,
1017 Seminary Avenue, Chicago, Ill.

B[1x].

CHICAGO, ILL., *April 18, 1896.*

DEAR SIR: In answer to your esteemed favor of the 11th instant, I beg to say:

Question. "First. The constituents of soups, with proportion of each constituent?"

Question. "Second. Method of manufacture?"

Answer. I can not very well answer. As you are aware, it has cost me a good deal of time and a great amount of money to learn how to make compressed soups, and to reveal my secrets without any compensation would be foolish, as I hope very much to utilize same once more by manufacturing within a future time. The constituents of the soups are all such as nature has given them. They contain no chemicals or drugs whatsoever. Even if I would explain the method of manufacture, it would be very difficult to make the soups for inexperienced parties.

Question. "Third. Results of any tests as to keeping quality of these soups?"

Answer. The keeping qualities of these soups are from twelve to eighteen months, if the soups are kept in a cool place. Tests have been made to this effect in Europe, United States of America, South America, China, and Japan. Since giving up the manufacture of soups, I have found a method to extend the keeping qualities from eighteen to thirty months.

Question. "Fourth. How do they differ, if at all, from the Erbswürste used in the German army?"

Answer. They differ in quality. My soups are better quality, because, on account of lower prices of meat in our country, I use more of same.

Question. "Fifth. Is it practicable to so prepare your pea soup that it can, in emergencies, be eaten without being cooked?"

Answer. No; but in emergency cases it is only necessary to cook the soup for five minutes.

Question. "Sixth. Is there in the United States any machinery for the manufacture of these soups? And if so, kindly give approximate cost."

Answer. I have machinery for the manufacture of these soups; they cost me about $2,500. Some of them had to be made specially after my ideas and sketches. This machinery would be sufficient to furnish the Government with all emergency rations needed, even in war times.

The cost of pea and bean soup made in parchment rolls of one-half pound (equal to 12 plates of soup), parchment paper and label included, would be from 3½ to 4 cents per roll, without labor; in large quantities, cheaper.

If the Government would manufacture the soup, I would be willing to superintend the factory, put up the plant, and give all recipes and information, if engaged to do so.

Respectfully, yours,

LOUIS WEIDNER,
1017 Seminary Avenue.

W. C. BROWN, Esq.,
First Lieutenant, First Cavalry,
Recorder Emergency Ration Board, Washington, D. C.

B².

WAR DEPARTMENT,
EMERGENCY RATION BOARD,
Washington, April 18, 1896.

GENTLEMEN: I am directed by the board of officers convened by Special Order, No. 74, c. s., A. G. O., (copy inclosed), to ask for such information as you may be willing to give us concerning the compressed soups, particularly the pea and bean soups, manufactured by you.

Information is desired covering, as far as possible, the following points:

First. The constituents of soups, with proportions of each constituent.

Second. Method of manufacture.

Third. Results of any tests as to keeping qualities.

Fourth. Is it practicable to prepare your pea soup so that it can, in emergencies, be eaten without being cooked? An early reply is requested.

Very truly, yours,

W. C. BROWN,
First Lieutenant, First Cavalry,
Recorder Emergency Ration Board.

The C. W. KOPF COMPANY,
130 Lincoln Street, Boston, Mass.

P. S.—A copy of this letter was sent to your New York address on the 11th instant, but thus far no reply has been received.

W. C. B.

B².

NEW YORK, *April 29, 1896.*

SIR: In response to your letter of the 27th instant, we beg to inform you that on inquiry we learn Kopf's Compressed Pea Soup is no longer being made. We know of but one soup of this kind that is on the market at present, which is a German preparation, manufactured by C. H. Knorr, of Heilbronn, Germany, and which can be procured here from Messrs. Bogle & Scott, Hudson and North Moore streets, this city.

Trusting the foregoing information will be of service to you, we remain,

Very respectfully,

PARK & TILFORD,
Per J. H. TONJES.

Lieut. W. C. BROWN,
Emergency Ration Board,
War Department, Washington, D. C.

B³.

WAR DEPARTMENT, EMERGENCY RATION BOARD,
Washington, April 11, 1896.

GENTLEMEN: I am directed by the board of officers convened by Special Order, No. 74, c. s., A. G. O., (copy inclosed), to ask for such information as you may be willing

to give us concerning the compressed soups—particularly the pea and bean soups—manufactured by you.

Information is desired covering, as far as possible, the following points:

First. The constituents of soups, with proportions of each constituent.

Second. Method of manufacture.

Third. Results of any tests as to keeping qualities.

Fourth. Is it practicable to prepare your pea soup so that it can, in emergencies, be eaten without being cooked?

Very truly, yours,

W. C. BROWN,
First Lieutenant, First Cavalry,
Recorder Emergency Ration Board.

The CALIFORNIA DESICCATED FOOD COMPANY,
103 Commercial street, San Francisco, Cal.

No reply received.

W. C. BROWN,
First Lieutenant, First Cavalry, Recorder.

C[1].

WAR DEPARTMENT,
Washington, D. C., April 21, 1896.

GENTLEMEN: I would propose the following as the quantity of the articles to constitute one emergency ration:

Hard bread	ounces..	16
Bacon	do....	8
Pea meal	do....	6
Coffee	do....	2
Saccharin	grains..	4
Pepper	ounce..	$\frac{1}{25}$
Salt	do....	$\frac{1}{2}$
Tobacco	do....	$\frac{1}{2}$

Respectfully,

CH. SMART,
Major and Surgeon, United States Army.

The MEMBERS OF THE EMERGENCY RATION BOARD.

C[2].

Proposed emergency ration.

	Calories.
16 ounces hard bread	1,712
12 ounces bacon	2,436
5 ounces soup material, one-half pea, one-half bean	460
$1\frac{7}{25}$ ounces coffee, roasted and ground, or eight twenty-fifths ounce tea, preferably in tablets, 3 grains saccharin.	
One-half ounce tobacco.	
Total weight with coffee, $34\frac{4}{5}$ ounces, value	4,608

Minimum (one-half ration), $17\frac{1}{2}$ ounces; value, 2,304 calories, or, with one-half beef on the hoof, 2 pounds per ration.

	Calories.
8 ounces hard bread	856
6 ounces bacon	1,218
Beef	1,180
5 ounces soup material	460
$1\frac{7}{25}$ ounces coffee, or eight twenty-fifths ounce tea.	
One-half ounce tobacco.	
Total weight with coffee, $20\frac{4}{5}$ ounces, value	3,714

The soldier carries only 7 pounds, but has five days' good substantial rations, or, with beef on the hoof, 2 pounds per ration.

	Calories.
8 ounces hard bread	856
Beef	2,360
5 ounces soup material	460
$1\frac{7}{25}$ ounces coffee, or eight twenty-fifths ounce tea.	
One-half ounce tobacco.	
Total weight with coffee, $14\frac{1}{2}$ ounces, value	3,676
or—	
16 ounces hard bread	1,712
6 ounces bacon	1,218
6 ounces cheese, skim milk	436
5 ounces soup material	460
$1\frac{7}{25}$ ounces coffee, roasted and ground, or eight twenty-fifths ounce tea, 3 grains saccharin.	
One-half ounce tobacco.	
Total weight with coffee, $34\frac{1}{2}$ ounces, value	3,826

C. A. WOODRUFF,
Major and Commissary of Subsistence.

C[3].

Emergency ration proposed by Major Garlington.

	Ounces.	Protein.	Starch.	Fat.
Biscuit	16	2.496	11.744	0.208
Soup material	4	.88	2.116	.0792
Bacon	8	.704		5.864
Coffee	2			
Tobacco	.5			
Salt and pepper	1			
Total	31.5	4.080	13.860	6.1512

E. A. GARLINGTON,
Major, Inspector-General.
L. A. CRAIG,
Captain, Sixth Cavalry.

MEMORANDUM RELATING TO PROPOSED EMERGENCY RATION.

It is assumed that on occasions when the emergency ration will be required that the work of the soldier will usually be the hardest which he has to perform.

Now, the desired amount of the elementary food constituents for a man engaged in very hard work is as follows: Protein, 6.2 to 6.5 ounces; fats, 4.5 ounces; carbohydrates, 17 ounces.

Let us assume the calories at 3,745, which is considerably more than is required for "hard work," but not quite what is demanded for "very hard work."

An examination of the analyses of the various articles to which we are limited in making an emergency ration shows at once that to keep within reasonable limits and get the desired amount of protein will be difficult, but as ordinary issue bacon has been selected as the meat component, it will be easy enough to get all, and more, than the required amount of fat.

The ration may be deficient in carbohydrates, but that is relatively unimportant. It will not be especially difficult to secure the proper number of calories.

The department boards as a whole have recommended a ration about as follows: Hard bread, 12 ounces; meat, 8 ounces; soup, 4 ounces.

A calculation shows that this ration for "very hard work" is very deficient in proteids, carries more than sufficient fats, and is deficient again in carbohydrates and, what is of most importance, in calories.

It is therefore proposed to increase the hard bread by 4 ounces, the pea soup by 1 ounce, as well as by 2 ounces of coarsely powdered dried beef, these being relatively rich in protein.

The bacon it is proposed to reduce to 6 ounces, for that amount will still give all the fats required. It is also recommended that whenever practicable that this component be breakfast bacon containing a large proportion of lean, which will not only be more acceptable to the men, but will in part make up the deficiency in proteids.

I regret that I can not join in the recommendation made by the other members of the board that tobacco be made a component part of the emergency ration, although I believe it to be important that men who are accustomed to its use should not in times of emergency be deprived of it, and every effort should be made to secure it for them.

To incorporate it in an emergency ration, however, is to induce men who are not accustomed to its use to try it, and to experiment with their nervous systems at the very time when they are undergoing the greatest strain; this it is thought would at best be a doubtful experiment, would be unwise, and is at variance with the principles on which the board has acted in selecting, as far as practicable, as components of the emergency ration, articles with which the men are already more or less familiar.

I therefore recommend the following:

	Protein.	Fats.	Carbohydrates.	Calories.
16 ounces hard bread	2.496	0.208	11.744	1,712
5 ounces pea soup	1.1	.099	2.645	460
2 ounces powdered dry beef	1.36	.24	.....	221
6 ounces bacon	.528	4.398	.....	1,218
Total	4.484	4.945	14.389	3,611

One and seven twenty-fifths ounces of coffee, roasted and ground; sixteen twenty-fifths ounce of salt, and one twenty-fifth ounce of pepper.

W. C. BROWN,
First Lieutenant, First Cavalry.

EMERGENCY RATION BOARD,
War Department, April 21, 1896.

MEMORANDUM OF TESTS OF VARIOUS ARTICLES OF FOOD SUBMITTED TO THE BOARD.

Tanty's concentrated French soup.—One can makes four times that bulk of rich and very palatable soup containing pieces of beef of various sizes up to as large as a walnut. Well suited for officers' supplies, but not suitable for an emergency ration.

Tests made by Major Smart, Major Woodruff, and Lieutenant Brown, April 7.

Kopf's pea soup (in pasteboard cartridge).—This sample had been on hand for over four years, and most of the time in Arizona, and no especial care taken to keep it fresh.

Boiled 10 minutes.

Soup good, with, however, a slight taint, which was due either to the pasteboard covering or possibly to the deterioration of the soup material.

Tests made by Major Woodruff and Lieutenant Brown, April 14.

Lazenby & Co.'s soup squares (haricot).—Very hard and difficult to break up.

Boiled 25 minutes.

Makes very good soup; thinner than the usual bean and pea soups, and contains apparently a considerable proportion of meat extract.

Tests made by Major Woodruff and Lieutenant Brown, April 14.

Weidner's bean soup (tablet).—Sample had been on hand at least three years. Very palatable and appetizing and nourishing, but requires too long (25 minutes) for cooking. Evidently contains beef extract.

Tests made by Major Smart, Major Woodruff, and Lieutenant Brown, April 10.

California Desiccated Food Company's pea soup (package).—Cooked 20 minutes.

Not as thick as Knorr's. Rather more salty than Knorr's or Weidner's, and not so good as either of the others tested.

Tests made by Major Smart, April 10.

The National Condensing Works' cocoa cream and sugar (powdered in can).—Is rather inferior to commissary chocolate. Nothing wrong about it, however; very fair.

Tests made by Major Smart, Major Woodruff, and Lieutenant Brown, April 10.

Kopf pea soup (in cylindrical package, 2 inches in diameter, 2¾ inches high).—Boiled 20 minutes.

Not sufficiently salty, and not quite equal to some of the other brands.

Tests made by Major Woodruff and Lieutenant Brown, April 11.

The regulation biscuit (French army).—Sample allowed to soak in hot water. Requires longer time to soften than either the United States hard bread or the nouveau pain de guerre. Hardly as palatable as that used in the United States Army.

Tests made by Major Smart and Lieutenant Brown, April 7.

Nouveau pain de guerre (French army).—Is quite a superior article; palatable, and has the peculiarity of having distributed through it uniformly very minute cells, probably the result of mixing thoroughly in the dough a small quantity of carbonate of ammonia. Swells considerably in soaking, though not more than United States hard bread.

Tests made by Major Smart and Lieutenant Brown, April 7.

United States hard bread (small crackers made in Omaha).—Quite flaky; swells considerably on being soaked.

Tests made by Major Smart and Lieutenant Brown, April 7.

Mocha tablet.—Has, when made as directed, absolutely no coffee taste whatever (probably chicory and licorice with saccharin).

Tests made by Major Smart and Lieutenant Brown, April 7.

Caffé cosmicos.—Contains coffee ground very fine. Makes very fair coffee.

Tests made by Major Smart, Major Woodruff, and Lieutenant Brown, April 7.

Bovril cartridge.—Cooked for 10 minutes, as per directions. When made according to directions, it makes a thick mush. It is very palatable. (See Report of Emergency Ration Board, Department of the Missouri.)

Tests made by Major Woodruff and Lieutenant Brown, April 15.

Bovril cartridge (blue).—Makes rather an inferior wet hash. (See Report Department of the Missouri.)

Tests made by Major Woodruff and Lieutenant Brown, April 11.

Knorr's pea soup (in parchment roll or sausage-shaped package).—Excellent, rich, and palatable. Tastes a little like a rich gravy. Sample tested was allowed to boil 12 minutes.

Tests made by Major Smart, Major Woodruff, and Lieutenant Brown, April 10.

Lentils (Army Conserve Factory, Mayence; prepared 1894–95).—Boiled 8 minutes. Good, palatable, rich soup. Evidently contains considerable meat extract.

Tests made by Major Woodruff and Lieutenant Brown.

Café instantané (P. Robertet et Ce., Paris).—Very fair. Evidently contains coffee and some chicory.

Tests made by Major Smart, Major Woodruff, and Lieutenant Brown, April 10.

Crystallized entire egg (C. Fred Lamont, New York).—Prepared according to directions, but makes a very poor substitute for the real article.

Tests made by Major Smart, Major Woodruff, and Lieutenant Brown.

SUMMARY OF PROCEEDINGS, EXPERIMENTS, CONCLUSIONS, AND RECOMMENDATIONS OF THE BOARD.

WAR DEPARTMENT,
Washington, D. C., May 4, 1896.

The board met, pursuant to the foregoing order,[1] on March 31, 1896, and after some discussion it was decided that all reports and correspondence submitted to the board should be carefully read by its members individually, in order that each should have a full understanding of the subject submitted to it before further proceedings were held.

The board has held frequent sessions during the past month, as is shown by the accompanying daily record of proceedings.

The questions as to what should constitute such an emergency as to require the use of the emergency ration was first discussed, and it was decided that in the opinion of the board "emergencies" are occasions on which, from any cause, the troops are mainly dependent on food carried on the person.

The emergency rations recommended by the department boards were then considered, in connection with various articles of food supply

[1] Special order No. 74, Headquarters Army, Adjutant General's Office, March 28, 1896.

submitted to this board, as suggested components of an emergency ration, and with the various communications on these articles and on the general subject. It appears that of the eight boards, six recommended a hard bread, pure and simple, one a bread from whole wheat, and another a hard bread composed of one-fifth oatmeal and four-fifths wheat.

In the matter of meat, five of the boards recommended bacon, one dried (chipped smoked) beef, another a cooked beef, one-third of which should be fat, and a third board a meat compound composed of one part pork and three parts corned beef.

The reports of the department boards indicate a general belief that it would be unwise to select, as the staples of an emergency ration, any article of food with which the soldier is not familiar, or which would make a material change in his dietary during the continuance of the emergency; for articles of known value will give greater satisfaction, other things being equal, than those of unknown or unusual character, and change of diet is to be deprecated at a time when the energies of the soldier have to be sustained under conditions of strain.

This board concurs in these views, and therefore rejects the suggestion of a bread containing oatmeal, which, although nutritious, palatable, and in other respects good, is open to the objection that, while it may be satisfying to individuals, the more familiar wheaten biscuit or hard bread is probably more acceptable to the majority of soldiers. It rejects, also, the bread made from whole wheat as known to be causative of diarrhea, and when tried, as was to be expected, it failed.

On similar grounds, this board rejects all suggestions of pemmicans or meat pastes prepared from dried and powdered beef, although some of these make nutritious and palatable dishes when well spiced and highly flavored with extractives. It rejects the suggestion of corned beef and dried and smoked beef, because much of the extractives are lost and the albuminoids hardened in their manufacture, and the suggestion of canned cooked beef, because such meats are acknowledged by the canners to be flavorless unless there is present at least 35 to 75 per cent of water, thus involving the transportation of that amount of innutritious matter in the ration. Many of the canned samples submitted to this board of stews, roast and boiled meats, etc., although otherwise good, are objectionable on this ground. The suggestion of peptonized or partially predigested meat is wholly at variance with the object in view in carrying an emergency ration which is to furnish to sound digestions the materials to keep them in function.

As all the department boards reported favorably on some variety of compressed soup to furnish a highly nitrogenous staple of the ration, and as the documentary evidence is strongly in favor of such an article, and as, moreover, this board has satisfied itself by personal experiment with regard to the preparation, palatability, and keeping qualities of certain of the compressed soups submitted, it concurs in the unanimous opinion of the department boards.

It was therefore decided that the three food staples of the emergency ration to be recommended for adoption should, in general terms, consist of hard bread, bacon, and some variety of compressed soup.

The board then proceeded to consider the character of the hard wheaten bread to be recommended as a portion of the emergency ration. It rejected the suggestion that any substance of a fatty nature be incorporated in the bread, as the evidence showed that such additions detracted from the keeping qualities of the finished article, and as, moreover, the bacon already recommended as a staple of the ration would furnish the soldier with the needful fat to be used at his pleasure.

It examined certain samples of hard bread submitted to it, and

concluded that the best sample was that which became soonest permeated when soaked in hot water. The sample which gave the best response to this test was one which was slightly aerated, its substance being evenly pervaded with minute or pin-point vacuolations. Its density was somewhat lessened by this porosity, so that, pound for pound, it would occupy somewhat more space than ordinary hard bread; but the board considered that this could be offset in great part by exposing the aerated hard bread to a higher degree of heat than is used in the baking of the ordinary bread; by this treatment weight would be lessened by getting rid of a small percentage of water, the percentage of the nutritive elements being thereby increased, while some of the starch would be converted into dextrine. The ready permeability of this biscuit would reduce to a minimum the number of cases of diarrhea that in field service so frequently originate in imperfectly softened and masticated hard bread. It was the unanimous opinion of the board that bread thus permeable, and browned on the surface, would be improved in its keeping and nutritious qualities, and be more acceptable to the men than the present issue.

In conclusion, on this subject the board decided to recommend, as the hard bread of the emergency ration, that quality of bread which should form at the time the regulation issue of the Subsistence Department. The board, however, in this connection, desires to invite the attention of superior authority to the possibility of improving the quality of the ordinary hard bread ration on the lines indicated above.

The character of the bacon of the emergency ration was then discussed to determine whether it should be cooked or raw, or partially cooked, i. e., sterilized, and whether it was advisable to have a selected bacon containing, for instance, a larger percentage of lean than is found in ordinary issues. As a result of a full discussion of these points, the board decided on recommending as the bacon of the emergency ration an uncooked bacon of the quality which at the time should form the regular issue of the Subsistence Department, preference being given to those cuts having the largest proportion of lean meat.

The board then proceeded to discuss the character of the soup-making material which it desired to recommend as a component of the emergency ration. On account of a deficiency of proteids in the hard bread and bacon already recommended, it was evident that this component should contain a large per cent of this proximate element. This could be done either by incorporating powdered beef, or by the use of pea or bean meal. As a matter of fact, one or the other of these meals appeared to enter into the composition of most of the samples submitted to the board. Most of them purported to contain meat, and some showed the presence of fragments suggestive of dried beef as a constituent; but the proteids in the analysis before the board were not materially in excess of that which would be present were pease or beans the only component. All the samples before the board made excellent soups, but some required to be boiled twenty-five minutes, which is longer than is desirable in an article intended for an emergency ration.

The board has been unable to obtain from those who have manufactured compressed soups in this country as full information as is desirable. The details of the manufacture of these soups being trade secrets, it is impossible on a mere request to secure them. So far as known there have been but three firms in this country who have manufactured these soups, but the demand for them has been so slight that two of the concerns have suspended operations, while the third apparently carries but a small stock.

The board suggests that the attention of the Subsistence Department

be directed to the elaboration of a soup-making material of the kind mentioned, and in the meantime recommends that pea meal be adopted for this part of the ration, as a palatable soup can be made from this meal when seasoned with finely chopped bacon, pepper, and salt.

Cheese, suggested as a desirable article on account of its high proteids and calorific value, was rejected after a full presentation of the arguments pro and con, and chiefly because it appeared from the evidence before the board that the Subsistence Department had already made an unsuccessful effort to introduce it as an article of food for our troops.

In taking up the consideration of coffee as a part of the emergency ration, the claims of chocolate as a palatable, highly nutritious, and easily prepared accessory were discussed, but on motion it was voted down as failing to give that general satisfaction which is known to be obtained from the coffee ration. From the records it appears that seven of the department boards recommended coffee as a part of the emergency ration. This board concurs in the recommendation, as it believes coffee to be preferred generally in the United States to any other dietetic stimulant. But, inasmuch as tea is recommended by one board and as an alternative by another, as the leaves can be put up in a suitable form, have good keeping qualities, and are more grateful to some tastes than coffee, while the active principle and physiological action are the same in both, the board recommends that tea may, when called for, be substituted for coffee in the emergency ration.

The board considered the efforts at concentration in the case of coffee to be practically failures, the solid extracts having no taste of coffee, while the fluid extracts had more of the flavor of chicory than of the aroma of coffee. It therefore decided on recommending that the coffee of the emergency ration consist of roasted and ground coffee berries.

Several preparations of the kola nut, with much manuscript and printed literature on the subject, including recent analyses made in the laboratory of the Surgeon-General's Office, were reviewed by the board; but it regards the whole of this subject as in the experimental stage, and, as such, unfit for serious consideration in discussing the constituents of an army ration.

The question of sweetening the coffee or tea, as between saccharin or sugar, was then brought up for settlement. The department boards were divided on this subject. On behalf of sugar the evidence showed that besides its sweetening power it has a high calorific value. Against saccharin was its novelty; but on its behalf it was found that the practically immaterial weight of 4 grains possessed the sweetening power of 2 ounces of sugar; that it has been used for long periods in much larger quantities than would be needful in an emergency ration with no detrimental influence on health, and that its antiseptic property would tend to lessen the prevalence of diarrhea due to intestinal fermentations. After obtaining full information on these and other points connected with the subject, the board decided on recommending saccharin as the sweetening agent of the emergency ration. The main consideration which led to this decision was the desirability of having a nitrogenous proximate principle in each of the articles which contributed materially to the weight of the ration, and as sugar contains no nitrogen it was believed that greater efficiency would be obtained if 2 ounces of some article containing proteids were substituted for it in the emergency ration.

It was then decided that pepper and salt, in quantities to be determined later, be recommended as components of the emergency ration.

The advisability of including tobacco among the components of an emergency ration was then considered. It is true that tobacco is not a food; but it is used so generally by soldiers during campaigns for the restful feeling which it induces, that many men would rather go short on food than be deprived of their tobacco. Moreover, those habituated to its use suffer acutely from its deprivation, and as it is the object of an emergency ration to keep up the powers of the individual at their maximum for the time being on the smallest weight of food to be carried, it is argued that half an ounce of tobacco would conduce more to comfort while on short rations than would the addition to the ration of an extra half ounce of bread or bacon. While men who use tobacco always endeavor to provide themselves with it, experience shows that it can not always be purchased during campaigns, and particularly in emergencies; and to the argument that many do not use tobacco, the reply is brought forward that no man will find difficulty in disposing of his portion to others for an equivalent in some other article of the ration.

The board then proceeded to discuss the amount or quantity of the ration as a whole, and of its various components. For the convenience of its members in appreciating the value of propositions in this connection, it prepared the following table as the basis of its calculations:

One ounce of 437.5 grains.*	Nitrogen.	Carbon.	Calories.	Protein.	Fat.	Starches.
	Grains.	*Grains.*		*Ounce.*	*Ounce.*	*Ounce.*
Biscuit	10.71	183.5	107	0.156	0.013	0.734
Beans	15.96	173.1	98	.232	.021	.574
Peas	15.13	161.6	92	.22	.0198	.529
Bacon	6.05	273.6	203	.088	.733	.....

The question whether the emergency ration should be a minimum or bare subsistence dietary, or one possessing a high potential energy, was then discussed at length. In this discussion it became apparent that the board was unanimous in the opinion that when emergency rations are issued to troops, it is to be expected that serious work is ahead of them, and that a ration of high calorific value is needful to sustain them under these conditions.

The board recognized that the difference in weight between that which is generally accepted as a standard diet for any ordinary man under ordinary conditions of labor, and the ration which will sustain the soldier under emergency calls to unusual strain, is only a few ounces, and the experience of its members authorized the belief that the high condition of the men, resulting from full diet on such occasions, would be bought cheaply by the carriage of the extra ounces on the person. Moreover, the board appreciated that if the emergency did not call for any unusual strain on the physical powers, or if from any cause it became needful to economize during the emergency, the extra ounces of a ration based on a maximum requirement could be withheld from consumption to constitute the ration of a period in excess of the face value of the emergency issue.

Guided chiefly by these considerations, the board decided that the emergency ration should contain as much of the proximate principles of food as is necessary to sustain the soldier under the maximum of physical strain.

It was then decided that the amounts of the various components should be as follows:

	Ounces.
Hard bread	16
Bacon	10
Pea meal	4
Coffee, roasted and ground, with 4 grains saccharin	2
(Or tea, one-half ounce, with 4 grains saccharin.)	
Salt	.64
Pepper	.04
Tobacco	.5
Net weight, with coffee	33.18
Net weight, with tea	31.68

It is recommended that the Subsistence Department supply suitable bags, in such numbers as may be necessary, for carrying the roasted and ground coffee, and the salt and pepper; also a tough paraffin paper for use in wrapping about bacon when carried on the person; also that the pea meal be issued in a compressed cylindrical package.

The nutritive value of this ration is as follows:

	Protein.	Fats.	Carbohydrates.	Nitrogen.	Carbon.	Calories.
				Grains.	*Grains.*	
16 ounces hard bread	2.496	0.208	11.744	171.36	2,936	1,712
10 ounces bacon	.88	7.33	.....	60.5	2,736	2,030
4 ounces pea meal	.88	.0792	2.111	60.52	646.4	368
Total	4.256	7.6172	13.855	292.38	6,318.4	4,110

In determining the quantity of the components of this ration, the board gave due consideration to the various dietaries for hard work, as stated by those who are generally cited as authorities on the subject. In general terms, such dietaries consist of 30 ounces of water-free food having an available energy equivalent to about 4,000 calories. The emergency ration recommended provides 4,110 calories from 25¾ ounces of water-free food. This greater food value from a less weight of material is obtained by an increase in the fat of the ration as compared with that of the standard dietaries. It must be remembered, however, that these dietaries are not intended for temporary, but continuous use. They express the views of the physiologists and scientists concerning the waste of the system under conditions of hard labor, and concerning the quantity and character of the food elements needful to completely repair their waste. The emergency ration is not intended for continuous use. It is to be used only occasionally, and for short periods. The necessity of having in it the exact proportion of the proximate principles required by the system is not imperative. The objective in its construction should be the largest food value in the smallest weight. Fat has an available energy of more than twice that of an equal weight of the proteids or carbohydrates. The amount of fat assimilated by the system varies not only with the conditions as to heat or cold and rest or labor, but also with the quantity of carbohydrates in the diet. If the carbohydrates are not to be had, fat in excess of that ordinarily assimilated will be utilized by the system. Any deficiency in the proteids and starches of the emergency ration recommended above is offset by the higher calorific value of the fatty element. The fat, however, can not take the place of the proteid principles in the repair of the muscular system. This has to be considered from another point of view. A standard dietary for hard work should have at least 4.4 ounces of the proteids, equivalent to about 300 grains of nitrogen, for the average

introgenous waste of the system amounts to about this quantity. The standard diets call for a larger proportion, but it is questionable whether this is not a concession to meat-eating habits rather than a necessity of the system. The emergency ration above recommended gives close upon the quantity needful to repair muscular wastes. Should there be a deficiency it could be made up by meat issues when the emergency is at an end.

The board is called upon to report upon the minimum amount of articles of food necessary to sustain a soldier in health and activity while in active service in the field for a limited period. In considering this subject the board recognized that the wear and tear of the human machine involved in the mere act of living, i. e., in keeping up the vital processes and in sustaining the heat of the system at its normal degree, required the expenditure of a certain amount of energy. To supply this energy a corresponding amount of food must be introduced into the system, and this amount is usually spoken of by physiologists as subsistence diet. The quantities are stated somewhat differently by different authors. The lowest figures are those of Playfair, who calls for 14.5 ounces, of which 2 are protein, 12 starches, and 0.5 fat, containing 138 grains of nitrogen, 2,975 of carbon, and having the available energy of 1,758 calories. The board believes, from the evidence before it, and as the outcome of its discussions on this subject, that men in well-fed and healthy condition at starting can undergo the ordinary fatigues and hardships of an active campaign for at least ten days on the equivalent of a subsistence diet, such as that given by Playfair, and without any impairment of health resulting from the temporarily restricted diet. Hence, if the emergency should require economy in the use of the emergency ration, the men could be put upon a limited dietary. Even if put on half rations they would have a full subsistence diet, so that in the direst emergency, rations for five days might be made to last for ten. The troops would individually suffer loss of weight by having to supplement their deficient dietary from their own tissues, but repair in sound men would be effected by a few days of rest and full diet.

The board considered from its experiments that emergency rations for five days should be the maximum number of rations to be carried on the person of the soldier. In emergencies of less than five days the troops should be required to carry the full ration for the number of days stated. In emergencies of longer duration the commanding officers may direct economy in the use of the ration, so that the five days' rations may be made to last for any number of days not exceeding ten. From their character as issued the articles of the ration are susceptible of accurate subdivision, by which means they may be used with any degree of liberality between a minimum of subsistence diet and a maximum emergency or hard labor diet.

Respectfully submitted.

CHAS. SMART,
Major and Surgeon, President.

C. A. WOODRUFF,
Major and Commissary of Subsistence.

E. A. GARLINGTON,
Major and Inspector-General.

L. A. CRAIG,
Captain, Sixth Cavalry.

W. C. BROWN,
First Lieutenant, First Cavalry, Recorder.

WAR DEPARTMENT,
SURGEON-GENERAL'S OFFICE,
Washington, May 5, 1896.

SIR: I have the honor to forward herewith the summary of proceedings of a board of officers convened by paragraph 3, Special Orders, No. 74, Headquarters of the Army, Adjutant-General's Office, March 28, 1896, "to consider and recommend a proper ration for troops operating in emergencies."

Accompanying this will be found the daily record of proceedings and its appended papers.

Respectfully,
CH. SMART,
Major and Surgeon, U. S. A., President.

The ADJUTANT-GENERAL, U. S. ARMY,
Washington, D. C.

[First indorsement.]

WAR DEPARTMENT, *October 6, 1896.*

Respectfully referred to the Major-General Commanding the Army, for remark.

DANIEL S. LAMONT,
Secretary of War.

[Second indorsement.]

HEADQUARTERS OF THE ARMY,
Washington, November 11, 1896.

Respectfully returned to the honorable the Secretary of War.

The report of the board as contained in the summary of its proceedings is approved, and the adoption of the recommendations contained therein is advised.

NELSON A. MILES,
Major-General, Commanding.

[Third indorsement.]

NOVEMBER 21, 1896.

Approved.

DANIEL S. LAMONT,
Secretary of War.

[Fourth indorsement.]

HEADQUARTERS OF THE ARMY,
Washington, November 24, 1896.

From the Major-General Commanding to the Adjutant-General for publication, with the orders and instructions to carry it into effect.

SAML. BRECK,
Assistant Adjutant-General.

General Orders, No. 49.

HEADQUARTERS OF THE ARMY,
ADJUTANT-GENERAL'S OFFICE,
Washington, December 5, 1896.

1. The following order has been received from the War Department:

WAR DEPARTMENT, *Washington, December 5, 1896.*

Under the authority vested in him by section 1146, Revised Statutes, the President hereby establishes an emergency ration for troops operating for short periods under

circumstances which require them to depend upon supplies carried upon their persons. Its component parts are as follows: Bacon, 10 ounces; hard bread, 16 ounces; pea-meal, 4 ounces, or an equivalent in approved material for making soup; coffee, roasted and ground, 2 ounces, or tea, one-half ounce; saccharin, 4 grains; salt, .64 ounce; pepper, .04 ounce; tobacco, one-half ounce.

DANIEL S. LAMONT,
Secretary of War.

2. The Secretary of War directs that this emergency ration be resorted to only on occasions arising in active operations when the use of the regularly established ration may be impracticable; that, although its nutritive qualities permit its use on half allowance, it will not be so used except in cases of overruling necessity, and never for a longer period than ten days; and that not more than five days' emergency rations be carried on the person at one time.

3. By direction of the Secretary of War, the Subsistence Department will provide tough paraffin paper for wrapping the bacon; will furnish hard bread in grease-proof packages, the pea meal in cylindrical packages, and the coffee, tea, saccharin, salt, pepper, and tobacco in suitable packages.

By command of Major-General Miles:

GEORGE D. RUGGLES,
Adjutant-General.

REPORT OF THE SURGEON-GENERAL.

REPORT

OF

THE SURGEON-GENERAL.

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, D. C., September 9, 1896.

SIR: I have the honor to submit the following report of my administration of the duties of this office during the past year. Besides the health of the troops and the sanitary condition of the various military posts, this report relates to certain duties imposed upon the Surgeon-General of the Army by the Revised Statutes of the United States and by acts of Congress making appropriations to be disbursed under his direction.

Among the expenditures authorized by Congress for the year ended June 30, 1896, were those for artificial limbs and their commutation, for appliances for disabled soldiers, for trusses, for the support and treatment of destitute patients in the city of Washington, D. C., for the Army and Navy General Hospital, Hot Springs, Ark., for the Army Medical Museum and the library of the Surgeon-General's Office, for the construction and repair of hospitals, and for medical and hospital supplies for the use of the Army.

ARTIFICIAL LIMBS AND THEIR COMMUTATION.

Every officer or enlisted or hired man who has lost a limb or the use of a limb by injury or disease in the line of duty in the military or naval service of the United States is entitled to receive once every three years an artificial limb or apparatus or commutation therefor. A pensioner whose claim has been allowed is entitled to benefit only from the date on which his application was filed in this office; in other words, arrears of commutation dating back to the time of the injury, the onset of the disease, or the date on which pension was granted, are not allowed. When a limb in kind is authorized to be furnished, the beneficiary is entitled to transportation to and from the selected place of manufacture to have the limb fitted. The commutation value of an artificial leg is $75, but transportation is not commuted. Commutation in all other cases, as in disability without amputation of the leg or in amputation or disability of the arm or foot, amounts to $50 in each instance. The laws relating to artificial limbs are the Revised Statutes, sections 4787 to 4791, and the acts approved August 15, 1876, March 3, 1891, and March 2, 1895.

During the fiscal year ended June 30, 1896, 21 artificial legs were furnished under the above laws, and commutation was paid in 101 cases of amputated leg, in 69 of amputated arm, and 13 of amputated foot. Commutation was paid also in 2,402 cases in which the use of a limb was lost. The money expended amounted to $135,518.16, of which $127,547.46 was from the appropriation for the year ended June 30, 1896, $7,610.74 from that of the previous year, $392.96 from the appropriation for 1894, and $30 from that of 1893, as follows:

Appropriated by act approved March 2, 1895		$130,000.00
Disbursed during the year		127,547.46
Balance on hand June 30, 1896		2,452.54
On hand July 1, 1895, act of August 18, 1894		9,807.45
Disbursed during the year		7,610.74
Balance on hand June 30, 1896		2,196.71
On hand July 1, 1895, act of March 3, 1893		48,532.96
Disbursed during the year	$392.96	
Transferred to surplus fund	48,140.00	
		48,532.96
Certified claim, appropriation June 8, 1896		30.00
Disbursed during the year		30.00

It is believed that the appropriation of $575,000 for the year ending June 30, 1897, will suffice to cover the benefits accruing to the pensioners during the current year.

The amount required for the year ending June 30, 1898, will be about $183,000. This estimate is based on the fact that of the appropriation of $194,000 for the fiscal year 1895 $184,192.55 was disbursed during that year and $7,610.74 during the year 1896, making a total of $191,803.29 disbursed from the appropriation. As these benefits recur every three years, an appropriation will be required for the year ending June 30, 1898, approximating in amount the sum expended from the appropriation for the year ended June 30, 1895. The actual amount that will be required will depend on the number of those paid in 1895 who are found to have survived the interval of three years. As well as can be learned from the statistics the death rate is about 1.6 per cent annually, or 4.8 per cent for the three years. The estimate for the fiscal year would, therefore, be the amount paid in 1895 lessened by 4.8 per cent, or $183,000.

APPLIANCES.

The number of appliances issued to disabled soldiers during the year was 162, for which was disbursed the sum of $1,192.15 from the appropriation approved March 2, 1895, with $53.07 from that approved August 18, 1894, a total of $1,245.22.

TRUSSES.

There was expended in furnishing and fitting trusses to disabled soldiers under sections 1176–78, Revised Statutes of the United States, and the act of March 3, 1879, the sum of $7,699.70. The number of trusses issued and fitted during the year was 1,106.

PROVIDENCE HOSPITAL.

The act of Congress approved March 2, 1895, appropriated $19,000 for the support and medical treatment of destitute patients in the city of Washington, D. C., under a contract to be made with the Providence Hospital by the Surgeon-General of the Army. The amount of relief afforded under this appropriation was as follows:

Patients in hospital July 1, 1895	114
Admitted during the year	1,206
Total number treated	1,320
Average number admitted, per month	110
Number remaining in hospital June 30, 1896	105
Total number days treatment afforded	41,872
Average number of days treatment per patient	32
Average number of patients treated per day	114
Longest term of treatment (days)	366
Shortest term of treatment (days)	1
Number of patients in hospital during the whole year	19

ARMY AND NAVY GENERAL HOSPITAL.

The capacity of this hospital is 15 beds for officers and 64 for enlisted men. One room in the officers' division has been fitted up as a surgical operating room. Nine officers remained under treatment at the close of the year 1894, 16 were admitted during 1895, 22 were returned to duty or to their former status of sick leave, and 3 remained under treatment December 31, 1895. The 22 officers, who recovered sufficiently to resume their duties or return to their homes, were under treatment an average of fifty-eight days, ranging from eight to one hundred and fifty days. The register does not show the exact condition of these officers on leaving the hospital, as many of them resumed sick leave and only reported for duty when this leave had expired. The largest number of officers under treatment at any one time was 10, the smallest, 1. In the soldiers' division 12 men remained under treatment December 31, 1894, 70 men regularly transferred for treatment and 3 on furlough were admitted, making a total of 85 treated during the calendar year 1895. Of these cases 50 were returned to duty, 15 were discharged for disability, 3 resumed their status on furlough, and 17 remained under treatment at the close of the year. Inquiries made in regard to the 50 men returned to duty six months after they were sent from the hospital showed that 36 were doing duty with their commands or were well at the time they had been discharged for expiration of term of service, 8 had been discharged for disability on account of relapses, and 2 for venereal disease contracted subsequent to their return to duty; 3 were undergoing treatment on account of relapse, and 2 had deserted. Of the 68 completed cases 43 were cases of rheumatism, and of these cases 36 were returned to duty after an average treatment of eighty-five days and 7 were discharged for disability after an average treatment of ninety-five and six-tenths days.

The special advantages afforded by the Government in this general hospital in the treatment of the diseases mentioned in Circular No. 16, A. G. O., December 8, 1892, do not seem to be appreciated properly by medical officers of the Army. It is equipped with all the latest and best appliances for the treatment of patients by hydrotherapy, electricity, massage and the Swedish movements. No sanitarium or private establishment at Hot Springs offers any such advantages. It is believed

that if cases suitable for treatment at the Springs were sent earlier in the progress of the disease many serious complications might be prevented and a larger percentage of recoveries be effected.

The balance, $41.95, on hand July 1, 1895, of the appropriation made by the act approved August 11, 1892, for the improvement and maintenance of the grounds of this hospital was disbursed during the past year.

ARMY MEDICAL MUSEUM.

The disbursements on behalf of the Museum have been as follows:

Appropriated by act approved February 12, 1895		$5,000.00
Disbursed during the year		4,560.61
Balance on hand June 30, 1896		439.39
Balance on hand July 1, 1895, act August 6, 1894		1,599.17
Disbursed during the year		1,560.59
Balance on hand June 30, 1896		38.58
Balance on hand July 1, 1895, act February 27, 1893		.47
Disbursed during the year	$0.04	
Transferred to surplus fund	.43	
		.47

The total number of specimens in the Army Medical Museum at the end of the fiscal year, June 30, 1896, was 33,746, of which 890 were received during the year.

The following statement shows, in detail, the additions and changes in the different sections:

Pathological section:	
In museum June 30, 1895	10,776
Discarded during the year	4
	10,772
Received during the year	249
In museum June 30, 1896	11,021
Anatomical section:	
In museum June 30, 1895	3,571
Received during the year	74
In museum June 30, 1896	3,645
Section of comparative anatomy:	
In museum June 30, 1895	1,717
Discarded during the year	28
In museum June 30, 1896	1,689
Microscopical section:	
In museum June 30, 1895	12,157
Added during the year	203
In museum June 30, 1896	12,360
Miscellaneous section:	
In museum June 30, 1895	2,017
Received during the year	253
In museum June 30, 1896	2,270

Provisional pathological section:	
In museum June 30, 1895	1,830
Discarded during the year	1
	1,829
Received during the year	94
In museum June 30, 1896	1,923
Provisional anatomical section:	
In museum June 30, 1895	821
Received during the year	17
In museum June 30, 1896	838

RECAPITULATION.

Specimens in museum June 30, 1895	32,889
Discarded during the year	33
	32,856
Received during the year	890
Specimens in museum June 30, 1896	33,746

Among the interesting specimens added to the museum during the year are the following:

1. Specimens of malformations: (1) Monstrous infant, showing one leg only, spina bifida, clubfoot, atresia of anus and urethra, and absence of kidneys and ureters; contributed by Dr. J. D. Bradfield, Washington, D. C. (2) Monstrous duckling, showing four legs and anencephalus, spina bifida, and defective maxilla; contributed by Mr. A. H. Wieneke, Washington, D. C. (3) Congenital stenosis of œsophagus in an infant; contributed by Dr. S. S. Adams, Washington, D. C. (4) Congenital stenosis of tricuspid orifice in a man, age 34; contributed by Dr. C. G. Stone, Washington, D. C.
2. Three specimens, showing shot fracture of the skull by the Krag-Jörgensen bullet; all were fatal. The fissuring is extensive. Two of the cases were suicides. One of the specimens was contributed by Surg. L. M. Maus, United States Army; the others by Surg. A. C. Girard, United States Army.
3. Series of nineteen plaster casts of skulls, showing pre-Columbian trephining. The original skulls are part of the collection made by Dr. Manuel A. Muñiz, surgeon-general of the Peruvian army, Lima, Peru.
4. Series of 79 specimens showing pathology of the teeth, including anomalies, various degrees of atrophy from wear, caries with or without abscess of jaw, various forms of the palate, malposition, etc.
5. Series of 69 bones showing the comparative injury from the 45-caliber leaden bullet and the 30-caliber German-silver jacketed bullet, fired at various distances. Experiments made by Asst. Surg. L. A. LaGarde, United States Army, who contributed the specimens.
6. Two specimens of vermiform appendix, one removed post-mortem, showing tuberculosis, and the other showing perforation, removed by laparotomy; contributed by Deputy Surg. Gen. W. H. Forwood, United States Army. Also, a third specimen of vermiform appendix showing inflammation with peritonitis, removed by laparotomy; contributed by Surg. J. C. Worthington, United States Army.
7. Four specimens of inguinal hernia in which the radical operation for cure was performed by extirpation of the hernial sac. In one of the cases there was also an undescended testicle, which was removed; contributed by Deputy Surg. Gen. W. H. Forwood, United States Army.
8. Two series of plaster casts of leg and foot, showing deformity after Pott's fracture and Kerr's operation for the same; contributed by Dr. J. Kerr, Washington, D. C.
9. Plaster cast showing ainhum of little toe; contributed by Dr. J. Kerr, Washington, D. C.
10. Impacted fracture of neck of femur, unhealed, from a man 82 years old; contributed by Surg. A. C. Girard, United States Army.
11. Aneurism of superior mesenteric artery of a horse, due to entozoa; contributed by Veterinary Surg. C. B. Robinson, Washington, D. C.
12. Series of three specimens showing ulcerative and perforative endocarditis, with atheromatous abscess and embolic infarctions of spleen and kidney; contributed by Dr. E. Gladmon, Washington, D. C. Also, heart of a child, showing vegetations on valves; contributed by Dr. G. N. Acker, Washington, D. C.

13. Spontaneous rupture of aorta in a man 76 years old; contributed by Dr. D. S. Lamb, pathologist, Army Medical Museum.
14. Sarcoma of thymus gland, involving also bronchial glands and lung, from a child; contributed by Dr. G. N. Acker, Washington, D. C.
15. Two specimens; right half of a brain showing tuberculous masses, and calvaria showing hypertrophic and atrophic portions, from a child which died of general tuberculosis; contributed by Dr. S. S. Adams, Washington, D. C.
16. Lung showing emphysema and lymphangiectasis; contributed by Dr. D. S. Lamb, pathologist, Army Medical Museum.
17. Two specimens, lungs showing gangrenous cavities and ileum showing healing typhoid ulcers, from a child in which suppurative parotitis occurred; contributed by Dr. G. N. Acker, Washington, D. C.
18. Stomach of infant showing post-mortem digestion; contributed by Dr. J. R. Wellington, Washington, D. C.
19. A specimen showing a gummatous tumor of liver, with dilatation of bile duct, the latter due to constriction of hepatic duct, apparently from a gastro-duodenal catarrh; there is also atrophy of gall bladder, a cicatrix of the colon with fistular opening into the gall bladder, and peritonitis. Also, heart in an atrophied condition, with open foramen ovale; the pulmonary valve shows only two leaflets; contributed by Deputy Surg. Gen. W. H. Forwood, United States Army.
20. Ulceration and perforation of gall bladder with fatal peritonitis; contributed by Deputy Surg. Gen. W. H. Forwood, United States Army.
21. Ulceration, perforation, and diverticulum of ileum, with fatal peritonitis; contributed by Asst. Surg. E. A. Mearns, United States Army.
22. Large melanotic cancer of ileum; contributed by Dr. W. E. Anderson, Pensacola, Fla.
23. Extensive invagination of ileum in colon, from an infant of thirteen months; contributed by Dr. S. S. Adams, Washington, D. C.
24. Two specimens from a woman, age about 45, one showing exstrophy of bladder, the other bilateral hydronephrosis; contributed by Dr. J. W. Chappell, Washington, D. C.
25. Uterus with a five months' fetus and membranes, removed because of large fibroids; recovery; contributed by Dr. J. Taber Johnson, Washington, D. C.
26. Large sarcomatous tumor of scalp, from a child aged 13 years, removed by operation; contributed by Dr. P. S. Conner, Cincinnati, Ohio.
27. Nine specimens showing developmental conditions of the teeth up to an advanced age; three showing classification of races by the dental index according to Prof. W. H. Flower; three showing classification of the same by the gnathic index; three showing classification of the same by the form of the palate, and ten showing the anatomy of the teeth on section.
28. Series of 28 plaster casts of skulls of various races of mankind, colored, taken from specimens in the Museum of the Jardin des Plantes, Paris.
29. Thirteen dry preparations of the brains of the young of the cat, the dog, the monkey, and the human subject; prepared by Dr. E. R. Hodge, anatomist, Army Medical Museum.
30. Dissection of human foot, showing the minute ramifications of the arteries of the plantar region; prepared by Dr. E. R. Hodge, anatomist, Army Medical Museum.
31. Hospital corps equipment of the French, Swiss, Prussian, Austro-Hungarian, Spanish, Norwegian, and Japanese armies, embracing litters, knapsacks, medicine chests, panniers, canteens, etc.
32. Five life-size figures representing the noncommissioned officers and privates of the Hospital Corps, United States Army, in full, fatigue, and field dress.

LIBRARY OF THE SURGEON-GENERAL'S OFFICE.

The disbursements on behalf of the library during the year have been as follows:

Appropriated by act approved February 12, 1895	$8,000.00
Refunded during the year	11.10
Total to be accounted for	8,011.10
Disbursed during the year	7,208.88
Balance on hand June 30, 1896	802.22
Balance on hand July 1, 1895, act August 6, 1894	438.39
Disbursed during the year	438.39

The following table shows the additions made to the library during the fiscal year:

Description.	On hand June 30, 1895.	Added during fiscal year.	Total June 30, 1896.
Medical journals	34,345	1,051	35,396
Medical transactions	5,067	202	5,269
Bound theses	1,762	67	1,829
Bound pamphlets	2,614	.....	2,614
Other medical books	73,475	1,761	75,236
Total	117,263	3,081	120,344
Medical theses	a 57,187	1,797	57,872
Medical pamphlets	135,844	5,884	141,728
Total	193,031	7,681	199,600

a Of the total number of theses on hand June 30, 1895, there were 1,112 bound in 67 volumes during the year.

There were presented to the library during the year 657 books and 7,940 pamphlets and journals.

Volume I, new series, of the Index-Catalogue, includes the letter "A" and forms a volume of 828 pages. It is now in the hands of the binder and will shortly be ready for distribution. The manuscript of Volume II, new series, is in the course of preparation for the printer, the usual appropriation having been made for this volume.

CONSTRUCTION AND REPAIR OF HOSPITALS.

The total appropriation for the construction and repair of hospitals for the year ended June 30, 1896, was $70,000, of which $45,000 was appropriated by the act approved February 12, 1895, and $25,000, by a special act approved March 2, 1895, for the construction of a new hospital at Fort Meade, S. Dak.

During the year new hospitals were erected at Fort Meade, S. Dak., and Fort Myer, Va., at a cost of $45,000. Operating rooms and laboratories were built at seven posts at a cost of $5,329.16. Operating rooms were enlarged at two posts at a cost of $211.45, and operating rooms were fitted up in hospitals at ten posts at a cost of $1,247.25, all as summarized below:

New hospitals erected during fiscal year ended June 30, 1896:	
Fort Meade, S. Dak., from special appropriation	$25,000.00
Fort Myer, Va., from hospital appropriation	20,000.00
Construction of additions for use as operating rooms and laboratories:	
Fort Apache, Ariz	357.36
Fort Huachuca, Ariz	408.75
Fort Clark, Tex	300.98
Fort Sam Houston, Tex	1,685.20
Fort Douglas, Utah	891.00
Fort McPherson, Ga	1,125.00
Fort Thomas, Ky	560.87
Total	5,329.16
Enlarging operating rooms:	
Whipple Barracks, Ariz	136.45
Army and Navy General Hospital, Hot Springs, Ark	75.00
Total	211.45

Fitting up rooms for use as operating rooms:	
Fort Grant, Ariz	$155.24
Fort Bliss, Tex	117.75
Fort Leavenworth, Kans	45.05
Fort Logan, Colo	196.87
Fort Reno, Okla	71.80
Fort Yates, N. Dak	46.19
Fort D. A. Russell, Wyo	47.11
Jefferson Barracks, Mo	404.85
Fort Columbus, N. Y	62.39
Fort Schuyler, N. Y	100.00
Total	1,247.25
Grand total	6,787.86

The balance of the appropriation was expended for repairs upon hospitals at various posts.

MEDICAL AND HOSPITAL SUPPLIES.

The following statement shows the disbursements made during the fiscal year ended June 30, 1896, from appropriations made by act of Congress for the support of the Medical Department of the Army:

Appropriated by act approved February 12, 1895		$160,500.00
Refunded during the year		22.94
Total to be accounted for		160,522.94
Disbursed during the year:		
Medical supplies	$31,800.47	
Pay of employees	31,696.55	
Expenses supply depots	110.03	
Medical attendance and medicines	10,481.56	
Washing at post hospitals	1,145.05	
Material for experimental cooking	499.82	
Miscellaneous expenses	64.95	
Total disbursed		75,798.43
Balance on hand to be accounted for July 1, 1896		84,724.51
In United States Treasury	$69,813.06	
In hands disbursing officers:		
New York	6,881.23	
St. Louis	3,257.51	
Washington	1,550.39	
San Francisco	3,222.25	
Army and Navy General Hospital	.07	
		84,724.51
Balance on hand July 1, 1895, act August 6, 1894		88,817.70
Refunded during year		115.10
Total to be accounted for		88,932.80
Disbursed during the year:		
Medical supplies	$27,831.72	
Pay of employees	1,118.33	
Expenses of supply depots	31.77	
Medical attendance and medicines	3,706.78	
Washing at post hospitals	177.12	
Miscellaneous expenses	53.45	
Total disbursed		32,919.17
Balance on hand June 30, 1896		56,013.63

Balance on hand July 1, 1895, act February 27, 1893		$30,396.68
Refunded during year		4.00
Total to be accounted for		30,400.68
Disbursed during the year	$149.48	
Transferred to surplus fund	30,251.20	
		30,400.68
Amount appropriated by deficiency act approved June 18, 1896		70.80
Disbursed during year		70.80

Of the sum of $84,724.51 on hand July 1, 1896, from the appropriation of February 12, 1895, about $35,000 will be required for payment for supplies contracted for and other obligations incurred prior to July 1, 1896, leaving a balance of about $50,000, which will revert to the United States Treasury.

The approximate value of the medical supplies actually issued during the fiscal year ended June 30, 1896, is $97,697.38.

Advantage was taken of the preparation of the new Manual for the Medical Department of the Army, to revise the supply table included therein. Several new remedies were added, and the allowance of others was increased where experience had shown this to be advisable. Several recent medical works have been distributed for the use of medical officers. Appliances for operating in accordance with the requirements of aseptic surgery have been issued to 65 post hospitals. The facilities for prompt and successful surgical relief are now much more satisfactory than they have been heretofore. Portable bath tubs on wheels, adapted to giving a patient a bath at his bedside in cases of fever, have been issued to most of the posts. Record books of an improved form have been issued to the more important posts. The balance ($117.41) on hand July 1, 1895, of the appropriation made for contingencies at headquarters military departments by the act approved February 27, 1893, was transferred to the surplus fund during the past year.

MEDICAL OFFICERS.

There were 67 medical officers reported to this office as having been on duty with scouting parties and on other field service during the year.

Deaths.—One surgeon with the rank of major and 2 assistant surgeons with the rank of captain.

Retirements.—On request, after thirty years' service, 1 deputy surgeon-general with the rank of lieutenant-colonel. For disability, 1 deputy surgeon-general with the rank of lieutenant-colonel; 3 surgeons with the rank of major; 1 assistant surgeon with the rank of first lieutenant. By operation of law, 1 surgeon with the rank of major. Wholly retired, 1 assistant surgeon with the rank of captain.

Resignations.—One assistant surgeon with the rank of captain.

Promotions.—Two surgeons with the rank of major to be deputy surgeons-general with the rank of lieutenant-colonel; 7 assistant surgeons with the rank of captain to be surgeons with the rank of major; 3 assistant surgeons with the rank of first lieutenant to be assistant surgeons with the rank of captain.

Appointments.—Five assistant surgeons with the rank of first lieutenant. These were selected by a board convened in Washington, D. C., October 1, 1895. Fifty-two candidates were invited to appear before the board; 9 failed and 2 declined to appear; 19 were rejected for physical disability; 15 were found disqualified professionally, and 2 withdrew after partial examination. Five were found qualified and were recommended for appointment.

Vacancies.—There are now four vacancies in the medical department.

THE HOSPITAL CORPS.

Of the $215,000 appropriated for the pay of the Hospital Corps during the year ended June 30, 1896, it is estimated that $17,800 remains unexpended. It is believed that the appropriation for the current year, $206,280, made by the act approved March 16, 1896, will suffice for the needs of the Corps unless unforeseen emergencies should arise.

There were in the service June 30, 1895, 116 hospital stewards, 82 acting hospital stewards, and 530 privates, making a total of 728 men. The loss during the year by discharge, transfer, retirement, death, and desertion amounted to 270 and the gain to 249 men, a net loss of 21 men. There were, therefore, in service at the close of the last fiscal year 707 men, of whom 106 were hospital stewards, 94 acting hospital stewards, and 507 privates, the quota under existing regulations being 741.

The loss to the Corps by the provisions of General Orders, No. 80, Headquarters of the Army, series 1890, which grant a furlough of three months after three years' service, was equivalent to 23 men constantly absent from the strength. The Corps suffered no loss by sentence of general court-martial; and although there were 17 desertions, the percentage of loss from this cause was reduced by the return of 8 from desertion.

The appropriation bill above cited provides that no appointment to the grade of hospital steward shall be made until the number of such noncommissioned officers in service is reduced below 100. As there are now 106 in the Corps it is not likely that an examination for appointment to this grade will be held for some time to come. Examinations for the position of acting hospital steward were held in November, 1895, and May, 1896. The successful candidates, numbering 31 out of 43 recommended for examination, have been detailed to duty in their new positions. Application for permission to enlist in the Corps was made by 178 persons, 67 of whom were accepted, while the remainder were rejected or failed to present themselves for examination.

The issue of Hospital Corps knives and of side arms has been discontinued. Members of the Corps may, however, by Circular No. 2, Headquarters of the Army, A. G. O., February 6, 1896, be furnished with firearms during Indian wars or when left with sick or wounded under circumstances which justify the expectation that their rights as noncombatants will not be recognized. The leather waist belt, discontinued in the line, has been retained for the use of the Hospital Corps, General Orders, No. 56, Headquarters of the Army, October 28, 1895. The contents of the Hospital Corps and orderly pouches have been revised and much improved, and the refitted pouches have been exchanged to replace those formerly in use.

The new litter, model of 1895, is now being issued to military posts. A new edition of the Drill Regulations of the Hospital Corps was necessitated by the adoption of this hand litter. The litter slings of the hand litter previously in use were attached to the handles of the litter, and in the drill provision was made for the disposition of the sling in all movements. By detaching the sling and making it a part of the equipment of the bearer, to be worn over the shoulders with the ends tucked under the belt in front when not in use, the drill has been much simplified. When the litter is to be raised or lowered the bearers have merely to slip the loops at the free ends of their slings on or off the handles. Special instruction in the duties of litter bearers and in the method of rendering first aid to the sick and wounded is now given to

all enlisted men of the Army by their company officers, in accordance with General Orders, No. 9, Headquarters of the Army, March 13, 1896.

A change has recently been made in the method by which certain of the recruits for the Corps are to be instructed in their special duties. It consists in the disbandment of the company of instruction at Fort Riley, Kans., and the distribution of the men constituting the company in small detachments at selected posts. Hitherto the expense involved in transporting men to a distance has prevented the posts on the Pacific Coast and on the Northwestern frontier from being supplied with men educated in the company of instruction. By distributing the men and educating them hereafter in small detachments each department will have its quota of men under instruction, from which assignments may be made with less expense for transportation than if Fort Riley continued to be the center of distribution. Emergencies in the East will be met, as heretofore, by drawing on the company of instruction at Washington Barracks, D. C.

Since the close of the fiscal year favorable action has been taken on my recommendation that the issue and use of a full-dress uniform for the men of the Hospital Corps be discontinued. These men, even on parade and occasions of ceremony, have always to be in readiness to render service in case of accident or sudden sickness. Fatigue uniform is more suitable for such work than the full-dress suit. The change will be of benefit to the men otherwise than by relieving them of an unnecessary uniform, for by drawing the value of the discontinued articles in white cotton duck clothing they will have a sufficient allowance for ward service, which has not hitherto been the case.

ARMY MEDICAL SCHOOL.

I submit herewith the report of Col. Charles H. Alden, president of the faculty of the Army Medical School, which shows the course of study pursued and the excellent results attained during the session 1895–96. I heartily concur in his recommendation that the final rank of the student officers in the Army should be made to depend on a combination of their marks at the examinations at entrance into the service and at the close of their school work. At present their relative rank is settled by the results of the examination at entrance, and their work during the session does not alter it. A very desirable incentive to secure every advantage from the practical courses of the school would be obtained if the class standing of the students were made to influence their future rank.

ARMY MEDICAL SCHOOL,
Washington, D. C., March 20, 1896.

To the SURGEON-GENERAL OF THE ARMY:

SIR: I have the honor, as the president of the faculty of the Army Medical School, to submit the following report on its condition, and the course of instruction and proficiency of pupils, as required by General Orders 78, Headquarters of the Army, Adjutant-General's Office, September 22, 1893.

The session of the school, which closed March 13, 1896, began November 18, and has lasted four months. The school had not been formally open since February, 1894, there being no newly appointed medical officers during this interval to form a class. Instruction has, however, been given from time to time in the chemical and pathological laboratories to older medical officers.

The retirement of Lieut. Col. J. S. Billings, Deputy Surgeon-General, U. S. A., October 1, 1895, and the relief from duty of Capt. J. M. Cabell, assistant surgeon, U. S. A., November 5, 1895, from Washington Barracks, D. C., necessitated their relief from the faculty, and by Special Orders 241, Headquarters of the Army, Adjutant-General's Office, October 15, 1895, copy appended marked A, Lieut. Col. D. L. Huntington, Deputy Surgeon-General, U. S. A., on duty at the Army Medical Museum and Library, and Capt. F. R. Keefer, assistant surgeon, U. S. A., in command of Hospital Corps company of instruction, Washington Barracks, D. C., were detailed.

By the same order a rearrangement of chairs was made, Maj. Charles Smart becoming professor of military hygiene as well as director of the chemical laboratory, and Lieutenant-Colonel Huntington taking the vacant chair of military medicine. Captain Keefer relieved Captain Cabell as instructor in Hospital Corps drill and first aid.

The main courses of instruction given were those laid down in the orders establishing the school, and announcing its faculty, namely: On duties of medical officers, military surgery, military medicine, military hygiene, sanitary chemistry, clinical and sanitary microscopy, and Hospital Corps drill and first aid.

Attention is respectfully invited to the detailed reports of the course of instruction in each branch, by the professor or instructor therein, hereto appended, marked B, C, D, E, F, G; especially to the reports of the professors of military surgery and of clinical and sanitary microscopy. My colleagues have taken advantage of experience acquired at the former session of the school to improve their courses, especially in the direction of making them more practical. The course in operative surgery on the cadaver, added to his course by the professor of military surgery, has been of great value.

Referring to my own branch, that of the duties of medical officers, while the course has been made as practical as possible, such practical instruction was necessarily limited, as the school is not directly connected with a military post or military hospital, but endeavor has been made to impress upon the student officers sound principles for their guidance in their future work.

In addition to the instruction given by the faculty officially connected with the school, the following auxiliary courses have been given, and have proved very valuable and interesting:

On military law, 5 lectures by Lieut. Col. G. B. Davis, Deputy Judge-Advocate-General, U. S. A., professor military law, West Point Military Academy.

On mental diseases, 4 clinical lectures at the Government Hospital for the Insane, Washington, D. C., under the direction of Dr. W. W. Godding, superintendent.

On the Army Medical Library, by Dr. Robert Fletcher, F. R. C. S., principal assistant librarian, Surgeon-General's Office.

On parasites in man, lectures and laboratory demonstrations by Prof. C. W. Stiles, Ph. D., Department of Agriculture.

Instruction in equitation has been given at Fort Myer, Va., every Saturday morning, under the direction of Col. D. S. Gordon, commanding, by Lieut. H. A. White, Sixth Cavalry, and has been thorough and very valuable.

The thanks of the faculty are due the gentlemen who have supplemented the regular work of the school by these auxiliary courses.

The daily order of duties appended, marked H, shows the hour and time devoted to each of the branches above referred to.

The class in attendance during the session has been composed of the five newly appointed medical officers, who were approved by the Army Medical Board in November, 1895, one assistant surgeon, Capt. Thomas U. Raymond, who obtained leave from his station for the purpose, and three other assistant surgeons who are stationed in this city or vicinity, and took such part of the course, chiefly the laboratory courses, as their regular duties permitted. Two medical officers of the District National Guard were authorized to attend the lectures and Hospital Corps drill, and one medical officer of the volunteer militia, State of Massachusetts, attended the lectures on military law.

As a rule, the student officers have been prompt in their attendance, attentive to their duties, and have gratified their instructors by their diligence and interest. No serious infraction of the rules has occurred.

Faculty meetings have been held each month as required by orders.

During the last week of the session the required examinations were held to ascertain the relative proficiency of the members of the class in each branch. The results were as follows:

Duties of medical officers: Stone, Wilson, Rand, Fauntleroy, Kirkpatrick.
Military surgery: Kirkpatrick, Rand, Stone, Fauntleroy, Wilson.
Military medicine: Rand, Kirkpatrick, Stone, and Wilson, equal; Fauntleroy.
Military hygiene: Stone, Rand, Kirkpatrick, Fauntleroy, Wilson.
Sanitary chemistry: Fauntleroy, Stone, Wilson, Rand, Kirkpatrick.
Clinical and sanitary microscopy: Rand, Stone, Fauntleroy, Kirkpatrick, Wilson.
Hospital Corps drill, etc.: Kirkpatrick and Stone, equal; Rand, Fauntleroy, Wilson.

The relative standing of the student officers, taking all the branches into account and the percentages attained by each, were as follows:

1. Asst. Surg. J. H. Stone	87
2. Asst. Surg. I. W. Rand	84
3. Asst. Surg. P. C. Fauntleroy	79
4. Asst. Surg. T. J. Kirkpatrick	75
5. Asst. Surg. J. S. Wilson	74

The closing exercises of the session were held on Friday, March 13, at 3 p. m., and consisted of introductory remarks by the president of the faculty, an interesting address to the class by Prof. J. H. Brinton, M. D., of Jefferson College, Philadelphia, and the presentation of the certificates of instruction by Gen. J. R. Hawley, chairman of the Senate Committee on Military Affairs, who concluded with brief appropriate remarks.

The faculty have naturally watched with interest the career of the officers who passed out from the school at the close of its first session, and have been gratified to find that they have acquitted themselves creditably and shown the benefit of the instruction gained here. In some instances the student officer has become in turn an instructor, and has communicated his knowledge to those who had enjoyed fewer privileges.

The experience with this class repeated that with the former one, in that the relative standing as determined by examination at the end of the school course was not the same as that given on admission to the Corps, which determined their rank. It would afford a very desirable incentive for the work of the student officer at the school if, as recommended in a former report, their final rank in the Army could be made to depend on a combination of their marks attained at entrance into the service and at the close of the school work. Probably in time this can be accomplished.

Very respectfully,

C. H. ALDEN,
Assistant Surgeon-General, U. S. A., President Army Medical School.

A.

SPECIAL ORDERS, }
No. 241. }

HEADQUARTERS OF THE ARMY,
ADJUTANT-GENERAL'S OFFICE,
Washington, October 15, 1895.

Extract.

* * * * * * *

2. By direction of the Secretary of War, the following changes in the faculty of the Army Medical School are announced:

Maj. Charles Smart, surgeon, to be professor of military hygiene, vice Lieut. Col. John S. Billings, retired.

Lieut. Col. David L. Huntington, deputy surgeon-general, to be professor of military medicine, vice Major Smart, transferred to chair of military hygiene.

Capt. Frank R. Keefer, assistant surgeon, to be instructor in Hospital Corps drill and first aid to wounded, vice Capt. Julian M. Cabell, assistant surgeon, hereby relieved.

* * * * * * *

By command of Major-General Miles:

GEO. D. RUGGLES,
Adjutant-General.

B.

DUTIES OF MEDICAL OFFICERS, ARMY MEDICAL SCHOOL, SESSION 1895–96.

By Asst. Surg.-Gen. C. H. ALDEN, U. S. A.

Lecture I.—Work of medical officers compared with that of civil practitioners. Military discipline; nature, necessity, as it affects medical officers. Importance of sanitary and administrative duties. Change of duties with progress of art of war and civilization. Position of United States Army medical officer, rank, title, command. Geneva convention. Army Regulations; development from first issue, in 1779, to present, as they affect medical officers.

Lecture II.—Examination of recruits. How foreign armies are recruited. Organization of United States recruiting service. Regulations and requirements. Mode of examination. Most common defects. Personal identification system. Outline figure cards.

Lectures III and IV.—Practical instruction in examination of recruits at Washington Barracks and Army Medical School. Each student officer required to examine recruits and make out necessary papers.

Lecture V.—Sanitary duties of medical officers; importance, origin, and development. Paragraph 1393, Army Regulations. Duties advisory. Study of previous inspections. Two classes of defects; of construction and administration. Barracks and quarters, kitchen, guardhouse, post exchange, storehouse, cellar, bakehouse, water supply, drainage, sewerage, disposal of refuse, sinks, disinfectants, clothing, habits, cooking, and rations, points to be examined into.

Lecture VI.—Practical instruction in making the sanitary inspection of a post, at Washington Barracks, D. C. Student officers shown by inspector points for especial attention and report of inspection required.

Lecture VII.—Medical attendance. Regulations. Persons entitled to it, to medicines, etc., and to admission to hospital. Sick call, how conducted. Records and reports. Private practice.

Lecture VIII.—Certificates of disability for discharge. Regulations. Method of procedure. Points to be specially regarded. Pension Bureau and its work and relation to Medical Department. Practical exercises in preparing certificates.

Lecture IX.—Transferring enlisted men on account of health. Disposition of insane soldiers. Admission to Soldiers' Home, to Army and Navy General Hospital. Certificates for sick leave for officers. Practical exercises in preparing certificates.

Lecture X.—Property responsibility and accountability. Proper use and preservation of public property. How received, how disposed of. Necessary papers and returns.

Lecture XI.—Supply table, Medical Department. Special regulations in detail. Examination of supplies furnished post hospital on deposit in museum.

Lecture XII.—Service of hospitals. Paragraphs 1435 to 1449. Assignment of duties, daily routine. Hospital fund, how it accrues, how spent, returns. Construction and repair of hospital. Estimates. Inspection of work.

Lecture XIII.—Medical officers in field. Importance of readiness for emergencies and detached service, inspection of field equipment, etc. Duties with scouting parties and larger commands, on the march, in camp, in action. Organization of the medical department of a divison, brigade, and army corps. Duties on board transports. Field reports.

Lecture XIV.—Malingering, including concealment, feigning, and artificial production of disabilities. The principal diseases and injuries which are the subjects of malingering and the mode of detection.

Lecture XV.—Duties of medical officers in command of Hospital Corps detachments. Assignment of duty, discipline, instruction, employment in personal service, accounts, papers, and reports required. Official correspondence. Official and social etiquette.

NOTE.—As indicated under some of the above lectures, practical exercises in duties, preparation of papers, etc., have been required wherever practicable.

C.

COURSE OF LECTURES ON MILITARY SURGERY, CARE AND TRANSPORTATION OF THE WOUNDED, AND ON HOSPITAL ADMINISTRATION, ARMY MEDICAL SCHOOL, SESSION 1895-96.

By Deputy Surg.-Gen. W. H. FORWOOD, U. S. A.

Lecture I.—Modern firearms, projectiles, and high-power explosives in their relation to military surgery. Evolution of the new small-caliber magazine rifle and carbine, the new steel-cased bullet, and smokeless powder. Progressive change in the character of wounds caused by the change in weapons. Illustrated by specimens of the old and new guns and side arms and the new and old projectiles and powders and by wall charts giving the ballistic data of all the more famous small-caliber guns now adopted by different nations.

Lecture II.—Effects of the new small-caliber steel-cased bullet on inanimate objects as shown by recent experiments in Germany and France and by numerous trials with our own small-caliber rifle at the Barnes Hospital. Effects upon vessels containing fluid, semifluid, and dry media. Hydro-dynamic theory of the explosive effect explained. Initial velocity, rotation, penetration, active energy, and heat produced in the barrel and by impact. The trajectory, effective range, elevation, and velocity at different ranges. The openings of entrance and exit and the tracks of the bullet in various objects. Practical deductions. Illustrated with charts, plates, drawings, and numerous specimens.

Lecture III.—Effects of the modern small-caliber steel-cased bullet on animal structures as a wound-producing missile. Modifying effect of higher or lower velocities and larger or smaller caliber and of greater or lesser resistance in the tissues. Moist and solid structures, fluid in the hollow viscera. Stability of the bullet, deformation, rupture, lodgment of the bullet, lodgment of fragments. Experience of the German commission, of Professor Kocher, of Professor Demosthenes, 1895. Statistics, charts, and numerous plates and drawings from the works above quoted and from other sources.

Lecture IV.—Demonstration of the surgical anatomy of inguinal and femoral hernia by dissection at post-mortem examination, and operation for the radical cure of inguinal hernia at Barnes Hospital in lieu of lecture.

Lecture V.—General consideration of gunshot wounds with modern firearms in actual warfare. Percentage of wounds made by the small-arm bullet, which is to be identical for the rifle, carbine, and machine gun. Wounds of entrance and exit. The tracks of balls through muscular and connective tissue, through the viscera, through bony structures. The explosive effects produced on compact diaphyses, results from bone fragments as secondary missiles and not from hydrodynamic pressure. Angle of impact at different ranges and its effect. Line of perforation. Injury to vessels, nerves, and viscera. Character of wounds made by the solid explosive compound missiles of modern artillery guns. Relative frequency and mortality of these wounds. Statistical charts from different wars, plates, drawings, and specimens.

Lecture VI.—Gunshot wounds of the head (including face and neck). Classification, symptoms, diagnosis, prognosis, and treatment. The telephone probe and forceps. Illustrative cases. Plates, statistical charts, and numerous specimens.

Lecture VII.—Gunshot wounds of the chest (including spine). Superficial, penetrating, perforating; symptoms, complications, management. Illustrative cases from recent reports of chest wounds with the new small-caliber rifles. Statistical charts, plates, and specimens.

Lecture VIII.—Gunshot wounds of the abdomen. Symptoms, diagnosis, prognosis, and treatment. Penetrating and perforating wounds with and without visceral lesions; methods of differential diagnosis. Wounds in the different viscera; diagnostic symptoms, relative frequency, mortality. Relations of shock and hemorrhage. Laparotomy; methods of dealing with intestinal, hepatic, and other internal abdominal wounds. Comparative mortality under operative and expectant treatment. Illustrative cases. Statistical charts, plates, drawings, and specimens.

Lecture IX.—Gunshot wounds of the extremities (including the joints). General character, description, and management. Relative frequency and prognosis. Numerous illustrative cases from the reports of the civil war in Chile, the riots at Biala, Austria, and other sources showing the general character, course, and results of these injuries by the new, small-caliber steel-cased bullet. Statistical charts, colored plates of frozen sections, and other illustrations and specimens.

Lecture X.—Gunshot fractures. Classification, description, prognosis, and treatment. Character of these injuries modified by distance and velocity of missile, and by density and quality of the bone. Experiments of the German commission, 1895, and others. Management of gunshot fractures in the field, immobilization, splint material, transportation. Conservative management, amputation. Illustrative cases, statistical tables, plates, and specimens.

Lecture XI.—Hemorrhage and shock. Symptoms; comparison and differential diagnosis. Character and frequency of gunshot hemorrhage; immediate, primary, and secondary. Regional injuries to vessels and hemorrhage; nature, diagnosis, prognosis, and treatment. Ligation in continuity and in the wound. Causes and management of secondary hemorrhage. Hemorrhage on the field; mortality, the tourniquet, asepsis. Nature, symptoms, diagnosis, prognosis, and treatment of shock. Statistics, illustrations, and specimens from the museum.

Lecture XII.—Treatment of gunshot injuries. General treatment in hospital. Treatment of special cases. Treatment on the field. At the first dressing stations; at the ambulance stations. Resources, material, deficiencies, contingencies. The question of asepsis in field practice; the protection of wounds, methods and practical suggestions.

Lecture XIII.—Handling the wounded on the field. Means of transportation. The trains of wagons, ambulances, and other impediments following an army; management, movements, accessibility, difficulties, and delays. The need of brigade pack animals to secure a few stretchers and other medical supplies early in action. Removing the wounded from the firing line Dividing into classes and attaching diagnosis tags at first dressing station. Collection at ambulance stations and at field hospitals. Delays and uncertainty as to location of latter; need of an advance detachment of light, quick-moving ambulances or pack animals to establish the field hospital as early as possible.

Lecture XIV.—Hospital administration (at the Barnes Hospital, United States Soldiers' Home, D. C.; inspection of the hospital, followed by lecture in the library).

Lecture XV.—Practical application of the principles of military surgery discussed in the foregoing lectures. Theoretical and practical lines of medical aid. Experience in the war of the rebellion, in the Franco-German war of 1870–71, and other wars. War maps and charts, showing the actual places of first and subsequent medical aid on the field. The importance of treating all the more severely wounded at some point on or as near as practicable to the field of battle.

OPERATIONS ON THE CADAVER.

1. Tuesday, February 11, 1896, 3 to 4 p. m.
2. Wednesday, February 12, 1896, 11 a. m. to 12.30 p. m.
3. Thursday, February 13, 1896, 11 a. m. to 12.30 p. m.
4. Saturday, February 15, 1896, 11 a. m. to 12.30 p. m.
5. Tuesday, February 18, 1896, 11 a. m. to 12.30 p. m.
6. Thursday, February 20, 1896, 11 a. m. to 12.30 p. m.
7. Saturday, February 22, 1896, 11 a. m. to 1 p. m.
8. Tuesday, February 25, 1896, 11 a. m. to 12.30 p. m.
9. Thursday, February 27, 1896, 11 a. m. to 12.30 p. m.
10. Saturday, February 29, 1896, 11 a. m. to 1 p. m.

Total, fifteen and one-half hours.

OPERATIONS DONE ON THE CADAVER.

LIGATIONS.

Dorsalis pedis	2	Internal pudic	1
Anterior tibial	6	Internal mammary	1
Posterior tibial	2	Radial	4
Popliteal	2	Ulnar	4
Femoral	4	Brachial	4
Gluteal	1	Axillary	2
Sciatic	1	Subclavian	2

AMPUTATIONS.

Foot:		Wrist joint:	
Toes	4	Circular	1
Metatarsal	1	Flap	1
Lisfranc	2	Forearm:	
Forbes	2	Circular	4
Chopart	2	Modified circular	2
Syme	2	Elbow joint:	
Leg:		Anterior eliptical	1
Guyon	2	Arm:	
Duval	2	Modified circular	2
Teale	1	Flap	2
Circular	1	Shoulder joint:	
Modified circular	4	Larrey's method	1
Kneejoint:		Excisions:	
Esmarch	1	Metatarsal bone	2
Thigh:		Kneejoint	1
Lateral flap	2	Metacarpal bone	2
Circular	2	Elbow	1
Hip joint:		Shoulder	1
Wyeth (steel pins)	1	Breast	2
Brown (new clamp)	1	Lower jaw (one side)	1
Hand:		Resections:	
Digital and metacarpal	6	Ribs	2

MISCELLANEOUS.

Appendectomy	1	Laparotomy	1
Nephrectomy	2	Colecystenterostomy (Murphy button)	1
Opening mastoid antrum	1	Lateral anastomosis intestine (Murphy button)	1
Trephining skull	1	End to end anastomosis (Murphy button)	1
Enucleation, eyeball	1	Lembert suturing for closing intestinal wounds	3
Hysterectomy, combined vaginal and suprapubic	1	Shortening round ligament of the uterus	1

DISSECTIONS.

Arm	1	Internal calcaneal region	1
Palm of hand	2		

D.

UNITED STATES ARMY MEDICAL MUSEUM AND LIBRARY,
Washington, D. C., March 14, 1896.

SIR: I have the honor to transmit herewith a synopsis of a course of lectures delivered by me on the subject of military medicine during the session of the Army Medical School just closed.

The course has been practical and historical in its character, with the endeavor to impress upon the minds of the students the great importance of preventive medicine as a means of maintaining the efficiency of our Army.

Very respectfully,

D. L. HUNTINGTON,
Deputy Surgeon-General U. S. A., Professor of Military Medicine.

Col. CHARLES H. ALDEN,
Assistant Surgeon-General U. S. A., President Army Medical School.

MILITARY MEDICINE, COURSE OF 1895-96.

Lecture I.—Military medicine. Definition and application. Sketch of early history of military medicine, with references to ancient and modern writers on the subject, and to its general literature.

Modern military medicine: Consideration of the soldier as the unit of military organization, with reference to the qualities demanded for military service. General remarks on diseases of armies; statistics and records. Intimate relations of military medicine, surgery, and hygiene. Conditions affecting the health of armies, considered as great aggregations of men: as, active military operations in times of war; conditions of peace; water and food supplies; climate; ochlesis; malarial influences; scorbutic influences; moral conditions; social or individual condition. Manner in which health and disease affect the operations of war, with general observations and illustrations.

Lecture II.—Diseases prevalent in armies in times of peace, and particularly with reference to United States Army. Geographical extent of United States. Climatic features. Geological features. Ethnological and sociological features. General observations on military posts of the United States, their location and purposes, with illustrations. Duties and occupations of soldiers in time of peace with relation to health and disease. Diseases most commonly met with at all posts. Diseases of digestive system. Diseases of respiratory system. Diseases of circulatory system. Diseases of nervous system. Rheumatism and rheumatic affections. Venereal diseases and alcoholism.

Lecture III.—Diseases and conditions affecting troops on field duty and during marches, whether in peace or war. Change of status and conditions on outbreak of war; mobilization and centralization. Transportation by land or water, by railroad, and by marching. Conditions to be observed as affecting health and comfort of troops on marches, with general observations on marching of troops and status of field duty, with illustrations.

Lecture IV.—Specific infectious diseases liable to affect troops in peace or war—measles, mumps, whooping cough, scarlet fever, diphtheria, and smallpox—with sketches of history of each disease, and prominent features and dangers in connection with military life. Vaccination and revaccination of troops. Remarks on army dysenteries and diarrheas. Epidemics of influenza and dengue. Febriculæ. Importance of military hygiene with reference to invasion and diffusion of all these diseases.

Lecture V.—Continuation of infectious diseases, malarial fevers, and malarial cachexia, with historical sketch. Typhoid fever in armies; historical sketch and observations.

Lecture VI.—Typhoid fever, yellow fever, cholera, and cerebrospinal meningitis as occurring among armies; historical sketch of each disease, and observations on preventive medicine.

E.

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, D. C., March 11, 1896.

SIR: I have the honor to report that the courses for which I am responsible at the Army Medical School were brought to a conclusion to-day by a written examination on the subject of military hygiene.

The session began November 13, 1895, and since that time I have had the class for two hours daily, 1 to 3 p. m., on five days of each week in the chemical laboratory. The attendance was excellent, only one officer having been absent for two or three days on account of sickness, during the session; and in this connection it gives me pleasure to report that the interest taken by the class in this work was such as to lead the members to be present and at work in the laboratory not only promptly on time, but generally long before the lunch hour, 12 m. to 1 p. m., had expired. The ground covered by the course was practically the same as that of the previous session. The earlier weeks had to be given up to general practical chemistry, to familiarize the class with chemical methods and calculations and laboratory manipulations. The detection of mineral substances had to be taught first, with their estimation by gravimetric methods. This was followed by general work in volumetric analysis, with special courses on the analysis of air, water, wine, milk, and other articles of food. As a result, I feel confident that each of the students has had that amount of laboratory training which will enable him to take up and prosecute with advantage any of the special studies connected with sanitary chemistry.

It gives me pleasure to commend to your favorable notice the work done by Capt. Thomas U. Raymond, assistant surgeon, United States Army, as a volunteer student during the greater part of the session. He was earnest, careful, and tactful in his manipulations, and as a consequence accurate in his analytical results.

I inclose a summary of the course of lectures on military hygiene.

Respectfully,

CH. SMART,
Major and Surgeon, U. S. A., Professor of Military Hygiene and Director of the Chemical Laboratory.

Col. C. H. ALDEN,
President of the Faculty, Army Medical School.

COURSE OF LECTURES ON MILITARY HYGIENE.

I. The general history of hygiene, leading up to present sanitary conditions, and the present status and duties of health officers.

II. Similarity of duties of sanitary officers in military and civil life. Sites of camps; surface configuration; natural drainage; subsoil water; malaria; made ground; old camping grounds. Plan of military camps; density of population of company areas. Regulation and other tents.

III. The shelter tent; summer camps; winter camps; sanitary administration of camps; general, company, and personal police. Marches. Physical training of soldiers.

IV. Ground plan of permanent posts. Company barracks; their sanitary essentials. Precautions to insure dryness; basements; ground air; rainfall; casemates. Cleanness. Lighting; natural and artificial. Warming; open fireplaces, stoves.

V. Warming continued; hot-air systems; hot-water systems; steam heating.

VI. Ventilation; physical study of air; pressure; light; heat; moisture; electrical condition; general circulation; local circuits; storms; climate.

VII. Medical climatology; prevention of diseases of exposure. Chemical study of air; oxygen; carbon dioxid; organic impurities.

VIII. Respired air. Calculation of ventilation from results of analyses and of probable results of analysis from known ventilation. Natural and artificial ventilation.

IX. Impurities in air; methods of investigating; dust; ammonia; exhalations from organic matters; sewer air.

X. Characters of waters; rainwater; pond, ditch, and swamp waters; lake waters; river waters; subsoil waters; deep-well waters; artesian waters. Effects of impure water: from dissolved mineral matters; dissolved organic matters; suspended matters; cholera, typhoid fever, and malarial fever.

XI. Sanitary analysis of water: history. The residue on evaporation; oxidation of organic matter; ammonia from nitrogen of albuminoids, from urea; ammonia, nitrites and nitrates; chlorin; microscopical examination of sediment. Inspection of surroundings of source of supply.

XII. Purification of water; nature's methods; distillation; sedimentation; filtration; rapid filtration: coagulants; special processes.

XIII. Sewage; dry earth conservancy; removal of liquid wastes; cesspools; pneumatic methods. The soil pipe and house drain; plumbing fixtures, with their traps, vents, and overflows.

XIV. Plumbing regulations of the Quartermaster's Department. Sewers; separate system. Disposal of sewage; chemical treatment; irrigation; filtration; electrolysis. Disposal of garbage; crematories.

XV. Food; percentage composition; calculation of carbon and nitrogen; calories and their mechanical equivalents. Standard diets; emergency rations. Scurvy.

F.

COURSE OF INSTRUCTION, PATHOLOGICAL LABORATORY.

UNITED STATES ARMY MEDICAL MUSEUM AND LIBRARY,
Washington, D. C., March 16, 1896.

SIR: I have the honor to submit the following report of the course of instruction given in the pathological laboratory during the session of 1895–96.

It was considered advisable to change, in some respects the course for the session just ended as compared with that given during the first session of the school; and, instead of devoting much time to the microscopic study of the several diseases of the lung, liver, spleen, etc., to endeavor more nearly to realize the requirements of a course in clinical and sanitary microscopy. With this object in view the first half of the session was devoted to the study of pathogenic bacteria. The method of preparing the various culture media was carefully taught, each student officer being required to make these from time to time as they were needed. In this part of the course more attention was given to the study of the pus organisms and the bacillus diphtheriæ than to the other pathogenic bacteria.

Having in view always the practical side of professional work in the service, it was considered imperative that the members of the class should be given as thorough instruction as possible with regard not only to the biological characteristics of, but also concerning the pathological conditions brought about by, the bacteria of surgical infection and the specific organism of diphtheria. Every step in the preparation of the best media for the growth of the Klebs-Loeffler bacillus was carefully taught. Comparative study of virulent and attenuated cultures and of the pseudo-diphtheria bacillus was required, and when the class had attained a certain familiarity with these organisms I was enabled, through the courtesy of Dr. Edmund Parker, bacteriologist to the board of health of the District of Columbia, to put their knowledge to a more practical test, viz, in the examination of blood-serum cultures taken from the throats of patients with suspected diphtheria. The zeal and intelligence manifested by the members of the class in this particular part of the work, as well as the accuracy in diagnosis attained, was highly creditable to each of them. That they were able to confirm, with scarcely an exception, the diagnosis of the bacteriologist of the board of health for or against the presence of the Klebs-Loeffler bacillus, was the cause of much satisfaction to their instructor.

The latter half of the session was given to the microscopic study of the sputum, urine, blood, and tumors, in the order here mentioned. Considerable time was devoted to the study of normal blood, as no member of the class had previously received any instruction in this line. The preparation of fresh slides of blood and the different methods of fixing and staining permanent specimens were taught. Afterwards the blood of malaria and spleno-myelogenous and lymphatic leukæmia was studied, together with the method of determining the relative amount of hæmoglobin, etc.

During the session lectures were given on the history of bacteriology, the classification of bacteria, the normal bacterial flora of skin and mucous membranes, the bacteria of surgical infection, of croupous pneumonia and diphtheria, and on the histology and pathology of the blood.

In addition to the five student officers, four other medical officers of the Army availed themselves of the course of instruction.

Very respectfully,

WALTER REED,
Surgeon, United States Army,
Professor of Clinical and Sanitary Microscopy.

Col. CHARLES H. ALDEN,
Assistant Surgeon-General, U. S. A.,
President Army Medical School.

G.

WASHINGTON BARRACKS, D. C., *March 13, 1896.*

SIR: I have the honor to report as follows upon the course of instruction in Hospital Corps drill and first aid during the session of the Army Medical School just closed.

At the outset of the course, the student officers were drilled daily in the position of the soldier, marchings, salutes, and setting up exercises; after they had become fairly proficient in these, a copy of the authorized manual of calisthenics was loaned to each with instructions that the setting up exercises should be continued through the session.

On each Saturday the officers under instruction reported at Washington Barracks at 9 a. m. for attendance upon the official inspections of the company of instruction of the Hospital Corps there stationed. On conclusion of the inspection, an hour's drill, based on the drill regulations of the Hospital Corps, followed.

This drill was varied with conversations on first aid, discipline, military deportment, and customs of the service; in addition, the manual of the sword was thoroughly taught.

During the major portion of the session instruction in equitation was given the student officers each Saturday morning at Fort Myer by Lieutenant White, Sixth Cavalry. It is worthy of note that those under instruction were much interested in this course and that everyone acquired marked proficiency therein.

In conclusion, I wish respectfully to indorse the suggestions made by my predecessor, Capt. Julian M. Cabell, assistant surgeon (see report of the Surgeon-General for the year 1894), in relation to the superior advantages afforded for instruction of the students in their military duties by residence at a military post. I would therefore recommend that officers composing subsequent classes be attached to the company of instruction of the Hospital Corps at Washington Barracks during the course.

I am, sir, very respectfully, your obedient servant,

FRANK R. KEEFER,
Captain and Assistant Surgeon, U. S. A.

Col. CHARLES H. ALDEN,
Assistant Surgeon-General, U. S. A.,
President Army Medical School.
(Through professor of military surgery.)

H.

ARMY MEDICAL SCHOOL, WASHINGTON, D. C.

[Session of 1895–96. Beginning November 18, 1895, ending March 13, 1896.]

ORDER OF DUTIES.

Daily, except Saturdays, Sundays, and holidays: 9 a. m. to 12 m., instruction in pathological laboratory; 1 p. m. to 2.50 p. m., instruction in chemical laboratory; 3 p. m., lecture.

Saturdays: 9 a. m. to 10.15 a. m., instruction in Hospital Corps drill and first aid at Washington Barracks, D. C.; 11 a. m. to 12 m., instruction in equitation at Fort Myer, Va. There are no exercises on Sundays, Thanksgiving Day, December 25 to January 1, inclusive, and Washington's Birthday.

The lectures will be delivered as follows: Duties of medical officers, Mondays; military surgery, Tuesdays; military medicine, alternate Wednesdays; military hygiene, Thursdays.

Hours for instruction in operative surgery will be designated by the professor of military surgery.

AUXILIARY LECTURES.

Military law, Lieut. Col. G. B. Davis, deputy judge-advocate-general, professor military law, United States Military Academy, March 2 to 6, inclusive.

Mental diseases (clinical) at Government Hospital for Insane, Washington, Fridays, November 29, December 13, January 3 and 17.

The Army Medical library, Dr. Robert Fletcher, F. R. C. S., England, Wednesday, February 19.

Parasites in man, Prof. C. W. Stiles, Ph. D., Department of Agriculture, Wednesdays, November 27, December 11, January 8 and 22.

Due notice of any change of programme will be posted on the bulletin board.

WALTER REED,
Major and Surgeon, U. S. A., Secretary of the Faculty.

HEALTH OF THE ARMY.

It is with much gratification that I report the health of the Army during the year 1895 as having been excellent. All the rates that are usually considered by statisticians as throwing light on the physical condition of a community have been lower than in any previous year of the recorded history of our Army. In 1894 we were fortunate in

having all the rates except the death rate lower than ever before. In 1895 all the rates except the admission rate for injuries fell below those of the previous year, and the death rate below that of the year 1889, which was the lowest on record. It is customary to compare the rates of an army with those of other troops, or the rates of a military department, garrison, city, or other civil or military community with those of other similar communities. Such comparisons are of value as indicating insanitary influences at work in one place and not in another. They lead to inquiry into the causation of excessive rates and to the institution thereafter of remedial measures. But to determine the absolute condition of a community as to health it must be compared, not with other people under other conditions, but with itself under the most favorable conditions. Its proper standard of comparison is, therefore, its own best annual record. The nearer it approaches its best record the higher its standard of health under the conditions which usually affect the individuals. That progress is being made in eliminating insanitary conditions or other causes which tend to affect injuriously the health of our troops is shown by the fact that during the past year the sick rates have been lowered so much that they henceforth become the standard of comparison for future years.

The admission rate to sick report numbered 1,110.22 per thousand of strength, as compared with 1,089.73 in 1894, the lowest previous rate, and with 1,329.94, the average annual rate for the years of the preceding decade. The average number of days each man was treated was 11.1, as compared with 11.6 and 11.7, respectively, for the previous year and the average of the previous decade. The admission rate for disease was only 837.53, as compared with 845.52 in 1894, while the rate for injury was 272.69, as compared with 244.21. It is thus seen that but for a slight excess of injuries the admission rate would, like all the other rates, have been lower during the year than ever before. Following injuries the infectious diseases, general and local, caused the next largest number of admissions, 263.53 per thousand of strength, as against 300.47, the average of the years of the previous decade. Of this rate malarial diseases caused 82.56 and venereal diseases 73.72, as against 80.43 during the previous year. The third class in order of frequency of admissions was constituted by disorders of the digestive system, 241.74 per thousand of strength.

The number constantly sick was 33.89 per thousand of strength, as compared with 34.49 during 1894 and 41.87 as the average annual rate of the preceding ten years. The number of days lost on account of sickness by each man of the Army was 12.4, as compared with 12.6 in 1894 and 15.3 during the preceding ten years. As disabling factors the general and local infections were as usual the most prominent, causing 11 of the total of 33.89 of nonefficiency or constant sickness, while injuries caused a disability equal to 8.46 per thousand.

The rate of discharge for disability per thousand of strength was 9.15 as compared with 13.30 in 1894, and with 23.77 annually in the preceding ten years. The discharge rate on account of disease was 6.81; on account of injury, 2.34. The absolute number of discharges was 250, of which 186 were for disease and 64 for injury. The nervous system was involved in 39 cases, the special senses in 24, the heart in 31; tuberculosis of the lungs was the cause in 29, while of the 64 occasioned by injury 18 resulted from gunshot wounds. The largest absolute number of discharges at any one post was 14 at Fort Leavenworth, Kans.; Fort Riley, Kans., and Fort Myer, Va., had 10 each; Fort Bliss, Tex., and Fort Douglas, Utah, had 9 each; Fort Thomas.

Ky., Fort Omaha, Nebr., Fort Apache, Ariz., and Fort Logan, Colo., 7 each. Omitting arsenals and small posts, the largest rates recorded were 45.23 at Fort Bliss and 37.04 at Fort Myer.

The mortality rate from all causes was 5.16 per thousand of strength as compared with 6.69 in 1894, 7.85 for the preceding decade, and 6.33 in 1889, the year of lowest record. Deducting the rate for injury, 1.61, the death rate for disease was only 3.55 per thousand as compared with 3.95 in 1889 and with 4.76 in 1885, which until now held second place on our records. The absolute number of deaths was 141, of which 44 were occasioned by injury, 21 were caused by gunshot wounds, 17 by diseases of the respiratory organs, 15 by diseases of the digestive organs, 10 by diseases of the circulatory system, and 9 of the nervous system. The largest number of deaths at any one post was 8 at Fort Leavenworth, but the largest death rate was at Fort Columbus, where 5 deaths gave a rate of 21.65 per thousand of strength.

The mean strength of the command, officers and men, white and negro, from which medical reports were received during the year amounted to 25,204; white, 23,195; negro, 2,009.

The admission rate for the white troops was 1,127.05; for the colored troops, 915.88. The admission rate of the latter was smaller than that of the white troops in 1889, in 1892, and in the years following the latter year to the present time. In speaking in my last annual report of their record of sickness, I characterized it as the most favorable yet shown by the statistics. The same remark might be made concerning their record in 1895. Their admission rate for disease was 659.03 as compared with 852.99 among the whites; their rate for injury 256.84 as compared with 274.07, and the duration of each case was 10.5 days as compared with 11.2. The number of men constantly sick per thousand of strength was 26.40 among the colored men and 34.54 among the white. Each colored soldier of the command lost 9.6 days on account of sickness during the year and each white soldier 12.6 days. The rate of discharge for disability was 5.03 among the colored men and 9.51 among the whites; and the deaths 4.12 and 5.25, the deaths from disease being respectively 2.74 and 3.62.

The susceptibility of the negro troops to disease was noted as greater than that of the whites only in the instances of rheumatism and neuralgia; although it was equal to or slightly in excess in several other diseases, as tonsillitis, colic, constipation, and conjunctivitis.

HEALTH OF THE MILITARY DEPARTMENTS.

The admission rate varied from 798.32 in the Department of the Columbia to 1,355.63 in Texas. It was above the Army average only in the Departments of Texas, the East, and the Platte.

The rate of constant sickness was highest in Texas. The Departments of the Columbia, Dakota, California, and the Colorado had low rates; the other departments did not differ much from the Army average.

There was little variation in the discharge rates of the various departments, the extremes being 6.01 in the Platte and 10.62 in Texas.

The death rate varied from 3.21 in the Department of the Platte to 7.54 in that of the Missouri.

The Department of Texas had the worst record; the Department of the Columbia had probably the best, but, if so, it was closely followed by the Departments of Dakota and of California.

DEPARTMENT OF THE EAST.

This department had a mean strength of 7,875 men; an admission rate of 1,247.87 per thousand of strength; noneffective, 34.08; discharge rate, 9.27; death rate, 5.84. The admission rate was higher than the average of the Army, and higher than the department rate of last year; the other rates do not vary much from the Army averages. The increased admission rate was mainly due to malarial affections, 162.16 per thousand of strength as compared with the Army rate of 82.56.

Fort Myer, Va., had the largest rates of admission and nonefficiency, and contributed materially to the excess of the department rates over those of the Army. Its admission rate was 2,800 and its nonefficiency 63.78. Malarial infection was the main factor of the increase. It caused 1,092.59 admissions, with 14.07 constantly sick per thousand of strength as compared with the corresponding rates of the Army—82.56 and 1.70. Injuries also were unusually common at this post, 607.41 admissions, with 15.24 constantly disabled, against 272.69 and 8.46 in the Army; and venereal and diarrheal diseases contributed to the excess. In fact, these four classes alone gave an admission rate of 2,059.26 as against 514.11 in the Army as a whole. The sick rates at this post have been increasing markedly during the past four years. A special report on the subject has been made by Maj. Walter Reed. (See p. 66.)

Columbus Barracks stood second in order of nonefficiency in this department, with a rate of 60.65, but its admission rate was not correspondingly high, 1,418.32. A number of causes, such as rheumatism, tonsillitis, bronchitis, vaccinia, and injuries contributed to this excessive rate, but venereal diseases, with a rate of 20.68, as against 5.24 in the Army, constituted the principal factor. The large nonefficient rates at Forts Thomas and Ethan Allen, 52.19 and 46.25, were also unaccompanied by correspondingly high admission rates. At the one the excess of constant sickness was due to venereal diseases, 15.29, aided by rheumatism, neuralgia, tonsillitis, and vaccinia; at the other the main causes were injuries.

Washington Barracks and Davids Island (Fort Slocum) had the admission rate over 2,000 per thousand of strength, with the nonefficient rate 46.18 and 45.60, respectively. The excess at the former post was due in part to vaccinia, diarrheal, and venereal diseases, but chiefly to malarial infection, which caused 1,079.89 admissions and a constant sickness of 13.71 per thousand men. At the latter post the excess was due to vaccinia, diarrhea, bronchitis, and injuries, with a slight increase in the rates of most of the reported diseases, excepting venereal diseases, the admission rate for which was only one-half of that reported from the Army as a whole. The large admission rate at Fort Hamilton, 1,543.55, was mainly occasioned by catarrhs and malarial diseases, the rate for the later having been 355.40. Colic and constipation, malarial diseases, and tonsillitis raised the admission rate at Fort Monroe to 1,473.87, but neither at this post nor at Fort Hamilton was the nonefficient rate correspondingly high. Fort Adams had a high nonefficient rate, 42.06, but its admission rate was less than that of the Army. Injuries in this instance occasioned the high rate. The admission rate at West Point was somewhat large, but as the cases were trivial the nonefficiency was below the average.

Fort Porter had the lowest rates of any post in this department—admission, 515.62; nonefficient, 10.27—and yet its rate for venereal disease was somewhat above the average. The admissions at Fort McPherson were only 566.14, and of these 105.82 were venereal diseases,

occasioning 7.29 of the total rate of nonefficiency, 25.17. Fort Wadsworth, Plattsburg Barracks, and Madison Barracks also had excellent rates, notwithstanding the occurrence of venereal diseases. The sick rates at Willets Point have improved considerably during the past two or three years. The posts not mentioned in this summary had rates which did not differ much from the average.

DEPARTMENT OF THE MISSOURI.

Strength present, 4,111; admission rate, 1,094.38; nonefficient, 35.05; discharge, 8.76; death, 7.54 per thousand of strength.

The post which gave the highest admission rate in this department was Fort Riley, 1,391.87, with a constant sick rate of 44.22. Fort Reno gave the highest nonefficient rate, 54.78, but its admissions were below the average. Jefferson Barracks and Forts Sheridan and Sill did not vary much from the Army average, while Forts Wayne and Brady had excellent records—admissions, 484.62 and 775.42, respectively, and nonefficient, 17.62 and 24.58. The records of Fort Riley show that its high rates were due to injuries, its rates for disease having been not above the average. It had less malarial, venereal, and diarrheal diseases and alcoholism, but more boils, abscesses, and tonsillitis than the Army generally. The large nonefficient rate of Fort Reno is ascribed to malarial, venereal, and diarrheal diseases, rheumatism, and injuries. The excellent rates at Fort Wayne were recorded notwithstanding a slight excess of venereal, and at Fort Brady notwithstanding an excess of vaccinia.

DEPARTMENT OF DAKOTA.

Mean strength, 2,565; admissions, 838.99; nonefficiency, 27.75; discharge rate, 7.02; death rate, 4.29.

Fort Snelling was the only post in this department at which the admission rate, 1,133.91, reached the average of the Army. Its rate of nonefficiency was large, 45.02, and that of Fort Buford, 38.89, was also relatively large. An excess of venereal diseases raised the admission rate at Fort Snelling, and this with rheumatism and pneumonia caused the excess of nonefficiency. The relatively large constant disability at Fort Buford was occasioned chiefly by injuries, conjunctivitis and other eye diseases. Fort Missoula had the best record of the posts in this department—admissions, 578.75, nonefficiency, 19.14—notwithstanding high rates for rheumatism, colic, and constipation. Fort Custer had lessened rates for all causes, and Fort Assiniboine low rates, notwithstanding an excess of bronchitis, rheumatism, and neuralgia.

DEPARTMENT OF THE PLATTE.

Mean strength, 2,496; admissions, 1,218.35; nonefficiency, 34.86; discharge rate, 6.01; death rate, 3.21.

Fort Omaha had the largest rates: Admission, 1,613.82; nonefficiency, 51.26. The excess of admissions was due to injuries, alcoholism 123.98, as against 30.11 in the Army, tonsillitis, diarrheal diseases, rheumatism, and neuralgia, all of which, together with some cases sent from other posts for observation prior to discharge, aided in constituting the large rate of constant disability. Fort D. A. Russell gave the next highest admission rate—1,354.52—due to alcoholism, venereal diseases, bronchitis, and tonsillitis, but its nonefficiency was not greatly in excess of the average. Fort Niobrara came second in degree of nonefficiency, with a rate of 39.80, occasioned by vaccinia, typhoid fever, tonsillitis,

coryza, bronchitis, and consumption. Fort Robinson had an excess of admissions, chiefly due to the prevalence of tonsillitis, rheumatism and neuralgia, and injuries, but the rate of constant disability—26.95—was by no means correspondingly high. The rates at Fort Washakie did not differ much from those of the Army. Fort Meade had the best rates—admission, 854.39, and nonefficiency, 26.28. Injuries were the only disabling causes at this post in excess of the Army average.

DEPARTMENT OF TEXAS.

Mean strength, 1,884; admissions, 1,355.63; nonefficiency, 42.26; discharge rate, 10.62; death rate, 5.84.

All the posts in this department except Fort Bliss and Fort Sam Houston had large admission rates. The largest rate was furnished by Fort Ringgold, 2,078.21; the largest nonefficient rate by Fort Brown, 70.69. At Fort Ringgold the admissions for venereal diseases were equal to 374.30 per thousand of strength, and gave a constant disability of 20 per thousand in excess of the Army average for these diseases. Alcoholism, rheumatism and myalgia, diarrheas, boils, abscesses, and injuries were also notably in excess, but the rates for malarial fevers, tonsillitis, and bronchitis were small. The rate of nonefficiency at this post was 63.92. In sequence of high admission rates Fort Clark came second, with 1,560.54 and a nonefficient rate of 40.40. Diarrheas, injuries, boils, abscesses, and venereal diseases were the causes of the high rates. At this post, as at Fort Ringgold, the rate for malarial infections was very low. Although the admission rate at Fort Brown was relatively small, 1,413.79, its nonefficient rate was, as stated, the highest rate of any post in the department. This excessive disability was due to malarial and venereal infections, boils, and abscesses. The admission rate of Fort McIntosh was similar to that of Fort Brown, but its nonefficiency was lower, 64.05. The excess resulted from venereal and diarrheal diseases and injuries. The nonefficiency from venereal infection was alone equal to 32.95 per thousand of strength, a rate almost as high as that of the Army from all causes. Malarial diseases at this post had much lower rates than in the Army generally. The small posts, Fort Hancock and camp at Eagle Pass, had high admission rates, to which injuries contributed largely. Fort Sam Houston, the largest post in the department, had rates well below the average, and Fort Bliss also had good rates. Malarial diseases did not exceed the average at the former and exceeded it but slightly at the latter post.

DEPARTMENT OF THE COLORADO.

Mean strength, 3,186; admissions, 1,013.18; nonefficiency, 29.40; discharge rate, 10.36; death rate, 5.65.

Of the posts in this department, Fort Wingate was the only one which had rates in excess of those of the Army. Its admission rate was 1,370.23 and its nonefficiency 41.35. Its rates for malarial and venereal infections and alcoholism were low, but these were more than offset by an increased prevalence of injuries, rheumatism, and myalgia. At Fort Apache the admission rate was below the average, but the nonefficiency, 44.31, considerably above it, due chiefly to injuries, but in part to the greater prevalence of neuralgia, tonsillitis, diarrhea, and heart disease. At Fort Logan the admission rate, 1,181.36, was slightly in excess and the nonefficiency, 30.29, somewhat below that of the Army. At the other posts in this department the admission rate

varied between the extremes of 676.06 at Fort Stanton and 1,078.26 at Fort DuChesne, and the nonefficiency between the low rate of 8.26 at Fort Stanton, 3.86 of which was the result of injuries, and 31.93 at Fort Grant.

DEPARTMENT OF CALIFORNIA.

Mean strength, 1,499; admissions, 947.30; nonefficiency, 27.96; discharge rate, 8.67; death rate, 3.34.

Excepting San Diego Barracks, which had a high degree of nonefficiency on account of cases of chronic disease, the Presidio of San Francisco was the only post in the department which had rates in excess of the army average. Its admission rate was 1,265.02, its nonefficiency 37.55, the excess mainly caused by malarial affections, but in part by injuries, coryza, and venercal diseases. The other posts had excellent records. Alcatraz Island had the lowest admission rate, 461.54, although its rate for venereal affections was above the average. Fort Mason had the lowest rate of nonefficiency, 14.38.

DEPARTMENT OF THE COLUMBIA.

Mean strength, 1,547; admissions, 798.32; nonefficiency, 27.65; discharge rate, 7.76; death rate, 5.82.

The largest post in this department, Vancouver Barracks, had the smallest rates—admissions, 655.59; nonefficiency, 22.67. None of the posts had the admission rate above 1,000, and only two had the rate of nonefficiency above the average of the Army. These were Fort Walla Walla, with a rate of 37.70, and Fort Sherman, with 34.14.

THE HIGHEST AND LOWEST RATES AT INDIVIDUAL POSTS.

Four posts during the past year had admissions to sick report in excess of two entries per man. These were Fort Myer, Va., with a rate of 2,800 per thousand of strength; Washington Barracks, D. C., 2,137.74; Fort Slocum, Davids Island, N. Y., 2,103.45, and Fort Ringgold, Tex., 2,078.21. Malarial infection was the principal cause of these high rates at the first two posts, but not at the others. A summary of the causes of the excess of sickness at these posts has already been given in discussing the health of the various military departments. Five posts had the rate of nonefficiency or constant sickness over 6 per cent of the strength: Forts Brown, McIntosh, and Ringgold, Tex., with rates per thousand of strength, respectively, of 70.69, 64.05, and 63.92; Fort Myer, Va., 63.78, and Columbus Barracks, Ohio, 60.65. Washington Barracks, D. C., although second in sequence of high admission rates, had a constant sickness of only 46.18, standing eleventh in order of nonefficiency, while Fort Brown, Tex., although heading the list of nonefficiency, stands fourteenth in sequence of admissions.

Six posts gave admission rates of less than 600 per thousand of strength: Fort Yellowstone, Wyo., 422.02; Alcatraz Island, Cal., 461.54; Fort Wayne, Mich., 484.62; Fort Porter, N. Y., 515.62; Fort McPherson, Ga., 566.14, and Fort Missoula, Mont., 578.75. Twelve posts reported a constant nonefficiency of less than 2 per cent of the strength, and among these were the posts of Plattsburg Barracks, N. Y., Fort Wayne, Mich., Fort Missoula, Mont., Fort Huachuca, Ariz., and Benicia Barracks, Cal. Fort Stanton, N. Mex., had less than 1 per cent constantly sick, only 8.26 per thousand of strength.

RECRUITING.

The total number of men examined for enlistment was 17,645, of whom 8,643 were accepted, or 489.83 of every thousand examined. The ratio of accepted men was higher among the colored men, 540.57, than among the whites, 486.46. The number rejected on primary examination was 8,354, or 473.45 per thousand of those examined, and 648 men, or 36.72 per thousand, declined enlistment.

Of every thousand men examined, 133.80 were rejected on account of imperfect physique, over or under height, weight, etc.; 59.67 for diseases of the eye and 52.08 for those of the circulatory system; 2.49 on account of being over age and 14.39 for being minors; 9.80 for illiteracy and 6.23 for imperfect knowledge of the English language.

Of every thousand accepted recruits 727.18 were natives of the United States—659.38 white and 67.80 negro. In 1894 the ratio of native born recruits was 679.99, and in 1893, 665.95. Of foreign nationalities Germany and Ireland furnished the largest proportionate numbers, 88.97 and 75.44 per thousand recruits. This is the first time that these ratios have fallen below 90. England contributed 22.79, Canada 16.31, Sweden 13.42, Austria 9.60, and Denmark 9.02.

Of the 8,643 recruits accepted during the calendar year 1895, 70 were boys under 20 years, average age 18 years; 4,203 were from 20 to 24 years, average 22 years; 2,294 were from 25 to 29, average 26.6 years; 780 were from 30 to 34, average 31.9 years; 448 had an average age of 36.7 years; 695, 44.7 years, and 153, 52.5 years. The average age of the whole number was 27.2 years.

The average height of these recruits was 67.51 inches, the native-born white recruit, 67.68 inches, being somewhat taller than the negro, 67.37, and fully half an inch taller than the foreign-born recruit, whose average was 67.14 inches.

The foreign-born recruit had the advantage over the native-born white in weight, the former averaging 147.18 pounds, the latter 145.68. The negro exceeded both, his average being 149.85 pounds.

In chest measurement and expansibility also the advantage appears to have been with the foreign-born recruit, his measurement at expiration and inspiration being 34.80 and 37.73 inches while the native-born white averaged 34.26 and 37.17. The corresponding measurements of the negro were 34.27 and 36.89 inches. See Table XXI for an interesting series of anthropometric data at various ages.

IDENTIFICATION OF DESERTERS, ETC.

From July 19, 1890, to August 31, 1896, the whole number of identifications made by means of outline figure cards was 759 (deserters, 339; soldiers dishonorably discharged from former service, 226; others, 194). In 189 cases (deserters, 117; dishonorably discharged soldiers, 34; others, 38) the identification was of value only to connect the several enlistments of men no longer in service. Three cases were applicants for enlistment identified at the instance of recruiting officers. One, a deserter, and another, a former military convict, left the recruiting station pending receipt of information from this office concerning their identity; the third, also a former military convict, was rejected by the recruiting officer when the information arrived.

In 567 cases the men were in service and amenable to punishment when identified, 221 as deserters, 190 as soldiers dishonorably discharged from former service, and 156 as frauds of a minor grade. Of

these, 50 deserted before final disposition was made of their cases, 424 were discharged the service by sentence of court-martial or by orders from the Adjutant-General's Office, 78 were held to service for the time being (of whom 10 were subsequently discharged by sentence of court-martial, 4 were discharged without honor by orders from the Adjutant-General's Office, and 24 deserted) and 15 are at present awaiting final action.

Of the whole number of identifications, 18 were made in the calendar year 1890, 111 in 1891, 215 in 1892, 104 in 1893, 110 in 1894, 121 in 1895, and 80 during the first eight months of 1896. Of the identifications of men still in service, 18 were made in 1890, 88 in 1891, 123 in 1892, 88 in 1893, 80 in 1894, 101 in 1895, and 69 to August 31, 1896.

The 121 identifications made in 1895 represent the "repeating" element of 4,929 recruits whose outline cards were examined—i. e., of every thousand recruits from civil life 24.55 were identified through the outline cards as deserters, military convicts, or otherwise bad characters. The first eight months of 1896 show similar results—identifications, 80; recruit cards examined, 3,059; identified per thousand, 26.15. Combining these two periods, from January 2, 1895, to August 31, 1896, the whole number of identifications was 201; number of recruit cards examined, 7,988; identified per thousand, 25.16. These ratios indicate that fraudulent concealment of former service is still practiced extensively, and but for the almost certain detection indicated by the identification cards it is reasonable to suppose that the practice would again attain its former dimensions.

UNIFORMITY IN MEDICO-MILITARY STATISTICS.

I have embodied in this report the data concerning the recruiting, sickness, and mortality of our Army during the calendar year 1895, tabulated on the forms suggested by the International Commission of Military Medical Officers which met at Budapest in September, 1894. The commission recommended that the various army medical departments begin publication with the statistics of the calendar year 1895; but as at this time last year I had at command all the data for 1894 needful to the construction of international tables for that year I submitted the first set of these tables in my last annual report. Copies of the report were sent to the members of the committee and to the chiefs of the army medical departments represented at the Budapest meeting. Reports in exchange are not expected from any of the foreign offices until the publication of their statistical data for 1895.

MEDICAL DEPARTMENT OF THE NATIONAL GUARD.

The interest taken by medical officers of the Army in the progress and methods of the medical department of the National Guard is well shown by an examination of the program of the sixth annual meeting of the Association of Military Surgeons of the United States, held at Philadelphia, May 12–14, 1896. Out of 27 papers announced by the program as to be presented for the consideration of the association, 16 were by officers of the Medical Department of the Army, 5 by medical officers of the United States Navy, and 6 by officers of the National Guard.

Maj. J. Van R. Hoff, surgeon, United States Army, was assigned to the duty of inspecting the camp of the National Guard of Pennsylvania

during the past summer. The following extract from his report is submitted as of interest to military surgeons:

Personnel.—The personnel of the department impressed me as being of excellent material, nor could this well be otherwise, for with the exception of the division and brigade staff surgeons, officers of military experience, no medical officer of the Pennsylvania forces can be appointed without the approval of the surgeon-general, while the hospital stewards and private soldiers are selected by the senior medical officer of the command to which they are attached, their detail being made by the commanding officer thereof. It will thus be seen that the selection of its personnel is largely in the hands of the medical department itself, and the responsibility for its quality rests exactly where it should.

Instruction.—I regret that my short stay in camp prevented a more thorough investigation into the methods and results of instruction of the hospital corps details. Many of the men I questioned seemed to be interested and well informed in their duties. I understand that there is no prescribed system or time of instruction, and no prescribed text-book on first aid. The day appointed for bearer drill (the last day of the encampment) was too inclement for outside work, and I was deprived of the opportunity of seeing what, no doubt, would have been an admirable illustration of battlefield sanitary work. The drill regulations, Hospital Corps, U. S. A., are used. The medical personnel of the Pennsylvania troops have in the division encampment an object lesson vouchsafed to no other such in our country. They have not to imagine what 10,000 soldiers together look like, for they can see them; they are only required to remember that if those troops were actually engaged, the medical department would be responsible for the sole care of some thousand of them who would be more or less seriously wounded, and whom it would not only have to succor and care for professionally, but would have to provide shelter, food, and transportation for as well. We sometimes forget that the daily routine of minor ailments which the military surgeon is called upon to meet is not all he will ever have to do. Perhaps one of the most valuable object lessons the military authorities could have given in that encampment would have been to have ordered a thousand men, representing wounded, to fall out during some maneuver, and to have required the medical department to treat them as though they were actually wounded. The gross results of a pitched battle would have been a lesson to the combatants, and the care of the hypothetically injured would have taught the medical officers how far short of perfection even the best military sanitary department falls.

Equipment.—I understand that all medical supplies are purchased by or with the approval of the surgeon-general. In my inspection of the regimental hospitals, the supplies seemed to be ample to meet the current requirements of the command, but there was little uniformity in the kinds of medicine in use, or in the manner of their packing. This was not an unexpected condition, since each medical officer makes requisition for the kind and amount of medicine he thinks he will need, based upon his own practice and experience under the given circumstances, and this works well enough when one has experience, but the experience of a medical officer is peculiar to his specialty, and is very different from that of a physician in civil practice. So, when the civil practitioner becomes the medical officer, which he would necessarily, if the whole of the Pennsylvania militia were mobilized, he should have some written rule upon which to base his requisition—in a word, a supply table. I observed that the medicines were, to a large extent, in liquid form, necessarily contained in bottles, heavy, bulky, and fragile. No particular objection can be urged against this for a fixed camp, but for a marching command medicines in a solid form are in every way preferable. There seems to be no official equipment for the sanitary department, such as medical chests, panniers, etc., common in other armies. Each medical officer has used his ingenuity to meet this want, and oftentimes very successfully, under the given conditions, but, of course, with no uniformity, and I recall very few of these improvisations which impressed me as being able to meet active-service conditions.

I surmise that the lack of uniform equipment may be due to several circumstances. I will consider but one—the question of what form the equipment shall take. Much attention has been given to military sanitary equipment the world over, and great advances have been made in this direction. The Medical Department of the regular establishment and of several States are assiduously working on this problem, and even now very satisfactory results have been obtained. Pennsylvania, so keen in perfecting her organization, could not go amiss in taking up this work at the point others have reached and carrying it forward. That her medical department is alive to the desirability of sharing in this effort is shown by the fact that during the year an admirable case of surgical instruments and a case of splints have been issued to the medical department of each military unit.

Routine of duties.—The routine of duties in camp was in the largest degree to meet the actualities of sickness and injury. So far as I observed no hypothetical condi-

tions were presented for the consideration of the sanitary department. Surgeon's call, morning reports, inspection of sick in hospital, inspection of sanitary conditions of camp and of the food by the brigade and regimental medical officers of the day, drill of the hospital corps, and details for all military formations, etc., afforded ample occupation for the medical officer. The value of the work done is evidenced by the extremely small percentage of sickness.

Recommendations.—First. That all medical officers and the enlisted men of the hospital corps be organized into a sanitary department, and that they be assigned to duty with such troops as the service may demand. Such an organization of the medical department is almost universal, except among our State forces, where the identical organization we inherited from the British during the Revolution still obtains.

Second. That regimental (3 battalions) sanitary detachments shall consist of 3 medical officers, 3 noncommissioned officers, and 5 privates.

Third. That one ambulance company be organized, to consist of 3 medical officers, 1 quartermaster, 16 noncommissioned officers, 2 artificers, 2 musicians, and 81 privates.

Fourth. That one field hospital be organized, to consist of 4 medical officers, 1 quartermaster, 17 noncommissioned officers, 1 artificer, and 49 privates.

The organization of the ambulance company and field hospital, suggested above, are borrowed from the British, and represent the result of their experience since our war of the Revolution.

Fifth. That the equipment of the different organizations of the sanitary department shall be, as nearly as possible, uniform.

Sixth. That a systematic course of instruction and text-books for the Hospital Corps be prescribed.

I do not presume that it would be practicable to at once carry out all of these recommendations, even should they be approved, in whole or in part, by the State authorities. It would, however, be entirely possible to make a paper organization such as is here outlined, and such as we must have in event of war, and to gradually build up an actual organization in accordance therewith.

PREVALENCE OF SPECIAL DISEASES.

SCARLET FEVER.

Six cases of scarlet fever were reported during the calendar year 1895 among enlisted men at military posts; 2 among recruits at Davids Island and 1 each at Fort McHenry, Md., Fort Snelling, Minn., Fort Harrison, Mont., and Vancouver Barracks, Wash. In addition to these cases the disease appeared among the children at quite a number of the posts, as at Forts Apache, Assiniboine, Meade, Omaha, Walla Walla, etc.; but isolation and disinfection in each case prevented the spread of the disease. For instance, Capt. C. N. B. Macauley reported December 9, 1895, from Fort Apache:

Lieutenant Lewis, assistant surgeon, reports this morning the appearance of a case suspiciously like scarlatina in a child belonging to his servant, who recently arrived at this post. The case has been isolated and quarantined for observation. Another child who, it is said, has been exposed to contagion has also been put under observation. * * *

January 12, 1896: I have the honor to report the recovery of the case of scarlatina reported in my letter of December 9, 1895, and that to all appearance any spread of the disease has been prevented. The case was exceedingly mild, but was followed by albuminuria, all signs of which are now over. The mother of the child came here from Snowflake, where I am informed the disease is epidemic; it is epidemic also at Pine Top, and at places along the Holbrook road. This accounts for its introduction into the post. The case was treated in strict quarantine, with disinfection of all articles that had been used with or about the patient, and disinfection with iron sulphate of all discharges and bathing water; clothes that could stand it were boiled. * * *

January 15, 1896: I have the honor to report the appearance to-day of an undoubted case of scarlet fever in the family of an employee of the quartermaster's department, who lives outside the garrison proper. I do not think this case is derived from that reported in my letter of December 9, 1895, as the interval is too long since there was any exposure. This employee is a Mormon, and I am told that the mail driver and freight teamsters put up at his house. From Snowflake to

about 30 miles from here a very mild type of scarlatina has prevailed recently. The ignorant people forming the Mormon settlements along the Holbrook road call it "scarlet rash," and will not be convinced that it is scarlet fever, or that it may be dangerous. These settlements have been infected consecutively from Snowflake by teamsters. The commanding officer has been informed and a request made that the house and family be kept under strict quarantine. Further, it has been recommended that teamsters and other civilians coming from the infected district be required to camp outside the post, and only permitted to come in to transact their business, without holding any communication with the families. It is exceedingly hard to make soldiers' and teamsters' families understand the need of disinfection, for they prefer that the children should have the disease and have it over while they are young. * * *

February 6, 1896: Case of scarlet fever reported January 15 recovered and quarantine raised.

MEASLES.

During the calendar year 1895, 38 cases of measles were reported as having occurred among enlisted men at 21 posts. The largest number at any one post was 7, at Jackson Barracks, La. Five cases were reported from Fort Brown, Tex., 4 from Springfield Armory, Mass., 3 from Fort Porter, N. Y., 2 from each of 2 posts, and 1 from each of 15 posts.

Since the close of the calendar year the disease has prevailed epidemically at a number of posts. It appeared in January at Fort Columbus, N. Y., Fort Thomas, Ky., and Fort McPherson, Ga. The troops at the last-mentioned post became affected while on duty at the Atlanta Exposition. At Fort Thomas, where 25 cases occurred during the month, the post school was closed, and the beds and bedding of all enlisted men affected with the disease were sent to the hospital for disinfection. At Fort Niagara, N. Y., and Frankford Arsenal, Pa., the disease was mostly confined to the children. At Columbus Barracks, Ohio, it extended to the enlisted men, 20 of whom were affected during March and April; the epidemic here ceased only from want of susceptible material in the garrison. An outbreak occurred in February also at Fort Grant, Ariz. It was introduced among the children at Fort Slocum, N. Y., from Brooklyn, prevailing in April and May; and its presence was at the same time reported at other posts, as Fort Monroe, Va., Fort McHenry, Md., and Fort Leavenworth, Kans.

INFLUENZA.

The number of cases of this disease reported during the year was considerably greater than in 1894, the absolute number being 1,156 as compared with 875. Only a few posts were free from this disease. The largest number of cases, 85, was reported from Fort Sheridan, Ill.; the next largest from Fort Thomas, Ky., 73. The disease has continued since the close of the calendar year and it may be expected to form a notable part of the record of next year. Maj. P. F. Harvey, Plattsburg Barracks, N. Y., reported March 31, 1896:

A mild form of influenza prevailed in this command during the month, and furnished the greatest number of cases taken up on the sick report. In addition to those admitted to hospital or excused in quarters there were many whose symptoms were so mild that, though they obtained medicines, they continued their usual avocations. The thoracic form of the disease occurred almost to the exclusion of any other type, the chief symptoms being a painful tracheal cough and substernal pain. Fever, insomnia, headache, anorexia, and furred tongue were present in all cases. The bowels were normal, and with few exceptions the attack lasted only a few days. Debility more or less pronounced, as is usual in this disorder, resulted from even mild attacks. The tracheitis, which was the first symptom in almost every case, and was no doubt partly caused by the climatic conditions, simulated an inflammation set up by respiring irritating gases. The cough was dry, paroxysmal, and painful.

MUMPS.

The cases of this disease were trivial. Fort Monroe, Va., had 59 cases, and Fort Sill, Okla., 19 cases. The total number of cases was 144, scattered at 22 different posts.

DIPHTHERIA.

During the calendar year there were reported among the troops only 21 cases of this disease, distributed among five posts. At Fort Omaha, Nebr., 13 cases; at Fort Custer, Mont., 5, and 1 each at Fort Sam Houston, Tex., Fort Trumbull, Conn., and Fort Yates, N. Dak. The history of diphtheria at the last-mentioned post during the past winter is instructive. The case treated in the course of the calendar year was that of a recently arrived recruit. He was admitted November 30, and retained in hospital four weeks. His temperature reached the normal and the membrane disappeared from his throat at the end of the first week, while at the end of the second week the Klebs-Loeffler bacillus could no longer be obtained by cultivation. Antitoxin was not on hand, and the case was treated by Lieut. H. C. Fisher with local applications of peroxid of hydrogen and occasional touches with a solution consisting of ferric chlorid, menthol, toluol, and alcohol. The usual disinfection of all culinary and other articles used by diphtheria patients was thoroughly observed, and when the patient left the isolation ward his body was washed and bathed in a solution of bichlorid of mercury, particular attention having been given to his hair. Nevertheless, a second case occurred in the person of a child, the son of a missionary who lived about 3 miles from the post. Dr. Fisher was called to see the case post-mortem, to prevent alarm in the community by showing that the child had not died of diphtheria. The family had dined at the post November 28, and the child was taken sick about five days afterwards. His parents thought he had some lung trouble, and allowed him to be up and about until he died suddenly on January 9. Inspection discovered the palate and pharyngeal pillars necrotic, and covered with a whitish deposit. Microscopic specimens made directly from the membrane showed numerous diphtheria bacilli, as did also the blood serum cultures. The funeral arrangements were changed, the body buried privately, and the house disinfected. Three days after the death of this child an enlisted man was taken into the diphtheria ward, and a positive bacteriological diagnosis was made. He was treated with antitoxin. As this man had been on detached service, his case was not regarded as having any causative relation with the others. He was returned to duty January 20. The next case was a child 4 years old living just outside the limits of the post. Antitoxin was used, and on the ninth day of the disease, March 26, cultures failed for the first time to show the presence of the diphtheria bacillus. In the absence of the bacteriological culture method of diagnosis, it is probable that quite an epidemic of diphtheria might have been reported from this post during these months, for, as observed by Lieut. Fisher—

> During this season there was a very large prevalence of sore throat, which formed the majority of the cases occurring for treatment. These were all taken into the hospital during the prevalence of diphtheria for close observation and better treatment. For every throat that showed white spots bacteriological cultures and examinations were made. Six or seven especially suspicious cases were at first isolated till examination proved the absence of diphtheria bacilli. Some of these at least would have been diagnosed "diphtheria" but for the cultures.

In January four cases, confirmed by bacteriological examination, occurred in the family of a medical officer at Fort Niobrara, Nebr., a child, its mother, father, and a servant. Antitoxin was used in these

cases, but the child died from toxemia and exhaustion on the day of the third injection. Many cases of tonsillitis among the children and the enlisted men of the post were under treatment at the time of this diphtheria outbreak, but none of them was considered suspicious. The infection was regarded as imported, inasmuch as the mother and child had arrived from the South two weeks prior to their illness.

No case of diphtheria was reported among the enlisted men at Fort Leavenworth during the calendar year, but cases occurred in the families of officers and enlisted men at this post toward the close of the year and during the early months of 1896. Eight cases were reported, in six of which the diagnosis was verified by bacteriological methods. All were treated successfully with antitoxin except one of two cases of laryngeal diphtheria in the practice of Lieut. W. F. Lippett, and in this instance the patient was moribund when medical assistance was called in. The diphtheria bacillus was not found in this fatal case, and bacteriological examination was not made in the case which recovered. Capt. J. M. Banister reported two of the cases, one of which became affected during convalescence with internal strabismus from paralysis of the external rectus. Maj. C. De Witt reported two of the cases, and one of these had double vision and numbness of muscles two weeks after convalescence was established. Lieut. J. H. Stone reported the other two cases, one of which had subsequently slight strabismus, hoarseness, and paræsthesia of the lower extremities. The history of these two cases is of interest as showing the period of incubation. The patients, a young lady and a boy 2½ years old, lived in the same house and were taken ill at the same time—April 8. It was found that three weeks before their illness they had gone to Leavenworth together to have their pictures taken. This was the only time they had been out together. The photographer had lost a child from diphtheria in December, and a toy which had been in the possession of this child during his fatal illness was given to the young lady with which to amuse the little boy and keep him quiet while being photographed.

Lieut. D. C. Howard, assistant surgeon, sent in an excellent report of 18 cases diagnosed and treated as diphtheria, at Fort Custer, Mont. during the period extending from November 19, 1895, to March 16, 1896. His report shows in each case the date of admission, condition of throat, results of examination of cover glass and cultures, maximum temperature, complications, and treatment. All the cases were mild and terminated in recovery without sequelæ. Daily examination was made of the urine, but in only 1 case was a trace of albumen found. In 4 of the cases pure cultures were made which answered all the requirements of the Klebs-Loeffler bacillus. Its virulence was not tested by injection in susceptible animals, as it was impossible to obtain them at the time. Two of these cases were infections by the Klebs-Loeffler bacillus alone, while two were mixed infections of this bacillus and the streptococcus pyogenes. In 11 of the cases, all of which were identical in their clinical course with these 4, the membrane from the throat showed bacilli similar in morphology and staining properties to the Klebs-Loeffler bacillus, but the attempts to obtain pure cultures from them were not successful. The cultures were made on agar, and usually on blood serum and agar serum on the morning of admission, at the same time that the smears were taken from the throat for examination. All gave growths of various organisms, but the record was considered negative unless isolation was effected. Lastly, in 3 cases the cover slip showed no diphtheria bacilli, although in 2 of these streptococci were present; the third was negative. These 3 cases, according to Dr. Howard, are out of place in his report, but he tabulated them

with the others because they were entered on the register as cases of diphtheria and were treated by injections of antitoxin. The first of the series was not recognized early enough to receive antitoxin, and the fifth was admitted when the supply was exhausted, and was convalescent by the time a fresh supply was obtained. With these exceptions, all the cases that showed suspicious bacilli on the cover slip received injections at once without waiting for verification by culture. In each case the injection was made on the first day of the disease, and in no case was it repeated. Surgical cleanliness was practiced, and no untoward result was experienced in any of the recorded cases; but in one case, a child, an erythematous eruption appeared on the seventh day at the point of injection and spread over the whole body, face and scalp. It lasted three days, but was unattended with itching or febrile reaction.

The thirteen cases at Fort Omaha were merely the 1895 beginning of an epidemic which extended into 1896, and gave, according to Capt. Charles F. Keiffer, the reporter, a total of 65 cases, as follows:

	Laryngeal.	Faucial.	Nasal.	Severe.	Moderate.	Mild.
Enlisted men	8	37	1	14	16	16
Citizens, male	0	1	0	0	0	1
Citizens, female	0	2	0	0	2	0
Children	7	8	1	8	7	1
Total	15	48	2	22	25	18

It is said that every suspicious throat was examined by direct examination of slides and cultures during the progress of the epidemic, and that no case was accepted as truly diphtheritic unless the clinical symptoms and bacteriological diagnosis gave positive testimony. According to Dr. Keiffer—

Various culture media were used. The Tochterman medium gave excellent results and permitted an earlier diagnosis to be made. It was found, however, that the least change of reaction modified the growth very much indeed. One lot of tubes was made with a trifling excess of sodium chlorid and the growth on these was extremely slow. Alkalin nutrient agar and glycerin agar were also used, but did not give good results. With these media the examinations were slow and laborious, and necessitated examination by cover slip of many colonies of other organisms whose development had kept pace with that of the bacillus diphtheriæ. On the whole, blood serum and Loeffler's modified blood serum were found most satisfactory, although the difficulty of obtaining the blood in the proper way and the lack of special apparatus for the preparation of serum tubes were keenly felt. The bacteriological work was also much hampered by the appearance in nearly all the tubes of a spore-forming bacillus, probably the B. subtilis. This laboratory pest invaded everything and overgrew everything. On two occasions all tubes and cultures were cleaned out in an effort to remove the infection. The germ usually found associated with the B. diphtheriæ was a streptococcus. The pus organisms, the pneumococcus, the micrococcus tetragenus and a number of chromogenic bacilli were encountered. A large oval organism resembling the pathogenic blastomycetes was met with in specimens from three throats. The time spent in observing the clinical details of the cases necessarily precluded any special study of these organisms.

In all the cases an initial dose of 0.3 gram each of calomel and sodium bicarbonate was given with benefit. Hydrogen peroxid was used locally, and in some cases Loeffler's toluol solutions. Atropin and strychnin were given as general stimulants, and particularly when there was a tendency to pulmonary stasis. Antitoxin was injected within the first twenty-four hours in 45 cases; on the second day in 13, and on the third, fourth, or fifth day in the remaining 7 cases. Albuminuria was found in 39 per cent of the cases; its average duration was ten days. Kidney structure indicating a clinical nephritis was observed in 5 per cent. Bronchopneumonia was developed in only one case, and was attributed

by Dr. Keiffer to the use of the steam atomizer. It was the only one of the cases in which this appliance was used. The most important of the observed sequelæ were the paralyses. These came on at intervals varying from the fifth day of the disease to one week after convalescence. There was 1 case of complete laryngeal paralysis, 3 of partial paralysis with involvement of the palate, 3 in which the soft palate alone was affected, 1 case of ptosis, 2 cases affecting the extensors of the thigh, and 1 suspect case involving the left hand. All were mild and recovered readily without special treatment. Six cases of neuritis were reported, 4 involving the ulnar nerve and 2 the sciatic. In one case polyneuritis was developed two weeks after convalescence from a mild attack of diphtheria. There was much precordial pain, with pain in the arms and legs and so much loss of power that walking was impossible; fever of a hectic type was present, with albuminuria and marked anæmia, but there was no arthritic swelling nor soreness.

Certain sequelæ consisting of cutaneous eruptions and joint symptoms were attributed by the reporter to the use of the antitoxic serum, because they occurred among the cases in which the serum was successfully given for immunization as frequently as they followed its therapeutic use. Immunization was effective in 16 cases. A cutaneous eruption was developed in 78 per cent of the inoculations. This percentage is greater than is usually reported, but, as suggested by Dr. Keiffer, these eruptions are easily overlooked unless patiently looked for during convalescence. The most common form in adults was urticaria, appearing from five to fourteen days after inoculation; the wheals small, sharply elevated and pinkish red, prominent in the morning and usually faded by evening. A bright diffuse erythema was common among the children. In one exceptional case the eruption consisted of maculæ and firm, hard papules covering the whole surface and lasting about six days. Joint symptoms, consisting of stiffness and weakness and in a few instances tenderness and swelling, were observed in 35 per cent of the cases.

It is to be regretted that the true character of some of the cases reported from Fort Omaha is involved in doubt, inasmuch as the bacillus of diphtheria was not found in any one of four tubes sent to the Army Medical Museum for verification, although it was present in two out of three slides that were submitted. It is probable that the cases include some pyogenic infections. The report has a value, however, from the careful detail of the symptoms in all the cases, and from its observations on the results of antitoxin inoculations for immunization.

Capt. G. M. Wells reported from Fort Mason, Cal., a case of fatal paralysis in a child sequent to diphtheria, which had been treated with antitoxin. This remedy was not used until the sixth or seventh day of the disease, when the membrane covering the soft palate extended into the posterior nares and all over the throat as low down as could be seen. There was a profuse foul discharge from the nose; the tonsils and glands of the neck were greatly swollen and tender, causing much difficulty in swallowing. The child was weak and stupid; temperature, 101°, and pulse 160, weak, irregular, and thready. A slight improvement was observed after the injection of 10 c. c. containing 600 antitoxin immunizing units. This was manifested by lessened temperature, sleep, detachment of scales from the lips and of membrane from the throat, and an improved pulse rate. On the second day after the injection the improvement was marked, and on the fourth day the throat was clean, the tonsils receding, the glands getting soft, the nasal discharge almost gone, and the color and general appearance good. Recovery after this was gradual, but full and complete. For a week the child played about the house and, aside from some pallor and loss of flesh, looked as well

as it ever did; but it now began to have some difficulty in walking, falling down at times without apparent cause. On examination the left lower extremity was found to be paretic, the flexors of the thigh and the extensors of the leg being most affected. Later the paresis became aggravated into a condition little short of actual paralysis, affecting both lower extremities, the muscles of the back and those of the neck, and the soft palate became involved so that regurgitation followed the effort to swallow liquids. The child died on the twelfth day after the development of the paresis. The sphincters remained free and the bowels and bladder were evacuated naturally and regularly. The face and upper extremities were at no time involved. The color was dark and for a day or two before death very livid; but the respiratory system was not affected. Death was occasioned by cardiac exhaustion, and, in the opinion of Dr. Wells, the antitoxin was an active agent in its production, acting either as the primary factor or as a powerful secondary one.

But in view of the larger experience of medical officers at other posts during the year, it is not possible to subscribe to Dr. Wells's opinion. The frequency of paretic symptoms as a sequel of diphtheria was known before the use of antitoxin. Their frequency in diphtheritic cases treated by antitoxin is manifested in some of the experiences above recorded, but its absence in those cases in which the antitoxin was used for prophylactic purposes is equally manifest, and is of value in placing the causation of the paralyses on the diseased processes. In this connection the following cases, one by Maj. P. F. Harvey, Plattsburg Barracks, N. Y., the other by Maj. L. M. Maus, Fort Sam Houston, Tex., are of interest:

Major Harvey's case.—Private Webster was taken sick March 5, 1896, and admitted to hospital the same date, with acute tonsillitis affecting both sides. His symptoms were carefully observed and his throat frequently examined. At no time did his tonsils or pharynx exhibit the slightest evidence of a false membrane. The case was to all appearances one of simple inflammation. He was returned to duty March 26 cured. On April 3, 1896, he was again admitted to hospital and then presented symptoms of influenza, which at that date was prevailing in the command. He remained under treatment five days, and was then returned to duty April 8 apparently cured.

His next admission to hospital was on April 17, 1896, when he had a return of tonsillitis. On April 25 the local disturbance had so far improved as to be regarded as cured; but at about that date symptoms of paralysis of the throat began to be developed, and his ocular muscles exhibited marked functional impairment. Attempts at swallowing liquids were accompanied by regurgitation of a portion of the fluid through his nose and he complained of diplopia. At about the same time he began to show signs of general muscular weakness, and on May 2 marked symptoms of paraplegia were discovered. A thorough test of his coordination of movement, his sensory and motor powers, and of his reflexes showed grave impairment of his nervous system, and especially of the conducting apparatus of the cord. There was complete loss of the patellar reflex, impaired cutaneous sensibility, muscular coordination, and power of locomotion. His symptoms rapidly increased until he became unable to walk alone; his legs became almost useless and he remained in bed or stood up only by the aid of crutches. The triple elixir, with electricity, gave no benefit. Early in June he was put upon nitrate of silver, and as soon as he had been taking it long enough to obtain its constitutional effects he began to improve, and at the present date the prospect of speedy recovery is good.

We have here a case of grave constitutional involvement of the nervous system proceeding either from a local inflammation of the throat or from a mild attack of epidemic influenza, unless it is assumed that the apparent local throat trouble was the expression of a constitutional affection. There was no diphtheria at the post nor in the village at the time, and no other case of inflammation I have ever witnessed has been followed by sequelæ in any way resembling those of this case. Altogether the case is unique in my experience.

Major Maus's case.—Acute multiple neuritis (bilateral) resulting from an attack of diphtheria.

Private Newmann, Battery F, Third Artillery, American, aged 20, was admitted to hospital February 24, 1896, suffering from sensory and motor disturbances of both

upper and lower extremities. He had been under treatment in the post hospital from December 3 to 28, 1895, for a serious attack of diphtheria, contracted in San Antonio, the disease being quite prevalent there at that time. His condition on admittance was as follows: Numbness and delayed sensation of both feet and legs as high as the knees, and both hands and arms as high as the elbows. The paresthesia almost amounted to complete anesthesia. With the eyes diverted he was uncertain as to whether a pin was introduced into his skin or not. Complete loss of tactile sensation; also paresthesia of the chest surfaces; paresis of the flexors and extensors of both upper and lower extremities, with complete loss of the cutaneous and tendinous reflexes. The gait was shuffling and uncertain; he could move slowly, dragging his feet along, exhibiting marked paresis of the extensors. The skin was cold and moist over the affected areas. The line of demarcation between the parts affected and the noninvaded areas was well marked by the sensory symptoms and the surface coldness just referred to. He was suffering from no special pain or increase of temperature. The thermometer recorded 99° under the tongue, and the heart beat was slightly under 100, the latter probably resulting from exercise in reaching the hospital. Diminished electro-contractility was also noted, with marked pain upon the application of the Faradic current.

The patient's statement is as follows: He first experienced a sense of weight and heaviness of feet and hands which was quickly followed by numbness and tingling of the same parts about three weeks before entrance into hospital. The numbness began in the toes, extending to the ankles and finally to the knees within a few days. About one week after the numbness started in the toes it began in the fingers and rapidly extended to the elbows. There was more or less pain, though not severe, from which he concluded that he was suffering from rheumatism. It appears that the attack was not preceded by fever. Motor disturbance began when the numbness ascended as high as the ankles, and he was hardly able to walk when it had reached the knees. He states that during drill he could scarcely grasp the corporal's hand (he being No. 3) when the order "prepare to mount" was given, and was unable to grasp the trail of the piece at the order "prepare to limber or unlimber." Private Newmann is quite young. He had during the past year been in the hospital several times, and being sensitive failed to present himself for treatment until he could go no longer. The similarity of symptoms between multiple neuritis (polyneuritis) and ascending paralysis (Landry's disease) frequently renders a diagnosis difficult, and indeed, according to certain authorities, quite impossible at times. I would infer from the literature of the subject that there are some who regard these diseases as identical. Both diseases are certainly quite uncommon in general practice, and extremely so among soldiers. I do not recall a single case of either before in my army experience. Upon the patient's admittance into the hospital, therefore, the question as to the true nature of the disease naturally presented itself, whether we had a Landry or a case of multiple neuritis to deal with. It will be observed from a comparison of the following two columns that a marked similarity in the symptoms of the two diseases exists, sufficiently distinct, however, when the two diseases are typical cases, for a diagnosis:

Acute multiple neuritis.

The disease usually begins suddenly with fever and symptoms of an acute infectious disease; is accompanied by sharp burning or tearing pains. This is soon followed by sensory symptoms, such as formication, tingling of toes and fingers, and numbness which advances into paresthesia or complete anæsthesia of the affected parts. Paresis of the flexors and extensors of the arms and legs soon merges into complete paralysis. There is loss of or diminished Faradic contractility. The paralysis as a rule extends from legs to arms before the trunk is invaded. Coldness of the surfaces of the affected parts is a prominent symptom in multiple neuritis. The later symptoms are trophic changes in muscles affected, skin, nails, and hair. Œdema of the hands and feet, albuminuria and enlarged spleen. The patient may die in a week from paralysis of the respiratory muscles, or the disease may terminate in recovery after weeks or months.

Acute ascending paralysis (Landry)

Slight fever first few days, pains in toes, fingers, and back first few days, accompanied by weariness and general discomfort. Sensory symptoms usually absent, though slight tingling, numbness, and hyperæsthesia have been observed in toes and fingers. Actual paralysis soon supervenes, involving feet, legs, thighs, arms, and trunk. The muscles of articulation, deglutition, and respiration are generally affected. The paralysis may begin in upper extremities. The patellar reflexes are sometimes obliterated. Electrical reaction remains normal. No trophic changes occur in muscles, skin, nails, or hair. Death may occur within a few days or the disease continue for months and patient finally recover.

It will be observed from a comparison of the two diseases that many of the symptoms are common. As a rule, there is a marked difference in the sensory symptoms: Numbness, tingling, formication, paresthesia, and anesthesia are always present in multiple neuritis and rarely so in ascending paralysis. The disease usually begins with fever and simulates the attack of an acute infectious disease in the former, which is not the case with the latter. This was not the case with Private Newmann. The electrical reactions are different in the two diseases and trophic changes do not occur in ascending paralysis. The paralysis in multiple neuritis usually begins in the feet and legs, then advances to hands and arms. In ascending paralysis the paralysis extends from legs to trunk before arms are involved; this symptom is variable. However, there are many exceptions to be noted, both in the march of the paralysis and as well in the sensory symptoms. Both diseases may terminate fatally within a few days from paralysis of the respiratory muscles or both go on to a tedious recovery. When sensory symptoms are present in ascending paralysis, the diagnosis between that disease and multiple neuritis becomes very difficult.

In acute multiple neuritis we find degeneration of the medullary sheath and axis cylinders of the nerve fibers. At first we find them swollen, divided into segments of a semifluid consistency. In more severe cases the medullary sheath is broken up into fine granules of fat or molecular débris, which is absorbed. The axis cylinders may not only be swollen, but also changed into a granular mass which may be completely absorbed, so that an empty sheath of Schwann alone remains as a trace of a former nerve fiber. As recovery occurs, regeneration of the nerve fibers takes place. Dr. Starr is authority for the above pathological statements.

In acute ascending paralysis we find myelitis of the motor tracts of the cord of the anterior gray matter and part of the medulla oblongata. The myelitis may chiefly be of the antero-lateral columns in the cervical and dorsal regions (Zenner). Hun states that Landry's disease, without sensory or bulbar symptoms, must be regarded as a clinical entity for which no corresponding lesion has yet been discovered.

The following history of this interesting case has been taken from the hospital records: The general condition of the patient remained excellent. His mind was clear, was free from pain when undisturbed, appetite excellent, and he slept well. The paralysis of arms and legs became complete within several days after admittance. Numbness and anesthesia of the affected parts remained unchanged until March 3, when slight symptoms of returning sensations were observed. About this time he suffered considerable pain in the kneejoints. The temperature, taken morning and evening, was normal, and pulse rate ranged from 60 to 84. March 4, hyperesthesia over arms and legs was complained of. The patient stated that he experienced a sensation similar to striking the ulnar nerve over elbow joint whenever anything touched his skin. He suffered from extremely cold hands and feet during first three weeks after admittance into hospital, so much so that the application of hot-water bottles became necessary for weeks. He was allowed to sit up March 23, and was rolled about in an invalid chair. There were no marked changes in motor or sensory disturbances until March 27, when the sensation of numbness and hyperesthesia suddenly disappeared.

Patient began to walk with a shuffling gait on April 5, and at this time had slight control over the extensors and flexors. There was still complete loss of the skin and patellar reflexes and more or less diminished loss of Faradic contractility. His anal and vesical sphincters remained unimpaired throughout entire sickness. The treatment consisted of good, nutritious diet, applications of heat, and iodine painted over affected parts; later iodid of potassium and electricity. Walking had improved by April 16, but he still experienced delayed sensation over both feet, legs, hands, and arms. More or less paresis of the flexors and extensors existed. States that his sense of touch is keener in right arm and left leg than left arm and right leg at this date. On April 24 he had better control over flexion and extension of both upper and lower extremities. States that there is less delayed sensation in left arm and right leg than in opposite arm and leg. Patient on April 28 was able to walk naturally, but still experienced slight delay in sensation over the affected parts. He says he is able to perform his duty. I regard the case as virtually recovered, and but for the removal of a congenitally elongated prepuce, which was done April 25, I would return him to duty.

Some medical officers are outspoken in their estimate of the value of the treatment by antitoxin. Every year for several years back at West Point, N. Y., an outbreak of diphtheria has occurred, with terribly fatal effect in one or two families in the laundress' quarters. During the past year the expected outbreak occurred in one set of quarters. Three out of five in the family were affected, treated with antitoxin, and recovered; while two children fully exposed and treated for immu-

nization escaped attack. In one of the cases there was post-diphtherial paralysis of the vocal cords, with great difficulty of swallowing and double vision from paralysis of the internal rectus, these sequelæ lasting about twenty days. Capt. Charles F. Mason remarks on his experience at this station as follows:

The antitoxin used in these cases was Aronson's, imported by Schering. The points of special interest to me were:

1. The efficiency of the remedy as a preventive measure even after there had been exposure for several days; heretofore, notwithstanding prompt and complete isolation (without the use of antitoxin), every child who had been exposed contracted the disease.

2. The marked remedial efficiency even when used late in one of the worst cases I ever saw.

3. The fact that the antitoxin apparently in no way affected the development of post-diphtheritic paralysis.

From my own observation now in about fourteen bad cases, I think there can be no reasonable doubt that the antitoxin is a most valuable remedy for diphtheria. Since I have been at this post I have treated nine severe cases of diphtheria with the antitoxin with no death; during the preceding three years at the same post there were eleven cases treated without antitoxin with six deaths.

The beneficial effects of prophylactic treatment are also seen in the following report by Capt. W. H. Arthur, Fort Myer, Va.:

I have the honor to submit the following special report of the unsuccessful use of antitoxin in the treatment of a case of malignant diphtheria, and the apparently successful immunization of five children living in the same house.

The case treated (a well-nourished boy three years and three months old) was one of the children of Private William Platt, Troop A, Sixth Cavalry. The family occupies a small house of two rooms and an attic, about half a mile from the post, and I was not called to see the case until the morning preceding the child's death, January 15, 1896. As soon as possible antitoxin was procured from W. S. Thompson, of Washington, D. C., and culture media and swabs from the Army Medical Museum, Major Reed, surgeon, U. S. A., kindly furnishing the latter and making and examining the cultures, which were pronounced by him, the following day, to be from a case of diphtheria.

The patient was far gone when first seen, the fauces, posterior wall of pharynx, and palate being covered with a very thick, tough exudate, which was already encroaching upon the air passages. Very little hope was entertained of this patient's recovery, and as there were five other children of ages varying from 3 to 12 years living in the same room with the patient, the chances of preventing the spread of the infection seemed very small. The healthy children were immediately removed to another room and each child given hypodermically 150 to 250 immunizing units of Behring's antitoxin at 7 p. m. At the same time the dying child was given 400 units, but by this time it was almost in articulo mortis and died at 1.30 a. m.

A rigid quarantine was at once established, which was willingly and effectively maintained by the parents; the house, and especially the room in which the child had died, thoroughly cleaned, and the carpet and bedding used in that room destroyed by burning. It is now twenty days since the death of the patient. The children are still kept from school, but up to date not a symptom of diphtheria has appeared in any one of the five, though three have had mild attacks of rubella in the interval (this disease being somewhat prevalent here at present).

Of course no conclusion of any value can be drawn from this one family, but that five children of susceptible age should entirely escape infection under these circumstances certainly seems sufficiently remarkable to warrant a short special report, and it is quite reasonable to suppose that without the use of antitoxin the infection of one or more of the children so freely exposed was almost inevitable. The antitoxin furnished was that made by Lucius & Bruning, of Hoechst, Germany, approved by Behring & Ehrlich.

TYPHOID FEVER.

One hundred and nine cases, 13 of which were fatal, were reported during the calendar year. This is an improvement on the average annual prevalence and fatality of the preceding ten years, 138.5 cases, of which 19.2 were fatal. Of the cases during the past year, 12 per cent were fatal, and the mortality per thousand of strength was 0.48. This latter rate can not be considered high, as it is exceeded by the

typhoid mortality rate of most of our cities, notwithstanding the great susceptibility of soldiers on account of the predominance of young men in the ranks.

The largest number of cases at any one post was 28, at Fort Sam Houston, Tex. Nine cases were reported from Fort Thomas, Ky., and 7 each from Fort Leavenworth, Kans., Fort Washakie, Wyo., and troops in the field. Four cases were reported from two posts, 3 from six posts, 2 from four, and 1 each from seventeen posts.

Cases of this fever with obscure causation so frequently occur in our Army that many medical officers have ceased to look for a previous case, and endeavor instead to determine the insanitary conditions present in the case under consideration, but not present in other and unaffected parts of the command. In several instances of late years a damp, foul, and unventilated condition of the space between the floor and the surface of the soil in buildings that have no cellar or basement has been regarded with suspicion as connected with the propagation of typhoid fever. A case of this kind was reported during the past year from Fort Meade, S. Dak. A man belonging to Troop B, Eighth Cavalry, on duty at the post for over a year, was detailed in January as assistant cook in the company kitchen, and eighteen days thereafter he was taken into hospital and suffered from a characteristic attack of typhoid fever. He had slept during the period of this detail in a small closet-like room communicating by an open doorway with the kitchen, and which at this season was regarded as a desirable sleeping room on account of its warmth. The floors, tables, utensils, etc., in the kitchen and its off-room were scrupulously clean, but while inspecting during the process of cleaning up for weekly inspection Capt. W. W. R. Fisher found the floor cleaning effected by flushing with hot water, scrubbing, and getting rid of the water through a hole in the flooring. The earth underneath had a surface layer 6 inches in depth of soft, foul-smelling muck, and the air from this fermenting soil was drawn into the building by the interior warmth. Provision was immediately made for cleaning and ventilating this subfloor space, repairing the flooring, and altering the method of cleaning up for inspection.

Many Army medical officers, indeed, look with favor on the theory of a de novo evolution of the typhoid-fever germ from saprophytes in the soil as the only method of accounting for the occurrence of cases during field service when the troops have been operating in unsettled parts of the country for weeks before the febrile attack became manifest. Capt. G. E. Bushnell, in the following admirable discussion of the subject, gives expression to the views which are held by many in the Army:

It appears to be generally assumed by recent writers that typhoid fever is always due to infection from previous cases of the disease. The possibility that the disease can be caused by contamination of the water supply with unorganized filth poisons, as was formerly claimed, is no longer to be admitted. But the question as to the de novo origin of typhoid fever is not settled by the discovery of the typhoid bacillus. It simply presents itself in another form, viz, Do a few generations separate the specific typhoid bacillus from the harmless saprophytes which it so closely resembles, or did the evolution take place once for all in the indefinitely remote past, as is generally taken for granted? The importance to practical sanitation of a positive answer to this question is obvious. Since bacteriology has as yet thrown little light upon it, and since the difficulties in the way of laboratory investigations of the subject appear to be great, it is necessary to appeal to clinical experience and to collect facts, if any such exist, which shall show that typhoid fever can originate without an infection through human agency.

A large number of cases of typhoid fever have occurred in which the infection could not be traced satisfactorily to a previous case. Such cases in the country or in small towns are generally explained by various more or less forced assumptions,

such as infection of the water supply directly or indirectly through the privy vault by the excreta of unknown persons, by the contamination of the ground water from considerable distances, by the existence of typhoid bacilli for years in dung heaps, etc. In cities supplied by public water systems it is of course easy to account for typhoid by supposing contamination of the streams which fill the reservoirs. Under the conditions of civilized life the absolute exclusion of contaminations of the water or milk supply is very difficult. It is therefore desirable to study the disease in isolated communities, remote from civilization, in order that the possibility of specific infection from other cases of the disease may be reduced to a minimum. For this purpose the Rocky Mountain region affords a favorable field of observation. I therefore respectfully submit the following report, in which I have briefly recorded my experience with typhoid fever, especially as respects the etiology of the disease, during nine years of service in the Rocky Mountain region, six years of which were spent in Wyoming.

While on duty at Fort Ellis, Mont., in the summer of 1882, two patients were sent to the hospital of that post suffering with a continued fever. These men, civilians attached to General Sheridan's pack train, had fallen sick in the region between Fort Washakie and the National Park after having been remote from civilization for a period of several weeks. Both patients were sick for about three weeks after admission to the hospital. Their fever was continuous, with unimportant oscillations. Both were obstinately constipated. One was conscious throughout; the other seemed apathetic, but answered questions rationally. On convalescence it appeared that he had no recollection of what had happened during his illness. This meager account is given from memory, no notes having been preserved of these cases. But it will suffice to indicate the fact that in "mountain fever," of which disease these cases were thought by local physicians to be typical examples, there are practically no pathognomonic symptoms. Another case was subsequently admitted to the hospital in the same season—that of a young gentleman who had been taken sick while traveling in the National Park. He had a fever characterized by extreme oscillations of temperature, otherwise no symptom except those belonging to a febrile movement; was conscious, and, in fact, acutely worried about himself, being provided with a clinical thermometer with which he took his own temperature frequently. He was nearly convalescent upon arrival, and the case is only mentioned here as a case of fever which could be classed as mountain fever, and the infection of which was probably received from a mountain stream

In May, 1888, I reported for duty at Camp Pilot Butte, Wyoming. This camp is situated in the town of Rock Springs. Coal mining is the only industry of Rock Springs. The population, consisting chiefly of miners, numbered about 3,000, and was rapidly increasing. There is no sewerage system. Privies are in use for the excreta. Wash water is thrown upon the ground. The town derives its name from two springs in its vicinity. One of these springs is of fair water, but is too small to supply more than the two neighboring houses. The other is a sulphur water, undrinkable at first on account of its nauseous taste. However, the gas with which it is charged escapes after prolonged exposure to the air, and the owner of the spring supplied a few families with water during the whole of my service at Camp Pilot Butte. The soil water being very deeply situated wells are unknown in Rock Springs, and the water supply of the town comes from Green River, 15 miles distant to the west, being obtained directly from that stream and pumped through pipes to Rock Springs. A reservoir has been constructed on the neighboring hills at a place well removed from contaminating influences. This reservoir is, however, used chiefly as a reserve supply in case of accidents to the pipe line, the water in daily use being supplied directly from the pipes. In 1888 the water had been brought into only a few houses. The great majority of the inhabitants were supplied with water by a water wagon which was filled at a hydrant. This water was preserved for use in water barrels, which, for the sake of coolness and because of the small size of the habitations, were almost universally kept out of doors, covered only by a wooden lid.

On my arrival at Rock Springs I learned that typhoid fever had prevailed almost as an epidemic during the previous summer. At that time, the waterworks not being completed, the town had been supplied with water by means of a water train, which was filled sometimes from Green River and sometimes at a small station to the east ward, known as the Point of Rocks. I know nothing of the character of the water which is found at the latter place. Although the population of the town was steadily increasing, the number of cases of typhoid fever in 1888 was much less than that of 1887. In 1889 there was, I think, a somewhat smaller number of cases than in 1888. In the summer of 1890 the number of cases was considerably less. By this time many new houses had been built, and these and the majority of the older houses were supplied with water pipes. The number of water barrels in use was correspondingly diminished. The miners received medical attendance from a physician appointed by the Union Pacific Railway Company. If patients, in this physician's judgment were sick enough to demand it, they could be transferred to the Union Pacific hospital at

Denver, and a majority of the typhoid fever cases were so transferred. The "company doctor" during the first part of my service at Rock Springs was a homeopathist, and did not enjoy the confidence of the miners. Hence it happened that I had many cases of typhoid fever under my charge, and on several occasions during absences of this physician and of his successor I saw nearly all of the cases of that disease then under treatment in the town. During the three years of my stay at Rock Springs I saw, therefore, a large number of cases in the aggregate, but many of them for only brief periods. No cases of typhoid fever occur in Rock Springs during the winter and spring. In June, at the time the river was swollen and turbid from the melting of the snows upon the mountains, cases of fever began to appear which were of two types.

In the first the patient complained of weakness, loss of appetite, and constipation. His tongue was coated with a white, moist fur. He stated that he slept more heavily than usual. There was no tenderness in the abdomen. The temperature was elevated two or three degrees above the normal. After a few days' rest the patient recovered his usual health. This affection resembled an ordinary bilious attack due to slight gastroduodenal catarrh. I generally treated it with small doses of calomel and quinine. It was not apparently shortened in its course by massive doses of the latter drug. In the second type the patient complained of sleeplessness as well as of weakness and loss of appetite. Sometimes constipation, more frequently diarrhea, was present. His tongue was coated with a dry, yellowish fur. His facies indicated a severer affection than that of the first type. Tenderness and gurgling were sometimes detected in the right iliac region. In short, the second class presented the usual symptoms of incipient typhoid fever, and that disease was shown to be present by the subsequent course of the malady. In one case the patient, a young Irishman, had been absent on a hunting trip for a few days and returned sick. He presented the symptoms detailed above as characteristic of the first type—heavy sleep, constipation, and a white, moist fur upon the tongue. I consequently gave a good prognosis, and visited him but twice. His fever disappeared after about three days and he was apparently well for three days more, then the fever returned, he became sleepless, and the disease pursued the usual course of typhoid fever with a fatal termination from intestinal hemorrhage. I was at first inclined to regard what I have called the first type of fever as an entirely distinct disease from typhoid fever. But greater experience showed that such cases only occurred at the beginning of the typhoid fever season. I therefore came to regard them as abortive cases of that disease, and the other physicians of Rock Springs held the same views as to their nature.

There is no absolute proof, however, that they were due to typhoid infection. I knew of no case in which typhoid fever developed after complete recovery from an attack of the kind described. But owing to the migratory character of the population and the brevity of the period of observation, such negative testimony is of little value. On the other hand, there is a little evidence (one case) that the Green River water may produce febrile attacks not of the nature of typhoid, since one attack does not protect against a recurrence, yet due probably to some organized poison because preventable by boiling the water. A physician coming to the Rocky Mountain region on account of the health of his wife, who had pulmonary phthisis, was attacked by a continued fever which lasted several weeks and was called malarial. This happened at Idaho Springs, Colo., at an altitude of 7,000 to 8,000 feet. He afterwards removed to Rock Springs, where his wife died of typhoid fever. While in Rock Springs he had repeated febrile attacks, with symptoms similar to those of the cases called abortive typhoid, which he regarded as malarial and treated with quinine. Finally he made a practice of invariably boiling the water used for drinking, and these attacks at once ceased. The individual cases of typhoid fever differed much in their symptoms and in the course of the disease. But two distinct types could be distinguished. In the one were high fever, cephalalgia, epistaxis, bronchial congestion, diarrhea, tympanites, iliac tenderness and gurgling, sweating, rose-colored spots, sometimes delirium, sometimes intestinal hemorrhage and perforation. The prognosis was not good. It was a very dangerous disease, with a high mortality, whether treated at Rock Springs or in the hospital at Denver. In the other the fever was not so high, the sleeplessness rarely so marked as in the first type. The bowels were constipated. In many cases there were hardly any symptoms except those of any continued febrile movement. The patient lay for weeks, perfectly rational, sleeping fairly well, and thinking that he was hungry and strong enough to get up, until experiment showed him that neither was true. The prognosis was good. I never knew a patient with such symptoms to die. In both types, but especially the second, relapses were extraordinarily frequent, but in my experience never terminated fatally. The condition of the bowels was the important point in the distinction between the two types and in general in the prognosis of the disease. In the constipated cases the lesions of the intestine probably did not advance to ulceration. The cases of the second type were indistinguishable from

those of "mountain fever," described at the beginning of this report. Since the cases of mountain fever and of typhoid fever occurred in patients who were under the same external conditions in every respect, and at the same time, there can be no doubt that the two types represent simply different degrees of virulence of the same poison, and that the mountain fever which occurs sporadically in the wilderness is just as certainly a mild typhoid fever as if the infection from which it results could be directly traced to antecedent cases of the typical disease. It was noticed that as the season advanced the cases of the second type, the mountain-fever cases, became fewer, until finally the new cases were all of the first type. The first sharp frost, while unfavorable for the cases already sick, at once put an end to the infection.

The surroundings of Camp Pilot Butte were unfavorable. The reservation is small and surrounded by houses. Many cases of typhoid fever in civilians occurred within a stone's throw of the hospital and the company barracks. Yet but two cases of typhoid fever occurred among the soldiers during the three years of my service at that camp. The first case—that of a private of the Hospital Corps, of the second type—terminated favorably, the only peculiar feature being a severe laryngitis. The second case was that of a private of Company A, Seventh Infantry, who, having obtained a furlough, worked in a settlement known as Hopkinsville, 4 miles to the southwest from Rock Springs, where there was a small coal mine. (This place was supplied with water mainly by water wagon from Rock Springs, but there was a spring of poor water near the village.) This man, returning sick, gave up his furlough and was admitted to hospital, where he died after a brief illness. The autopsy, the only one I was able to secure in Rock Springs, showed large and numerous ulcerations of the small intestine, quite typical of typhoid fever. There was no typhoid fever in the officers' families during my service at the camp, except one case, the infection of which was undoubtedly incurred in Portland, Oreg. The camp was supplied with water by pipes. The officers all boiled their drinking water. The enlisted men did not.

I do not know the facts concerning the epidemic of 1887 with sufficient definiteness to be able to discuss its origin. The water cars, it is easy to see, might have become infected with the specific poison. If that did not occur, the conditions under which the water was kept in the water tanks of the train were favorable for the growth of bacteria. The question that interests us now in the inquiry as to the causes of the prevalence of typhoid fever in the years 1888, 1889, and 1890 is: Was the infection in those years the same as that of 1887? In other words, did the specific bacilli survive the winters and awaken into renewed activity at the arrival of warm weather? The absence of wells and sewers simplifies the problem. The specific bacillus must have lived, if it survived at all, in the privy vaults, in the houses, in the water barrels, or upon the ground. Since there was practically no ground water we may dismiss the privy vaults from consideration as sources of infection. If the bacilli had survived in the warmed houses, winter infection with the fever could not have been absolutely unknown. The same is true of the water barrels, which were, moreover, exposed to considerable variations of temperature, alternate freezings and thawings during three or four months, which would probably have killed a bacillus which had developed as a parasite. The soil of Rock Springs is a clay almost impervious to water except after prolonged soaking. Hence, water poured upon the soil flows over its surface without penetrating to any depth. The winter climate is clear and bright. Many days are really warm in the sun, but the nights are always cold. The diathermancy of the atmosphere is so great that melting occurs upon the surfaces exposed to the sun's rays even when the temperature of the air is low. Hence the scanty snows are quickly dissipated and the ground is usually, for the most part, dusty during the winter. If the typhoid bacilli are contained in watery fluids poured upon the ground, they are therefore promptly desiccated and blown away into the desert by the violent winds, or if supplied with moisture are exposed to such great and repeated alternations of temperature in the winter that they must quickly lose their vitality. These considerations, as well as the fact that the fever never developed until June, warrant, I think, the conclusion that the bacilli which caused the summer infection were not the direct descendants of the pathogenic bacilli of the previous season.

An infection renewed each season independently of previous years must have been brought from without. Milk could not have been the means of conveying it. Milk was not brought in from the surrounding country. Moreover, milk was an expensive luxury in Rock Springs, and the majority of the typhoid patients did not use it until they fell sick. I know personally that the families of the milkmen had no cases of typhoid fever, and that the milk was well cared for. Hence, by a process of exclusion we reach the conclusion that the water was the vehicle by which the poison was carried. This is proved by the fact that no one who drank boiled water was attacked by the disease. It might be objected to this that the persons who exercised sufficient foresight to take this precaution would naturally be of the better class, more

comfortably lodged, better fed, less liable to exhaustion from overwork or dissipation, and therefore less readily infected. This is true so far as the Caucasian population of Rock Springs is concerned. But no case of typhoid fever was ever known among the Chinese. These numbered about 500, and were almost exclusively miners. They were of slight physique, and their food was insufficient for hard labor, according to our standards, consisting chiefly of rice, with small amounts of chicken, pork, and dried fish. The disease has been known to occur in the Chinese, showing that there is no racial immunity. The Chinese of Rock Springs lived crowded together in small cabins. All the waste water from washing and cooking was discharged through a drain from their kitchens upon the immediately surrounding ground, with the result that large heaps of fetid muck accumulated about their houses. Their privies were of the most primitive character, and near the houses. All circumstances were favorable for an epidemic, except that everything which they ate was taken hot from the stove, and that they drank only boiled water, in the form of weak tea. Another possible source of infection should not, however, be passed over in silence, viz, the swallowing of the dried bacilli with the dust. Dust storms were frequent and severe, and as the contamination of the surface of the ground with the various discharges of the typhoid fever patients must have been frequent, the inhalation of the typhoid bacillus must have occurred. We can not, of course, always fix upon the precise source of infection in a given case, but since everybody who drank boiled water escaped the disease, the inference is a fair one that aerial infection was at least not common. But if the dust was not a direct source of infection, it is less certain that it did not contribute indirectly to the virulence of the disease.

In the summer of 1888, when the population was almost entirely dependent upon water barrels for their supply of water, there was a large number of cases of typhoid fever. As has already been stated, there was a diminution of the number of fever cases, with at the same time a rapid increase in population, in the two succeeding summers, and at the same time the number of water barrels in use was rapidly diminishing. It was clearly apparent that the water from the water barrels was much more likely to communicate typhoid fever than that taken directly from the pipes. This water being stagnant and comparatively warm, afforded favorable conditions for the multiplication of the bacilli, and the greater danger of infection from it is thus easily explained. But another fact was also noticeable, the reason for which is not so obvious, which was that cases of typhoid fever were much more numerous in the eastern than in the western part of the town. I endeavored at one time to account for this fact by the supposition that the infection reached the water barrels through the agency of the dust; that as the winds which caused the dust storms were almost always from the west the eastern part of the town received the dust contaminated with the typhoid poison in greater quantity. The possibility that the infection was thus scattered can not be denied. Another fact, however, interesting in this connection, was presented to my attention too late for full investigation. Holding as I did the belief that the dust carried the specific poison, I was surprised at the immunity from typhoid fever of a large family which occupied a house in the center of the worst plague spot in the town, and which was dependent upon a water barrel for their water. The mother informed me once incidentally that none of the family had ever had the fever, and ascribed their freedom from the disease to the fact that they obtained their water from the sulphur spring mentioned above. The owner of this spring stated upon my inquiry that no one who used water from that spring had ever had "the fever." If we accept this, we must conclude that the poison was rarely brought by the dust, and that the agency of the latter, if it was of influence at all, was simply that of a carrier of organic material, which by affording pabulum to the bacilli already present in the water from Green River enabled them to develop greater virulence. That the infection was present in the water as delivered in Rock Springs by the water company is shown by the fact that cases of typhoid fever continued to occur, though with diminished frequency, among those who drew their drinking water directly from the pipes.

Green River rises by several branches in the mountains of northwestern Wyoming, and runs through an almost uninhabited region until it reaches the town of Green River. Like all the streams of the Rocky Mountain region, it is exposed, especially in the spring, to contamination with organic substances from the dead bodies of cattle, which, when starving, seek the shelter of the thickets on the river banks during the winter, and die there. The water is quite hard, showing the presence of an unusual amount of mineral salts for a surface water. The town of Green River has a population of perhaps 1,200 inhabitants, almost all of whom are connected in some way with the Union Pacific Railway. This town is supplied with water by the same company which supplies Rock Springs. No houses are situated on the river bank above the intake of the water system. The people are of a better class than the miners of Rock Springs, better lodged and fed, and not subject to such arduous toil. The houses are for the most part supplied with water pipes. Typhoid fever occurs here in patients who could not have been infected elsewhere, but it is much

less common than in Rock Springs. Comparing the population of Green River with that part of the population of Rock Springs which they most nearly resemble in their sanitary condition, the garrison of Camp Pilot Butte, we should say that their liability to the disease is perhaps about the same. This I regard as an additional proof that the typhoid fever of Rock Springs is not due to some local condition which we have overlooked, but that the river water is the source of the infection. It is not probable that this stream is directly contaminated by typhoid discharges before reaching the town of Green River, though of course the possibility of that can not be absolutely excluded. Yet if the disease were due to direct infection from previous cases, we should expect that the virulence of the poison would be greatest in the first cases of the season, instead of which we find a gradual evolution from the benign toward the malignant types as the summer advances. It would seem that the only supposition which satisfies the facts is that a bacillus lives in this water as a saprophyte which is capable of acquiring more or less pathogenic power—that is, of becoming a veritable typhoid bacillus—if the conditions with respect to nutrition and temperature are favorable.

I was transferred to Fort McKinney, Wyo., in July, 1891. This post was supplied with water from the Clear Fork of Powder River, a stream which, rising by many sources in the neighboring Big Horn Mountains, descends rapidly through densely wooded foothills to the military reservation. The water was pumped from the stream by a steam pump into a water tank, whence it was distributed throughout the post by gravity. It is unnecessary to describe more minutely the water system, as it does not appear that disease was due to its defects. Typhoid fever had been unknown at Fort McKinney for several years—I do not know how many—until the summer of 1893. During the previous winter less snow than usual had fallen upon the mountains, so that the high peaks were nearly bare in August. The streams were correspondingly low. Private G., Troop C, Sixth Cavalry, was admitted to hospital on August 31. This man had come from Jefferson Barracks as a recruit about six weeks previously, and said that he had suffered from malarial attacks while at the depot. The fever during the first few days having been characterized by extensive oscillations, he was given quinine to cinchonism. The fever, gradually diminishing, continued for fourteen days, after which there was an afebrile period of ten days, succeeded by a slight relapse, which ended in complete recovery. Private F., of the same troop, was taken sick on September 6 with a similar febrile attack, but with slighter oscillations of temperature. The fever, as in the first case, ran for fourteen days. The temperature was then normal for fifteen days, and in this case, also, a relapse followed, which lasted ten days, after which recovery ensued. Both of these cases were still in hospital when the relapses occurred. The next patient, Sergeant B., of the same troop, was taken sick on September 10, with apparently the same affection. In this case there was a mild diarrhea during the first week, whereas the two former cases had been constipated throughout the disease, and the course of the disease was more severe. But here, too, the temperature chart shows after fourteen days what we might call an abortive attempt at defervescence. The temperature remained nearly normal for three days, after which the fever gradually rose to nearly its former height, lasting in all a few days more than a month. In the fourth case, Private F., Company E, Eighth Infantry, who was admitted to hospital on September 18, the disease more nearly resembled typhoid fever in its usual form. There were marked bronchial congestion, as shown by cough during the first few days of illness, diarrhea, tenderness in right iliac region, and abundant rose-colored spots. The fever gave no sign of abatement after two weeks, as in the other cases, defervescence not taking place until November 1. On October 2 phlebitis of the left femoral vein declared itself, producing great œdema of the entire limb. On October 12 a troublesome bedsore developed over the sacrum. On December 12 a marked paresis, almost a complete paralysis, of the tibialis anticus and the peroneal muscles of the right leg was discovered. This paresis lasted several months. The collateral circulation was never completely reestablished in the left leg. Because of the swelling and weakness of the left leg the patient was kept on sick report during the winter and the following spring, and was finally discharged for disability in the summer of 1894.

In addition to these cases, a boy of 5 years, the son of a sergeant, was taken sick at about the same time with a similar attack of fever, which in his case only lasted about ten days. With reference to the etiology of the fever, Sergeant B. had been absent on duty at the Bellevue rifle range during the summer, returning about ten days before he was attacked with the fever. He sufferred with diarrhea while absent. It is possible that he incurred the infection before his return to Fort McKinney. However, a comparison of the temperature charts of Sergeant B., and Privates G., and F. shows such points of similarity that one can hardly doubt that all three had a similar type of the same disease. Private F. had not been away from the post. There can be no doubt that in his case as well as that of the boy the infection was not imported. There was no apparent reason why Troop C, Sixth Cavalry, should have furnished so large a proportion of patients. The sanitary

conditions, the food, and the water were the same for that troop as for the other companies. Sergeant B. was weakened by a severe diarrhea; G. was not acclimated; F., who was a tall, thin, young Irishman, in addition to the duty with his troop, had been doing extra work and had probably overtaxed his strength. In all these cases we may account for the disease by supposing a weakening of the individual resistance, the immunity of the rest of the garrison being due to the comparative weakness of the infection to which all were probably exposed. I have already mentioned the unusually low state of the stream which supplied the post with water, and I regard this as the reason why the disease reappeared in 1893 after a long absence. The mountains were only traversed by an occasional hunter or wood chopper. There was no typhoid fever in the vicinity so far as the physicians of the neighboring town of Buffalo knew. I think that the infection of the stream by the dejecta of typhoid-fever patients could be pretty certainly excluded.

It is interesting to note that the cases of "typhomalarial" fever reported by Surgeon Hoff, United States Army ("Typhomalarial fever," Am. Jour. Med. Sci., Jan., 1880, p. 38.) were thought by him to have received the infection from the water of the Clear Fork, and that "in the summer of 1878 the snow disappeared entirely from many of the peaks which, according to tradition obtainable among the few trappers who hunted in that region, were never before uncovered" (p. 56). But how are we to account for the fact that the attack of F., Eighth Infantry, was so much more severe than those of the other patients? The answer is: He was employed in the post garden and is known to have drunk of the water in the irrigating ditches. To appreciate the significance of this, a brief description of the topography of these ditches is necessary. A considerable amount of water was diverted from the Clear Fork above the post into a canal which, near the row of officers' houses, divided into several branches, two of which passed around the parade ground, one in front of the officers' quarters, and the fourth and much the largest through the back-yards of these quarters. This stream, contaminated by wash water, slops of various kinds, and the droppings of various domestic animals, was conducted through a gully at the rear of the hospital to the plain below the post on which the post garden was situated, and was there used for irrigation. The waste-pipes from the hospital kitchen and bathroom discharged into this stream. There was no watercloset in the hospital. The dejecta for the typhoid-fever patients were disinfected at once and emptied into the privy vault, which was situated some hundred feet from the ditch. It is not thought probable that the stream was poisoned by the discharges from the fever patients in hospital. If the bacilli from these cases reached this water at all, it must have been in the water used to cleanse the nurses' hands, or in some other roundabout way. There was no disease remotely resembling typhoid fever in the officers' families at that time. My own explanation of the greater severity of F.'s case was either that the bacilli already present in the water of the Clear Fork developed greater toxicity in the irrigating ditch because supplied abundantly with organic matters, or that these same matters when drunk with the water contributed to enfeeble the patient's resistance to the typhoid poison.

It is hardly necessary to argue in favor of the proposition that mountain fever is really typhoid fever; that is, I think, generally admitted to-day. Those cases of typhoid fever, not rare in the East, in which the patients are constipated and their symptoms otherwise largely negative, the diagnosis being reached by exclusion, are, in my opinion, identical with mountain fever. As I have seen it, moreover, mountain fever is unmixed typhoid fever. It is not a malarial remittent, nor in any way complicated by malaria; first, because malaria in its usual forms is unknown in Wyoming; secondly, because it is generally admitted by the physicians of my acquaintance who have had the most experience with this fever that it is not aborted, nor favorably influenced by large doses of quinine; thirdly, because one attack of the disease is protective against further attacks. There is abundant evidence in addition to that which I have here presented, to show that the disease is acquired from the water of mountain streams. To explain the presence of the typhoid poison in these waters three hypotheses present themselves. First, the infection of these streams directly from the excreta of typhoid-fever patients. This may, of course, occur, but it is absurd to adopt this supposition to explain the majority of the cases apparently infected in the wilderness. Second, that the living germs of the disease are precipitated with the snows upon the mountains (Surgeon Smart) with the corollary that the especial prevalence of the disease when the mountains are almost bare of snow is due to the fact that the poison is contained more abundantly in "the snow many seasons old which every year becomes more and more impregnated with organic germs filtered through superimposed strata." (Surgeon Hoff, loc. cit., p. 56.) It is true that the disease begins at the time of year when the snows of the higher mountains commence to melt, also that it is more likely to prevail when the mountains are nearly destitute of snow, but these facts are not necessarily connected causally with one another. The supposition that the specific typhoid bacillus can live indefinitely in perpetual snow is not in accordance with the facts now known

as to the natural history of this bacillus. The third hypothesis is that there has been no specific infection of the water, but that a saprophyte which has its natural habitat in these waters can develop pathogenic properties if afforded a sufficiency of food and a suitable temperature.

Surgeon Smart has shown (Am. Jour. Med. Sci., Jan., 1878) that the snows of the Rocky Mountain region and the waters which result from the melting of these snows contain a large amount of organic matter. These waters in Wyoming also contain a considerable amount of mineral salts. (The presence of such salts is believed by Frankland to affect favorably the longevity of the typhoid bacillus. (Jordan, Med. News, Sept. 28, 1895.) The bacillus (which is assumed to be present) thus has various nutritive substances at hand, and needs only an elevated temperature for vigorous growth. The connection noticed between the commencing toxicity of the waters and the melting of the mountain snows is probably only this, that the temperature which is high enough to affect these snows is also sufficient to favor bacterial increase in the water of the streams. Again, when the streams are low the water is more apt to cause infection, not because the deeper strata of the mountain snows are now melting, but because the conditions for bacterial growth in the water are improved—the water, being then shallower, is more thoroughly warmed by the sun's rays, and pools in the hollows of the partially bare bed of the stream afford favorable places for the multiplication of the bacilli. We have already noticed the increase in noxiousness of the water of Green River when it becomes warm and stagnant in the water barrels of Rock Springs.

It is not probable that the bacterial life of the Rocky Mountain waters is essentially different from that of other streams; but the waters of more thickly settled regions, if they afford equally favorable nutritive conditions, are always more or less open to the suspicion of contamination through human agency, and typhoid fever acquired from their use is explained as necessarily due to infection from some previous case of the disease.

On account of the uncertainty concerning the nature of the fevers reported from some of our Western posts, as Texas fever, continued fever, etc., a call was made from this office, August 30, 1895, on the medical officers of certain posts for a special study of the fevers occurring during the season of prevalence. Very excellent reports were rendered, some of which are given below, but, as a rule, the assistance afforded by a careful microscopic study of the blood was not fully utilized in the differentiation of the cases.

Report of fevers occurring at Fort Sam Houston, Tex., for the calendar year 1895. By L. M. Maus, major and surgeon, United States Army.—I have the honor to submit herewith a report of the fevers occurring at this post during the past year, in compliance with request embodied in letter from your office dated August 30, 1895. In order to make the report more complete, every case of fever occurring here among the command during the past calendar year has been included. The list is as follows:

Ephemeral fever	7	Remittent fever	2
Catarrhal fever	2	Typhoid fever	29
Quotidian intermittent fever	32		
Tertian intermittent fever	7	Total	79

Among the list were seven cases of ephemeral fever, or febricula. The clinical history of these cases differed in no manner from the ordinary fugitive fevers commonly observed in daily practice elsewhere.

These fevers should be classified as symptomatic, since they result from some slight functional disturbance and are never organic. They generally can be traced to gastric or intestinal irritation as the result of indigestible articles of diet, from the absorption of certain toxic substances, heat, or malarial poisoning, malaria and indigestion being the most common causes. The maximum duration of temperature was eight days and the minimum two days. Rarely did the temperature exceed 102°. Recoveries occurred in each case. The treatment consisted of phenacetin, salines, quinine, rest, and diet.

Two cases of acute catarrhal fever occurred during the year. They probably resulted from exposure during inclement weather, and were accompanied by a general inflammatory condition of the nasal, pharyngeal, and bronchial mucous membrane. These cases differed from the ordinary epidemic influenza, which has prevailed here more or less during the past two winters, inasmuch as the former were unaccompanied by intense muscular pain and general depression. Both cases made a complete recovery. The maximum duration of temperature was ten days, the mini-

mum four days. The treatment consisted of applications to chest, phenacetin, Dover's powder, quinine, aperients, cough mixtures, rest in bed, and diet.

Thirty-nine cases of intermittent fever were taken on sick report during the year, and many other cases treated, though not taken up.

Thirty-two of these cases were of the quotidian type, the remaining seven being quartan. Malarial fevers, while common in this vicinity, are usually of a mild type and very readily respond to quinine treatment. Rarely do more than two or three chills occur in any one case. Malaria exists in a very large portion of the State of Texas, but is principally confined to that portion lying east of longitude 99°. San Antonio is situated on the western border of the coastal plain at the foot of a range of hills which extends north and west and merges into the Tertiary formation. It likewise occupies the eastern border of the semiarid belt, agriculture being very uncertain a few miles west on account of the lack of the necessary rainfall during the growing season. The city lies in a valley through which flows the San Antonio River. This stream rises from two large springs north and west of the city. The land on either side of the river is low and flat, and its immediate edges are bordered by a luxuriant growth of shrubbery, weeds, and tula. Owing to the flatness of the valley there is little current in the river, and it practically forms a long, tortuous bayou as it winds its way through the city, where it is crossed by many bridges.

Malaria is quite prevalent here during the spring, summer, and fall months, and occasionally during the winter. More than 50 per cent of the cases enumerated in this report originated here. This fact has been obtained from individual investigation. More than one-half of these patients stated positively that they were never affected with the disease before coming here.

The post is located upon a parallelogram, which rapidly slopes to the east, the officers' quarters occupying the ridge on the western border and about two-thirds of the north and west sides, while the barracks occupy the eastern border and the remaining portions of the north and south sides. There is a difference of 35 feet in altitude between the eastern and western borders of the post, the former resting in a ravine. This ravine receives the subsoil drainage from the ridges on either side, which may in part account for the prevalence of malarial manifestations among the command. The officers are rarely affected. During the warm weather many of the men sleep on the porches, while the windows and doors of the dormitories are constantly kept open during this season, thus permitting an easy ingress to the malarious atmosphere. Several cases of malarial fever likewise originated among the families of the department staff. They occupy quarters in what is known as the old post, a large tract lying to the west of the garrison proper. The ground recedes here to the west, and consists of black loam, 6 to 20 inches deep, resting upon an impervious, lixiviated marl, which rapidly hardens when exposed to the atmosphere. This formation has proven to be an excellent material for buildings, the quadrangle and officers' quarters at department headquarters being entirely constructed of it. The grass, shrubbery, and trees during the warm months are kept green by constant irrigation, and very frequently this is greatly overdone. I am satisfied that the lake of water between surface and subsoil is an important factor in the growth of the malarial germ. Recommendations were made to the proper authorities that irrigation be done with moderation. These instructions were carried out with beneficial results. The treatment consisted of quinine in liberal doses. Two cases of malarial remittent fever occurred during the year, one in March, the other in June. Both cases were preceded by periodical chills and fever. Malarial symptoms existed throughout the attack. The temperature lasted in one case twenty-six days and in the other fourteen. Both cases recovered. The treatment consisted of calomel, quinine, phenacetin, diet, and rest in bed.

TYPHOID FEVER.—Twenty-nine cases of this fever were treated in hospital during the past calendar year. The first case was that of Private Otto Glaser, Troop A, Fifth Cavalry, who had been continuously on duty at the post for several months; was admitted to hospital January 11, having felt badly for one week previous. This case was mild in character, and characteristic of the mild type common to this section of the country. We find here quite frequently a mild temperature of short duration, with low pulse rate. The graver symptoms of muttering delirium, dry brown tongue, intestinal hemorrhage, severe and persistent diarrhea were frequently absent. The eruption, as a rule, was not well marked, except in severe cases. The mild character of many of these cases often leads to much doubt as to the nature of the disease, and not infrequently experienced physicians are misled. It is quite common to hear medical men speak of these cases as continued, malarial, thermal, or slow fever, and not a few regard them as undetermined. Since my arrival here—November, 1893—63 cases have been treated in hospital, occurring in the command, and a few cases in officers' and soldiers' families. I think there can be no doubt as to their true nature.

The occurrence of these simple continued fevers in warm climates has led many observers to believe that they result from continued heat, and they class them as

heat or ardent continued fevers. The term "Texas fever" has also been used by local physicians for the want of a better name and knowledge of the disease. That they are not malarial has been settled by absence of the malarial hæmatozoa in the blood. It would seem that the virulency of the typhoid poison is more or less modified by climatic conditions. This may account for the mildness of many cases which are observed here. This I believe to be true of the exanthemata. It is a well-known fact among the profession that scarlet fever, measles, whooping cough, and diphtheria are milder here than in the East.

Etiology.—Considerable effort was made to ascertain the causes of infection in the foregoing cases. Each patient upon admission to hospital was carefully questioned as to habits, length of residence, etc. These facts, together with the premonitory symptoms, and a history of the case as it progressed were carefully recorded.

The water, which is regarded as the principal source of infection in typhoid fever, is beyond question, it being from the city supply. An exception will be made in two cases, who were sent to hospital from a practice march with the fever. The city water is excellent, and nothing can be found wanting in the sanitary conditions which surround these men. They have no sewers to contend with, except one which runs behind the officers' and men's quarters to drain bathrooms, lavatories, urinals, and kitchen sinks. Dry-earth closets are used and the night soil removed daily. The habits of the men are excellent, and they rarely leave the garrison of nights. All deny the use of water from the acequias which run through the city, or from other suspicious sources. A large percentage of these cases were recruits or recent arrivals; 11 had been here less than two months, 6 less than six months, 7 less than one year, and 5 less than twenty months. Many of them came from the North or other distant points and were not thoroughly acclimatized. Change of climate has been insisted on as a very strong predisposing cause of typhoid fever. Immunity, natural or acquired, plays an important rôle as a preventive measure. It has been suggested that an immunity to typhoid fever may be acquired by those accustomed to the odors of sewer gases or to drinking impure water. This fact is more than probably the explanation for the infrequency of this disease among the Mexicans, Indians, and others accustomed to filth, imperfect and poor sanitation. The lowering of the vital functions from whatever cause leads to an increasing liability; unhappiness, mental depression, nostalgia, and the acclimatizing process are important factors in lowering the vitality. Stockmen are aware of the remarkable changes which take place in cattle or horses brought from the North or from a distance to Texas. It is a noted fact that these animals, though in an excellent condition on arrival, fat, with slick coats and plenty of animal spirits, gradually undergo such changes in two or three months that they are scarcely recognizable. During this change the animal falls away, his coat becomes rough, appetite poor, and spirits gone; in fact, from a handsome, spirited animal he degenerates into a veritable hack. There is no doubt that he has been subjected to fever more or less during this period. After a while, with no apparent cause, a change occurs, and in the course of six months or a year he returns to his normal condition. It is very probable that the changes which occur in the human system, consequent upon transplantation here during the warm months, may in part account for the development of these cases among so many of the recruits. Upon the closest investigation it often seems impossible to locate the cause, and the suggestion that the transformation of the ordinary intestinal bacilli, or those introduced by means of food and water into the typhoid bacilli, becomes a possibility during the disease.

Clinical history.—As a rule, weariness, headache, feverishness, loss of appetite, and insomnia were the prodromal symptoms, and existed from three to ten days before admission to hospital. In a few instances chills or chilly sensations, nosebleed, and some gastric and muscular pain were complained of. The moist whitish tongue was by far the most common, though occasionally it was reddish, or tip and sides reddish, with white center. In three cases the tongue was dry and brown or of a beefy color. In these cases, however, there was marked evidence of intestinal ulceration. Iliac tenderness and gurgling were marked symptoms, the latter being invariably present. The eruption was not constant, appearing in about 40 per cent of the cases. It was most commonly found on the abdomen, though frequently on the shoulders, chest, and arms. In three cases it was general, covering the entire body. The pulse of typhoid fever in this section ranges from 70 to 90 beats per minute during the early stages of the disease, becoming subnormal later on. A pulse beat of less than 70 is not uncommon. Generally speaking, the bowels remained regular or were constipated during the first half of the sickness. A looseness or diarrhea was observed generally sometime during the sickness, though it may have consisted of but one or two loose stools. Persistent diarrhea was uncommon. Apathy, moderate or marked, existed in every case. Insomnia was quite common; subsultus rare; carphologia absent. Delirium existed in 4 cases. The spleen was enlarged in 9 cases and the liver in 2.

General remarks.—In accordance with the severity of the cases they were divided into three classes, mild, medium, and severe. There were 14 of the first, 9 of the second, and 7 of the last. The average maximum and minimum duration in the three classes was as follows:

	Maximum.	Minimum.
	Days.	*Days.*
Mild cases	23	10
Medium cases	40	19
Severe cases	60	17

Relapse occurred in 6 cases, or in 20 per cent. It occurred in 30 per cent of the series of 1894. Several of the relapses that year directly resulted from indiscretion in diet during convalescence, while none occurred from that cause in the series of 1895. Several of the milder cases were of the asthenic character and merged into a chlorotic condition during convalescence, from which the patient recovered with difficulty. Three deaths occurred, a mortality of 10 per cent.

Treatment.—Upon entrance into hospital each patient was given 0.3 to 0.6 of calomel, which was followed by a saline or castor oil in six or eight hours. As a rule little medicine was prescribed, main reliance being placed upon diet and cold baths. Milk, fresh or sterilized, formed the principal article of diet throughout the entire sickness. In several instances patients objected to the use of milk on the ground of its indigestibility. In these cases it was predigested by pancreatic tablets before administration. Several patients objected to it so seriously, however, that beef tea, oatmeal gruel, or Mellin's food was substituted. The last article I regard favorably as a food for typhoid patients. Phenacetin, antikamnia, and quinine proved useful at times. The salicylate of bismuth was very useful in checking diarrhea. In one case there were several profuse intestinal hemorrhages, which were promptly arrested by the high injection of 500 c. c. of a three-fourths of 1 per cent solution of nitrate of silver. It was unnecessary to repeat this injection.

Sulfonal, trional, hyoscyamus, and opium were used to produce sleep, the last in my opinion being the most efficacious. Digitalis, caffein, and strychnine were employed occasionally as heart stimulants.

The ice bath was used in the treatment of a number of serious cases. In several of these the temperature persisted from 103° to 105°, morning and evening, unless reduced by baths. This treatment was kept up during the severest portion of the illness every two or three hours, day and night, a bath being given whenever the temperature reached 103°. The tub filled with water at 80° F. was placed at the side of the cot and the patient carefully lowered into it. The temperature was then reduced to 70° by cubes of ice, the patient being briskly rubbed in the meanwhile. He remained there, as a rule, twenty minutes. After his return to bed a whisky or milk punch was administered, the patient enveloped in a blanket, and hot-water bottles applied. I can not too strongly advocate the use of the ice bath in those cases where there is a persistent high temperature with dry skin and nervous phenomena. After each bath the patient, who previously had been tossing about the bed, delirious, with coma vigil, would fall off into a restful sleep, which would last several hours or until the return of the temperature. Each bath, if properly administered, is capable of lowering the temperature to normal, and several hours pass, as a rule, before it returns to the high point. One can easily calculate the many hours of feverishness and insomnia spared the patient by this means of treatment. In order to administer the ice bath successfully, a special tub on wheels is required. It should be very wide and only deep enough to comfortably immerse the body. The top of the tub should be on a level with the cot. It is very inconvenient to administer these baths with a narrow tub on account of the difficulty of placing and returning the patent; besides, the application of friction and rubbing while the patient is in the tub is almost out of the question.

I would especially call attention to the successful use of large hypodermic doses of strychnin in averting death in the case of Private Hall, who was suffering from complete collapse about the end of the third week of his illness. He entered the hospital July 21, suffering from very grave typhoid symptoms. The temperature from the onset was from 104° to 105°, and persisted for eighteen days unless reduced by the baths. At the end of the third week he was very much emaciated, with dry, brown tongue, sordes, low muttering or active delirium, subsultus, and constant mental aberration. On the morning of August 6 it was apparent that he was gradually sinking, as the pulse was becoming very weak and thready, skin cold and clammy, while the respiration was irregular and shallow. Digitalis, caffein, and brandy were given in larger quantities and oftener, with no apparent beneficial results. By 5

p. m. the patient had merged into an unconscious condition and was evidently sinking fast. I concluded to use strychnin in large doses and to press the drug until some result was obtained, the case being otherwise considered hopeless. The following is the record of amount given and time of each injection:

Date.	Grain.	Pulse and respiration.	Temperature.
August 6:			°
3.30 p. m	1/25	Pulse could not be felt at wrist; respiration, 33.	103
6 p. m	1/15		104 1/5
6.30 p. m	1/10		104 4/5
7.20 p. m	1/10		100 2/5
8 p. m	1/10		
8.40 p. m	1/10	Respiration, 35	100 2/5
10.30 p. m	1/10		104 2/5
11.30 p. m	1/10		102 1/5
August 7:			
12.20 a. m	1/10		103 2/5
1.15 a. m	1/10		103 2/5
2.05 a. m	1/10		
2.55 a. m	1/10	Respiration, 36	104
3.45 a. m	1/10		104 2/5
4.35 a. m	1/10		104
5.25 a. m	1/10		
6.15 a. m	1/10		103
7.30 a. m	1/10		103
8.35 a. m	1/10		102 2/5
9.25 a. m	1/10		101
10.25 a. m	1/10	Respiration, 34	102 2/5
11.05 a. m	1/10	Pulse stronger	102 2/5
12.15 p. m	1/10		103 2/5
1.20 p. m	1/10		103
2.20 p. m	1/10	Pulse, 126	103
3.20 p. m	1/10	Pulse, 112	103
4.20 p. m	1/10	Pulse, 128	103 2/5
5.20 p. m	1/10	do	102 2/5
6.20 p. m	1/10		103 2/5
9 p. m	1/10	Pulse, 114; respiration, 30.	
11 p. m	1/10		
August 8:			
1 a. m	1/10		
3 a. m	1/10		
5 a. m	1/10	Pulse, 112; respiration, 28.	

I remained with the patient during the night of the 6th, and personally administered the hypodermics. Brandy and peptonized milk, 30 c. c. each, were given by rectum every two hours. During the entire night the patient's condition remained virtually the same, with slight temporary improvement of pulse and respiration after each hypodermic. The conditions remained about the same during the following day, but sufficient encouragement was given to continue the use of the drug. Toward night the pulse and respiration were visibly stronger, and hypodermics after 6.20 p. m. were reduced to every alternate hour. At 5 a. m. on the morning of the 8th there were slight symptoms of returning consciousness. The pulse had become much stronger and respiration more regular and deeper. At no time during the rapid administration of the drug were there any symptoms of strychnin poisoning.

About 7 a. m. the patient became conscious and asked for milk. During the remainder of the day the strychnin was administered in one-tenth grain doses every three hours, and finally discontinued by evening, the urgent symptoms having passed away. The patient received 175 milligrams (2.7 grains) in first twenty-four hours, and 65 milligrams (1 grain) in the succeeding twenty-four hours, a total of 240 milligrams (3.7 grains) in forty-eight consecutive hours. I am unable to find in the literature of the subject the use of strychnin in such heroic doses. I believe in cases of collapse following typhoid fever, typhus fever, cholera, pneumonia, cerebro-spinal meningitis, etc., that the drug should be pushed until its physiological effects are produced before abandonment, and believe if thus administered that many cases would be tided over this critical period who otherwise would never rally.

REPORT OF MAJ. CALVIN DE WITT, FORT LEAVENWORTH, KANS.: From August 22, 1895, to June 17, 1896, there have been treated in this hospital 21 cases of fever, 7 of typhoid and 14 of malarial.

In every case of typhoid the patient stated that he had been sick for some days before admission, but none were definite as to the exact number of days. If, how-

ever, in each case a varying number of days—from seven to ten—is added to the time in the hospital when the temperature fell to the normal, the sum will be about three weeks. One case was fatal thirty-one days after admission. The diagnoses were made from the symptoms. The rose-colored spots appeared in all cases except the first; they were few, in some instances only three or four were discovered, and usually on the abdomen. Epistaxis occurred in the majority of cases in slight degree. Some meteorism was present in all cases, usually mild, except in the fatal case, in which it was excessive, prolonged, and obstinate to treatment. Diarrhea was more or less prominent during the course of the disease whether there was initial constipation or not, except in the first case, in which there was no diarrhea. Headache was usually slight and of short duration, except in two cases, in which it was severe and prolonged. Nervous symptoms were not marked, except that sleeplessness was present. In two of the cases it was obstinate and in three it was associated with troublesome delirium, subsultus tendinum, and severe depression. In four of the cases, and in two other cases not treated in hospital, mentioned below, First Lieut. W. H. Wilson, assistant surgeon, U. S. A., made cultures from the fæces and found typhoid and colon bacilli, from which pure cultures of typhoid bacillus were made and differentiated by microscopical appearances and chemical reactions. Cultures from sterile urine of two of the patients were examined, but the characteristic bacillus was not found. In one case a "pneumonic area" of the upper lobe of the left lung was a serious complication. This was determined not only by the physical signs, but pneumococci were demonstrated by microscopical examination. Three cases were complicated by "hemorrhage from the bowels." In one there was a loss on each of three occasions (nineteenth and twentieth days after admission) of about 500 c.c.

The treatment preferred by the medical officer who had charge of the cases was cold-water bathing; sponge baths were preferred to immersion, although this was resorted to when the sponging was not successful. The directions given were to bathe when the temperature reached 103°, and to continue the bath until there was a reduction of at least 2°. Large doses of quinine were given at first, but when the diagnosis was determined smaller doses as a heart tonic were ordered, and were continued until convalescence was established, when tonics usually of either pills or elixir of iron, quinine, and strychnine were employed. Stimulants were freely given when indicated. Strychnine and digitalis were employed either hypodermatically or by the mouth when the action of the heart became weak. Opiates in combination with astringents or with bismuth were administered for the diarrhea. Meteorism was treated by turpentine stupes and by turpentine internally; in one case it was necessary to use a rectal tube. Epistaxis required no treatment. In all cases the diet was liquid, 2 or 3 quarts of milk daily in divided doses at regular intervals; if it did not agree, limewater was combined with it; freshly made beef broth was also given. Solid food was denied until after the temperature remained normal for two weeks, and then it was given cautiously. Particular attention was given to the nursing, which was continued day and night. Especial care was taken in disinfection; the excreta were mixed with the milk of lime, which, after standing for twenty-four hours, was incorporated with sawdust and immediately burned. Bed and body clothing after use was disinfected before being sent to the laundry, and other measures were taken to prevent infection. No case of the disease occurred among the attendants or patients.

Shortly after admission the question was asked of all these patients whether they had drunk any water other than that supplied to the post, and within three weeks of first feeling ill or sick. Everyone asserted they had not except two who are known to have used water from a creek named "Little Stranger Creek," about 15 miles from the post, near to which they had encamped with the organization to which they belonged (Troop K, Sixth Cavalry) when on a practice march one week before being taken sick and hardly time for the incubation of the disease. The object of the question was carefully explained to them and they were enjoined to be exact in their replies, and I have no reason to believe their statements were not true. It may be assumed that the cause of the typhoid was the water supply of the post, the source of which is the Leavenworth waterworks, which takes the water from the Missouri River, about three-fourths of a mile below the outlet of the sewer through which all the sewage of the post flows and about 1½ miles below the outlet of the sewer of the United States Penitentiary. In other words, the intake of the Leavenworth waterworks is on the same side of the river (25 feet from the bank) and not far from the outlets of the sewer systems from which the sewage of a village of more than 1,500 inhabitants flows into it. The sewage mingled with the river water is then pumped into a settling basin, from which it is thrown into the distributing reservoir. It is well known that the water of the Missouri River holds in suspension a large amount of organic and inorganic impurities, principally the latter, and because of this it is first pumped into the settling basin. How complete the sedimentation is I can not say; it is, however, within the experience of all the inhabitants of the post that the water as drawn from the distributing pipes, with rare exceptions,

contains sediment, is discolored, often gives off an odor suggestive of decomposition, and is not only uninviting but unpleasant for bathing or toilet use.

There is no doubt that the sewage of the post and prison largely diluted with this dirty river water is in part given back to the inhabitants for domestic use. A case, then, of incipient typhoid fever among those who use the closets with which quarters and barracks are provided, and before the subjective symptoms of the disease become severe enough to drive the patient to report for examination and treatment, discharges excreta into the house sewerage system, which, when carried away, mingle with the general volume and are discharged into the river. This is shown by the fact that all of the severe cases stated that they had been sick for days prior to admission to hospital, and all testified that the only water they drank was from this supply. In the only case of typhoid fever which has occurred in the person of an officer since November, 1893, it was known, from his own confession, that he had drunk freely of the water taken from the water supply pipe in his quarters. In the only other case which occurred among the officers' families, the son of an officer, in whom it proved fatal, it is uncertain whether the disease was contracted from eating some ice, which had been stored the year before and believed to be what was left of a supply which was suspected of having caused a large number of cases in the United States military prison—an opinion expressed by the attending surgeon, Capt. Charles Richard, United States Army, after careful investigation—or from drinking water from the general supply of the post. It is to be noted as an important fact bearing upon the opinion of the causation of typhoid fever that the families of officers stationed here for the past two and one-half years before using this water for drinking purposes have it filtered through the Pasteur-Chamberland filter or have it boiled, and in a number of cases both filtered and boiled. To this rule I do not know an exception, apart from those who use water from cisterns, with which many of the houses are supplied. Two other cases occurred, one an adult male employed by the quartermaster's department, the other a young woman, aged 15, the daughter of an enlisted man, both of whom had used freely the water from the supply pipes. In these cases, however, it is not known that they did not use water from some other source.

Dr. Mew, analytical chemist, quoted in sanitary report of this post, dated May 28, 1891, made by Maj. John Brooke, surgeon, United States Army, says: "Whatever the source of the large amount of albuminoid ammonia, and holding the question of possible sewage contamination sub judice, it is quite certain such a water (taken from the general post supply) is not fit for drinking purposes for man or beast." In the same report Surgeon Brooke remarks: "The ordinary sewage matters are doubtless oxidized or otherwise broken up to such an extent as to be inappreciable at the pumping station; with living germs it would be different, the excretions from a single case of cholera at the post would, through the water supply, be sufficient to infect the entire post, the military prison, and the town of Leavenworth." In sanitary report of October, 1890, Maj. A. A. Woodhull, surgeon, United States Army, remarks: "It should be thoroughly understood that the post sewage flows into the Missouri River about a mile above the intake of the Leavenworth waterworks; we are therefore constantly and increasingly polluting, or liable to pollute, our own water supply."

Since these opinions were written the sewerage systems of the post and prison have been enlarged and extended, so that, with one or two exceptions, and excepting the old outlying buildings occupied principally by married enlisted men, all the inhabited buildings are connected with them, and the volume of sewage has been largely increased.

The unfit condition of the water for drinking purposes was recognized by the Quartermaster's Department when that department purchased and had placed in the officers' quarters, barracks, and other buildings suitable "Pasteur-Chamberland filters," which have been in use nearly one year. It was recommended that these filters should be cleaned once every week because of the excessive amount of foreign matter suspended in the water, which it is believed from inquiry and inspection was generally done. The water after this filtration was clear, limpid, and pleasant, and the amount of filtrate obtained was surprising and very unpleasant to look at. The use of this water is necessarily limited to those in or near the barracks and buildings which contain it. The system of filters, excellent so far as it goes, is not and can not be sufficient to secure an adequate and pure water supply to this large and important post.

I do not know of any wells in the post or of any springs in the neighborhood which are liable to pollutions which would contain the specific cause of typhoid fever. There are, however, two small water courses, which drain very limited areas and which are usually dry, whose pollution from one in the earlier stage of the disease is just possible. These empty into the artificial pond (or lake) from which the supply of ice is harvested. The lake is also fed by springs in its bed. This lake is located one-half mile from the national cemetery, in which the bodies of those who die in the post are buried, and the source of the water courses is within about 300 yards of the boundary of the cemetery and is in the direction of the principal drain-

age, and it may be possible that the springs in the bed may be polluted, although the water must pass through one-half mile of earth intervening between them and the cemetery. I think it can be asserted that few drink from it, although the ice from it is freely taken when it is available.

Ten cases of typoid fever yearly in a garrison of 1,200 men, women, and children is not a large number. It should, however, be remembered that the majority of the men are carefully chosen for their physical strength; so that it is probable that with the same source of infection present in a town or city the proportion of cases would be larger and their character more severe. It is also with so small a number difficult to establish the opinion that the water supply is the source of the infection, but the statements made, in my judgment, do point, and with much force, to the supply of this post being in this respect dangerous. Cases of this disease would doubtless appear in this garrison, to which neighboring towns are so accessible, and in which there are sources of infection, as polluted wells. The infection, however, would then be obtained elsewhere, and not at home.

A pure water supply for this post is certainly very desirable, if not necessary, either from artesian or other wells or obtained from the river by means owned by the Government and independent of the present supply. Under these conditions it is highly probable the water would be clean, pure, and more inviting, and there would not be the disagreeable feeling that our own sewage, although largely diluted, is in part returned to us for our domestic use.

In the treatment of the malarial fevers quinine was depended upon. Fort Leavenworth has a reputation as a malarial region. That malaria is present in a mild form is proved by the cases reported above. In some of the cases it doubtless was contracted by walking to and from Leavenworth City late at night, or perhaps by sleeping in a ravine on the reservation, in which there is an area of ground that is always wet and which becomes a swamp after a rain, and remains so for some time. As the prevailing wind is from the southwest and passes over this area before it reaches the buildings, it is possible this may be one of the sources of the malaria; other sources may be an artificial lake a short distance to the south, and a large river flat to the north and south, which is left bare and exposed to the sun when the river is low. If heat, moisture, and decaying vegetation are favorable conditions for growth and increase of the malarial poison, the prevention of dense growths of weeds and the access of sunlight and air to the ground formerly covered with them has acted favorably.

Capt. W. D. McCaw reported from Fort Ringgold, Tex., on the cases that occurred at his post from September 22 to December 31, 1895:

Fortunately as regards the health of this post, but unfortunately as far as the value of this report is concerned, the clinical material in this line is almost nothing. Excluding from consideration one case of measles and all cases of abscess, carbuncle, orchitis, etc., attended by high temperature, there remain:

1. One well-marked case of quotidian intermittent fever, in the person of a recruit who arrived at this post suffering from the disease, a perfect type of "fever and ague," with complete subsidence of all morbid symptoms between attacks. He recovered promptly under treatment with quinine.

2. One case of malarial fever, remittent type, occurring in the person of a general prisoner in the guardhouse. This man was very anæmic, and has been the subject of chronic ulcers affecting various parts of his body for the past year. His case was regarded by the last post surgeon as one of farcy. He was admitted November 20, and gave a history of a chill that morning. He had headache, pain in back and legs, gastric disturbance, and vomiting; bowels constipated; temperature 101°. While working as a prisoner, he had often drunk of the water from hydrants at the post rather than go to the guardhouse or barracks for a drink of condensed water. A mercurial purge and quinine caused a subsidence of all symptoms on the third day, but the patient was kept in the hospital until December 2 on account of his general anæmic condition.

3. Three cases occurred in one company within two days, all presenting the following symptoms: Fever, headache, constipation, distention of bowels, and very foul coated tongue—no chill. An investigation of the barracks showed that the water barrel for condensed water stood in the amusement room, and that due to the cold weather here, not more than a third of the barrelful was consumed daily. In delivering the fresh water the barrel was simply filled every day without first emptying the water of the day before. The water had a stale odor, and an unpleasant taste. I believe this to have been the cause of the three cases. The barrel was scalded and instructions given to empty it carefully every day. These cases I have diagnosticated as "febricula," although I think "intestinal toxæmia" would be a better name. All three recovered in a day or two.

I have seen no other cases of fever, nothing in the least resembling typhoid or so-called "Texas" fever.

Among the precautions taken here to prevent disease, I believe that the use of condensed water for drinking purposes is by far the most important, and I attribute the freedom of this post from fevers to its use. The men are generally alive to the importance of using this water, and do not willingly drink any other, although it must frequently happen that in the town and elsewhere bad water is used by them.

I may say that I have seen in consultation several cases of fever of a typhoid type among citizens in the neighborhood.

Maj. H. S. Kilbourne made a special report of the febrile cases which were observed at Fort Clark, Tex., during the months of August, September, and October. The duration of the cases recorded as simple fever in no instance exceeded five days. No parasitic form was discovered in the blood, and no relapse occurred. Dr. Kilbourne regards the details of his report as showing—

1. The occurrence of typical cases of malarial intermittents.
2. The prevalence of continued fevers which are not amenable to quinine, and are not typically typhoid in character, and are possibly of mixed infection.
3. The diminished number of the latter type during the fever season of 1895 as compared with the same season in 1894. This is coincident with an improved water supply, but not yet strictly referable to this improvement.

	1894.	1895.
Simple fever	15	19
Intermittents	.....	8
Remittent or continued fever	23	7
Total during the season	38	34

Maj. P. J. A. Cleary reported as follows concerning the fevers prevalent at Fort Brown, Tex.:

The causes of the different types of fever in this location are not far to seek. The general surface of the country is low and flat and will not average over 20 feet above sea level. There is very little natural drainage, so that after heavy rains or a rise in the river there are large areas covered with shallow lakes, and the lagoons and old river beds are filled; afterwards the water sinks into the ground and also is evaporated, leaving, of course, decaying vegetable matter, which contains the fever germs and is carried by the prevailing winds. Another fertile source of fevers is the wretchedly unsanitary condition of the town. It is low, and with not only no system of even surface drainage, but all around it is a dumping ground, not in the distance, but in the town. The streets are in many places lower than the sidewalks, so that after a rain the water settles in the streets, forming lakes; and, what is worse, frequently to fill up these lakes or ponds it is common to see stable manure and every kind of garbage dumped into them. One would readily believe that such conditions would cause the extermination of the inhabitants, but there is almost constantly blowing a strong south or southeast wind, which is doubtless an important sanitary factor. The men are constantly in town in the night and away into the night, which, doubtless, is the most fertile source of the intermittent fever.

Regarding the fevers of this location, it may be remarked that that type known as malarial continued fever gives rise frequently to much uncertainty as to its true character because of its resemblance to typhoid. It sets in frequently like typhoid and continues with many of its symptoms, the headache, furred tongue, high fever with diurnal variations of temperature, delirium, and frequently abdominal tenderness, then it goes on for weeks, and convalescence is slow. One case (civilian) which I attended with a local physician had severe hemorrhage of the bowels, no doubt from mucous lining, and I have been told that such is not very uncommon here in this class of fevers. One of the cases here reported yielded in fifteen days to quinine, while in the other it was of no avail and the case continued for six weeks.

A gentleman, formerly post surgeon of this post, strongly recommended chlorinated soda solution in half-dram doses, saying it acted as a specific. I have seen it fairly and fully tried, and can say in every instance it acted as a powerfully depressing emetic and had to be quickly discontinued. I have no doubt that cases of typhoid are very liable to be mistaken for malarial fever, and vice versa, but in these malarial fevers there is commonly a constipated condition of the bowels, whereas in typhoid there is a looseness, and the presence of the eruption in the latter points conclusively to its nature.

In connection with the subject of fevers at this post, the water supply would seem to be of much importance, more especially with regard to fevers of malarial origin and also of typhoid fever. This ought to be more strongly marked from the fact that some years ago the water supply was from the river (Rio Grande), and now, and for some years past, it is condensed water supplied from the ice machine; and yet a strict and accurate conclusion can not be drawn, for the very plain reason that the troops are not rigidly restricted to this condensed water.

The town (Brownsville) contains about 6,000 inhabitants, most of them Mexicans. It is supplied with two kinds of water, cistern and river. The cistern water is limited to the American population and the better class of Mexicans, while by far the larger number of inhabitants use the river water. The soldiers, as before mentioned, spend part of the night in town, and some of them a large part of the night, and what water they drink there is very little of it cistern and none of it condensed. Now, how far this has affected the prevalence of fevers among them it is hard to say; however, such are the facts. What seems to add some significance to this aspect of the case is that, as before mentioned, the men go into town and remain in it more or less at night, and had an average of 32 per cent per annum attacked with fever for the period referred to, while the officers, who for the most part did not frequent the town at night and probably never drank the river water, had not a single case of fever among them or in their families. The daily average number of enlisted men for the period referred to was 115; of the officers and their families, 13.

The following extract from a report of the medical director of the department is of interest in this connection:

"During the month of November, 1888, 58 per cent of the command at Fort Brown was taken on sick report for intermittent fever alone."

This was before the use of condensed water. The ice machine was in operation August, 1887, but was inadequate to furnish condensed water to the command. It was not furnished in quantity to fully supply the command until July, 1889, from which time it has been exclusively used for drinking and cooking purposes. The following table is taken from official records:

Period.	Strength of command.	Cases of fever.	Per cent of sick to command.
July 1, 1886, to June 30, 1887	152	60	39.47
July 1, 1887, to June 30, 1888	125	64	51.20
July 1, 1888, to June 30, 1889	141	393	278.72
July 1, 1889, to June 30, 1890	144	140	97.22
July 1, 1890, to June 30, 1891	99	3	3.03
July 1, 1891, to June 30, 1892	58	1	1.72
July 1, 1892, to June 30, 1893	57	None.	.....
July 1, 1893, to June 30, 1894	115	3	2.61
July 1, 1894, to June 30, 1895	116	35	30.17
July 1, 1895, to June 30, 1896	114	33	28.95

Another condition which bears strongly on this subject is the precipitation or rain. The old residents always look for an unhealthy season and much fever when rain is abundant, but except late in 1894, when there was some rain, and the summer of 1895, when there were several inches, a drought has prevailed over this entire section since 1889. When the river overflows its banks, the lagoons and old river beds are filled and the lowlands submerged, but when in addition there are heavy rains vast areas of lowlands are under water, and fevers of an intermittent type prevail as soon as the waters begin to evaporate.

There can be no doubt that to the condensed water is largely due the comparatively less number of fevers and the almost total disappearance of typhoid fever. Bowel affections are also rare or due chiefly to some imprudence in diet, and the health of the troops is far above that of the town, and due, I believe, chiefly to the better quality of the water supplied.

SPOTTED FEVER AS REPORTED FROM IDAHO.

The surgeon at Boise Barracks, Idaho, referred in one of his monthly reports to the prevalence of spotted fever in the civil settlements in the neighborhood of his post. On being requested to give fuller particulars concerning this fever he stated that as he had not seen any of the cases that had occurred he had called upon his medical friends in civil life for information. These gentlemen responded promptly, and

from their reports it is learned that in the spring months a fever which presents marked clinical characters prevails in the mountain valleys of that country. The course of the febrile movement is somewhat similar to that of enteric fever, a continued fever lasting two or more weeks. The symptoms indicating the existence of the local intestinal lesions of typhoid fever are not present; but there is intense headache, with afterwards dullness of mind and grievous pains, like those of dengue, in the muscles, bones, and joints, the last being occasionally swollen. Instead of the rose rash of enteric fever there appear on the skin about the third or fourth day circular red spots about one-eighth of an inch in diameter, which soon cover the surface, increasing in size, becoming purple in color and desquamating as convalescence is established, leaving the site of each spot so altered that it can be distinguished readily for months afterwards when the cutaneous capillaries are stimulated by exercise or cold. Notwithstanding the alarming nature of this concourse of symptoms, the fatality of the disease is slight. The reports kindly furnished by the prominent medical men of this part of the country are herewith submitted:

C. L. SWEET, M. D., PRESIDENT IDAHO STATE MEDICAL SOCIETY.—The following data are gathered from about ten years' experience with the disease, coupled with fairly close attention to the clinical details.

Geographical distribution.—The whole Snake River basin and tributaries in Idaho.

General characteristics.—Continued fever, with mild exacerbations; temperature usually not excessive. Cases sometimes pass into an adynamic or typhoid condition.

Duration.—From three weeks to three or four months; i. e., though the fever may not last longer than twenty-one days the lesions may continue for months. Convalescence is usually rapid.

Special symptoms.—Onset usually accompanied by severe breakbone pains; constipation usual, though sometimes diarrhea; headache; anorexia; hemorrhagic eruption over entire body usually within one to three days, papular, evidently extravasation of blood beneath skin, fading to a faint blue color in four to thirty days, yet remaining faintly visible often for many weeks; considerable irregularity regarding disappearance of eruption. These skin lesions often remain as faint blue indurated "spots" on exposure to cold for months. The nervous system is sometimes involved; in such cases there is marked hyperpyrexia; tongue always coated, a thin, white fur usually persisting for a long time; intense boneache, suggestive of dengue.

Fatality.—Slight; usually due to lowered vitality from other causes, such as bad air or surroundings.

Causation.—While there are indications which seem to point out this peculiar affection as a water-borne disease, there are other circumstances which militate against this theory and in favor of its being akin to malaria, in that it is frequently seen in persons who have been living in the vicinity of newly broken ground, post holes, plowed ground, and in those who have drunk seepage water from worked soil, etc. This so-called "spotted fever" I do not consider to be infectious or contagious in any degree per se. Frequently several cases occur in a household, again only the single case; this latter fact often due to the patient returning home ill after sojourning in another locality up to time of malaise. The disease differs principally in its occurrence of the symptoms from our occasional mountain fever, which seems to be similar to the mountain fever of the Eastern Rocky Mountain region, a typhomalaria, or at least a modified typhoid. This "spotted fever" does not, to my knowledge, occur in Utah, and is confined to the Snake River Basin, much of it being seen along the routes of the Oregon Short Line Railroad.

Treatment.—Milk diet; a cholagogue followed by frequent alcohol hot baths, with usually very little positive medication. As routine I usually relieve the dengue ache with salol, quinia salts, and some coal-tar products in very small doses until free diaphoresis is obtained. I give little, but a placebo in mild cases.

W. D. SPRINGER, M. D.—*Geographical distribution.*—Snake River Valley and its tributaries.

Character.—Continued fever, with typhoid condition and a red eruption general over entire body.

Duration.—Two to three weeks.

Special symptoms.—A feeling of malaise for a few days, generally followed by a chill. Fever then sets in, ranging from 103° to 105°. The eruption makes its appearance from the second to the fifth day, continues throughout the attack, and is visible even after convalescence, especially if the surface becomes chilled. The patient

usually complains of severe pains throughout the body, especially in the back and stomach, and in many cases in the larger joints, causing the patient to cry out on any movement. The tongue has a yellowish-white coat with red edges; in the later stages it becomes red, or dry and brown. Stomach is irritable, bowels as a rule constipated, urine scanty. The fever ranges high and continues from ten days to two weeks; then it intermits for the following week or two. Pulse 100 to 130 in ordinary cases. Pains in different parts of body are of a shooting character and not continuous. Many patients after a few days pass into a typhoid condition. The eruption does not fade on pressure and in many cases there are large areas of skin almost black (hemorrhagic), especially in front of the tibia. Spots vary in size; average about one-eighth inch in diameter. Patients are usually very nervous and irritable.

Fatality.—Low; probably 1 or 2 per cent; more fatal to old people. Death usually results from exhaustion.

Probable causation.—Water; sepsis.

Treatment.—Expectant. Morphine for pain; salines for constipation; sponge baths and antipyretics for high temperature. Diet, milk.

R. M. FAIRCHILD, M. D.—*Geographical distribution.*—Confined principally to Snake River Valley and its tributaries.

Character.—Fever of typhoid type, self-limited, and characterized by a red eruption over whole body.

Duration.—Fourteen to twenty-eight days.

Special symptoms.—Sometimes ushered in by chill, but usually find two or three days of malaise, with severe headache, particularly in the back part; also severe shooting pains throughout body and limbs, usually more severe in bowels and back. Pain is neuralgic in type. About the third or fourth day the characteristic eruption appears, beginning on the legs and arms and soon covering the whole body. It is hemorrhagic in appearance and the spots vary in size from one-eighth to one-half an inch in diameter. Sometimes they coalesce, covering a large surface. The color does not fade on pressure. The eruption continues throughout the disease, or until convalescence is fairly established, when it gradually fades. When exposed to cold, the remains of the spots can be seen for months after complete recovery. Bowels as a rule are constipated and abdomen retracted, but occasionally we have marked diarrhea, but no tympanites or tenderness of abdomen. Tongue coated by whitish fur, with red edges in early part of disease; later whitish coat usually disappears and tongue becomes red and frequently dry and brown or black. Many cases suffer from congestion of throat, which is very sensitive and painful and interferes with swallowing. A slight cough usually accompanies the disease. Other cases develop rheumatic trouble, particularly of the larger joints. Neuralgic pains, severe in type, continue throughout the disease, affecting principally the back and bowels. Occasionally sloughing of limited areas takes place, such as of scrotum, etc. In some cases febrile action runs high; it usually ranges from 101° to 104½° or 105° F., and is continuous, showing but slight remissions; pulse usually slow and full, from 85 to 110. There is a hyperæmic condition of the nervous system, as shown by the general neuralgic pains. In my opinion it is a hybrid, between typhoid fever and cerebro-spinal fever, the disease having many symptoms common to both. In one case I found marked opisthotonos during the fourth week of the disease, which proved fatal. In this case there were marked cerebral symptoms. In many cases the eruption invades the eyes, causing severe pain, and making them very sensitive to light. All cases are very nervous, sleepless, and throughout the disease suffer intensely. In many cases appetite is lost and there is marked irritability of the stomach. The urine is scanty and highly colored. I have examined for albumen, but found none. Convalescence usually begins by or follows a stage of profuse sweating. Pain is controlled only by morphia.

Fatality.—Low in my experience, perhaps 2 or 3 per cent.

Lesions.—I have had no opportunity for post-mortem observation.

Probable causation.—Unknown. It usually prevails from April 1 to July 1, and in my experience the cases have been sporadic, it being exceptional to have more than one or two cases in the same house. All classes and all ages are affected—the rich, the poor, the weak, the robust, the young, and the old, and male and female alike. Families using water from the same well are not liable to be affected similarly.

Treatment.—It is a self-limited disease, and drugs have little or no effect on the attack. I treat on the expectant plan principally. When pain is severe, I control it with morphia, and to lessen the hyperæmia of cord, etc., I usually give a mixture of bromide and ergot. When temperature goes above 102° F., I bathe with tepid water, and, if indicated, give small doses of acetanilid or phenacetin. Quinine has given no results in my hands. I keep the patients in the recumbent posture constantly, overcome constipation with salines, and confine them to milk diet.

GEORGE COLLISTER, M. D.—Spotted fever, so called, is an epidemic fever, the causes of which have not been satisfactorily determined. It extends from Pocatello to Huntington, along what is called the Snake River Plains, being very rarely found in the high mountains. It makes its appearance in March, and continues until the

latter part of June. Many cases are taken suddenly without previous malaise, some with a severe chill, and others with more or less chilly shudderings frequently referred to the spinal region; still others with little or no chill at all. The febrile stage gradually follows. The pulse usually does not run very high, not often above 110, in adults; nor is it common to find the temperature over 103° F., except in an occasional case. There is generally severe headache, with pain of a rheumatic character in the back and limbs, mostly referred to the joints. The tongue is usually covered with a whitish or yellowish fur; but in severe and typhoidal conditions it is dry, red, and glazed. The kidneys are not often disturbed. Nausea and vomiting are frequently present until the fourth or fifth day of the fever; the skin, as a rule, shows no abnormal appearance. The rash first appears on the feet, and from there spreads over the body. This exanthem consists of flat, rosy-red papules about a sixth of an inch in diameter. When these papules are pressed upon, especially soon after they have formed, their color disappears, but later on they do not disappear on pressure. They become organized into new tissue and can be seen weeks, and sometimes months, after recovery, especially if the patient gets a little chilly. The fever continues from two to three weeks. This disease is not very fatal. In children the fatality will not exceed 1 per cent; in old age, from 4 to 5 per cent.

L. C. BOWERS, M. D.—*Geographical distribution.*—The disease is endemic in southern and central Idaho, over an area about Boise City of about 4,500 square miles.

Causation.—The disease develops during spring only, from about the 1st of March to the middle of May. It attacks persons in all conditions and periods of life, but males in the larger proportion. As to its special cause and the circumstances concerned in its production, we have no positive knowledge. The causation does not involve a contagion, as the cases occur sporadically. The auxiliary causes seem to be exposure to cold, draughts, and dampness. The vera causa, probably, is of a telluric character.

Lesions.—No post-mortem examination made. The spots are due to a sanguineous exudate, probably into or beneath the corium. The joint lesions develop with the spots, and the swelling disappears during the period of absorption and convalescence. The scrotum and testicles are swollen in severe cases. Sloughing of the scrotum occurred in one instance. Before death children have symptoms of meningitis. In adults and the aged death results from toxemia and exhaustion.

Duration.—The period of incubation is uncertain, probably from ten days to three weeks; from the appearance of prodromal symptoms until convalescence, twelve to twenty days; average period of convalescence about one month, very infrequently several months. In one case two years elapsed before sunlight was borne without intense cephalalgia.

General character.—During the period of incubation there is slight headache and a feeling of lassitude and inaptitude for work. During the first week following this period the patient complains of chilly feelings, nausea, loss of appetite, intense headache, pain in back and legs, a muscular soreness and stiffness of the entire body, and he takes to his bed with a temperature of 102° to 105°; pulse, 90 to 120. During this week appear also the characteristic red spots and swollen joints. During the second week the eruption matures, and in favorable cases and those of moderate severity there is a gradual decline in fever and less headache and mental torpor. During the third week convalescence is established, which usually is prolonged.

Special symptoms.—Early in the disease the face acquires a dusky flush, and is slightly swollen; conjunctiva more or less injected. The expression becomes listless, dull, and heavy. The temperature varies in different cases. There is a daily rise during the first four or five days. The evening temperature is about 1° to 1½° higher than the morning remission. A temperature of 102½° to 104° is not uncommon by the fourth or fifth day. Having reached its acme, the fever persists for several days. At the end of the second and during the third week the fever falls by lysis to an evening record of 98.4°. There is more or less acceleration of the pulse, often greatest at the beginning of convalescence. In the onset the pulse is sluggish, and lacks force. In fatal cases it is not usually greatly quickened; I have observed it slower than in health. During the first week the skin is usually dry; later it is somewhat moist; night sweats are common during the third week. The round red eruption makes its appearance about the fourth or fifth day; first about the ankles and wrists, and by the end of the first week the spots have extended over the entire body. On their first appearance they are one-eighth to one-fourth inch in diameter, and disappear momentarily on pressure. In three to four days they enlarge, one-fourth to one-third inch in diameter, become papular, and are modified only slightly on pressure. They reach the stage of absorption and desquamation in eight to twelve days. A browny desquamation is usual about the third week. Subjects that die at this stage present a resemblance to smallpox, due to the loss of epidermis from the apices of the papules. In fatal cases the spots turn dark purple before death. They disappear slowly during the period of absorption, which is very variable, a few weeks to several months. Loss of appetite is early, and the relish for food is not regained until the patient is quite convalescent. Nausea is common, and vomiting

an occasional symptom. Sore mouth and congested fauces are met with; tongue thick and furred; constipation usually during the entire illness. Up to the period of convalescence the urine is of high specific gravity, scant, and high colored. Cephalalgia is the most common and persistent symptom in the development of this disease. The pain is intense and persists without intermission; it is referred to the frontal region, or also occiput or entire head. Pain is severe also in the lumbar region or along the entire spine and in the lower extremities. There is hyperesthesia of the surface of the body. Owing to the muscular and articular soreness and stiffness, patients lie in a position of general flexion for hours without moving. Sleeplessness is common during the first week. The mental processes become dulled and the patient listless and apathetic. In severe cases there is delirium of a typhoid character, due to fever or to toxæmia.

Fatality.—The death rate is about 2½ per cent. In fleshy subjects the disease is a serious affection, but particularly in the aged is it fatal. From the fifth to the eighth decade the mortality progressively increases from 5 to 50 per cent. Delirium, or involvement of the nervous system, is a bad prognostic sign. The amount of fever is deceptive, as fatal cases may have a temperature not exceeding 103°. Death is due to toxæmia or exhaustion.

Treatment.—No abortive or reliable curative treatment has yet been discovered. The disease is self-limited and a large proportion of cases recover without any internal medication. Treatment of individual cases is governed by the rational and symptomatic indications present. On the theory that the infection enters through the alimentary canal, I employ intestinal antiseptics and evacuants, and a supportive treatment.

J. K. DUBOIS, M. D.—In relation to the so-called spotted fever as observed in this vicinity, I would state that it is an acute, febrile, eruptive disease, noncontagious, but epidemic, and found chiefly in March and April. It occurs sporadically within a radius of 50 miles from Boise and springs from an unknown cause, but may confidently be looked for during the spring months above mentioned. There is usually no prodromal stage and a patient is stricken down without warning, with severe frontal headache, photophobia, nausea, lassitude, persistent anorexia, and intensely severe pains of the joints and muscles. The pain is boring, breaking, and stabbing, and appears to penetrate into the very substance of the bones. The pain and fever persist during the entire attack, from fourteen to twenty-eight days. The fatality is not great, although weak subjects, and even strong ones, often succumb from intercurrent affections of the bowels, kidneys, or heart. It may be called a nonfatal disease, yet the convalescence is remarkably slow and may be prolonged for months. The eruption occurs early, in forty-eight to seventy-two hours, first appearing upon the palms of the hands and extending over the entire body in fine, red, round papules of an erythematous nature. The term exanthesis rosalia arthrodynia more nearly expresses the disease than spotted fever. All ages are subject to its ravages, but adults of both sexes are more prone to it than children. No medication will relieve the pain and fever; but quinine, dissolved in aromatic sulphuric acid, in comparatively large doses, gives the best results to those who can withstand the treatment. The eruption fades slowly and may be discerned weeks after convalescence has set in. No constitutional lesions are left, and no probable cause can as yet be assigned.

D. W. FIGGINS, M. D.—*Geographical distribution.*—Only in the valleys of the mountain districts.

Character.—Ushered in by a chill, pains in the extremities, muscular soreness, and fever, temperature ranging from 100° to 105°, pulse 100 to 120. The eruption appears from the third to the fifth day, first affecting the face and hands, then the trunk, finally the extremities; skin swollen and very sensitive to touch; considerable bronchial irritation, cough lasting during convalescence, or as long as there is any appearance of the eruption; in some cases epistaxis; bowels either constipated or quite loose; in some cases typhoid symptoms in a malignant form; fever remittent.

Duration.—From fourteen to forty-two days, the eruption showing for four or five months after the patient is up and around, especially when subject to heat or physical exercise.

Special symptoms.—Raised eruption, first of a light red color, assuming a dark purple hue as the disease progresses; eruptive patches from one-fourth to 1 inch in diameter, mostly of a circular form: desquamation about the third or fourth week.

Fatality.—I have treated about 60 cases during the past fourteen years. During that time I have seen but one fatal case, and that, I believe, superinduced by years of dissipation, and age.

Lesions.—So far as I know confined to the skin.

Probable causation.—I never saw any cases except among those who had used water from creeks and surface wells. I have seen it in families who used water from springs and where the entire family had the disease; but it is mostly confined to teamsters, who camp out during the summer months.

Treatment.—I never employed any other than such as is used in ordinary malarial fevers, and that of a symptomatic nature.

H. ZIPF, M. D.—*Spotted fever* is called so by the medical men of Boise on account of a spotted eruption, red in the center and blue at the outside margins.

Geographical distribution.—More or less every year in the valleys, very seldom in the mountains.

Character.—Usually the onset is sudden, high fever, violent headache, coated tongue, back ache, flushed face.

Duration.—The fever is continuous, lasting from one to two weeks; patient feels weak for two or three weeks more; he complains of soreness and stiffness of muscles.

Special symptoms.—The fever is out of proportion to the danger of disease; it also leaves patient weak for weeks, and the eruption will stay out even after the patient feels well again.

Fatality.—Very seldom fatal. I heard of one fatal case this spring, but the patient had always been of weak constitution.

Lesions.—Never heard of nor saw any with this disease.

Probable causation.—Malaria.

MALARIAL DISEASES.

The admission rate for malarial diseases in 1895 was 82.56 per thousand of strength, and the rate of nonefficiency 1.70, the former higher and the latter lower than the corresponding rates for the previous year, 74.72 and 1.88 respectively, but both considerably lower than the average annual rates of the preceding decade, 103.32 and 2.57. The lowest admission rate on our records was reported in the calendar year 1891, 62.23, with a nonefficiency rate of 1.58.

In looking over the sick rates of the military departments it is found that the increased malarial rates are evidently due to increased prevalence in the Department of the East, the admission rate in this department being 162.16, while that of the Department of Texas is only 72.19, and that of the Department of the Missouri only 65.68. It is all the more singular that the increased rates come from Northern rather than from Southern posts. Thus while Fort Hamilton, N. Y., reported an admission rate of 355.40, with a nonefficiency of 4.32, Jackson Barracks, La., had only 53.03 admission and 1.04 nonefficiency, and Key West Barracks only 15.62 and 0.19. Although some of the posts in New York, such as Fort Hamilton, already cited, Fort Wadsworth, Willets Point, and West Point, contributed to the increased rates, the two posts on the Potomac River at the national capital—Fort Myer, Va., and Washington Barracks, D. C.—were the main source of the increased rates, not only of the Department of the East, but of the Army as a whole, the former having 1,092.59 admission and 14.07 nonefficiency per thousand of strength, and the latter 1,079.89 and 13.71. These rates indicate that the cavalry force at Fort Myer suffered more than the artillery at Washington Barracks, but this was by no means the case, for the latter post is not credited with the whole of the record of sickness that belongs to it. During the summer some of the batteries were camped temporarily at Fort Monroe, Va., for artillery practice, and the recurring sickness among the men of these batteries gave Fort Monroe an admission rate of 162.16 for malarial diseases that were not indigenous.

Maj. Walter Reed, surgeon, United States Army, has investigated the character, prevalence, and probable causation of the malarial fevers at the posts of Washington Barracks and Fort Myer. He finds that intermittents and æstivo-autumnal fevers prevailed at both posts, the proportion of the latter manifestations, as shown by microscopical examination of the blood, being greater at Washington Barracks. The records from 1871 to the present time show that malarial diseases prevailed with varying intensity during the whole of this period, and that as a rule, while the percentage was higher at the barracks than at Fort Myer, there was a remarkable agreement in the rise and fall of the annual rates at both posts. He attributes the prevalence at the barracks to the low grounds

surrounding the site of the post—the bottom lands of the Anacostia River on the east, the Potomac flats and the low grounds of the Virginia shore on the west, the marshes across the Anacostia on the south, and the James Creek Canal in the immediate vicinity of the post on the northeast. He concludes that the water supply is not concerned in the propagation of these fevers at this post, as it is drawn from the mains of the city of Washington, and while the citizens in the vicinity of the post who are exposed to the influences of the neighboring marshes suffer considerably from malarial diseases, those who live in other parts of the city are unaffected, although using the same Potomac River supply. From a close study of the conditions at Fort Myer, he concludes that the fevers there are to be attributed to the marsh lands of the Potomac Valley, as in the case of Washington Barracks. The water supply is shown to have had no influence in modifying the prevalence of the fevers, as they continued to occur during several changes of the supply and even during a period when the supply was boiled and filtered. He draws attention to a point of interest developed by a comparative study of the meteorological conditions and the prevalence of malarial fevers; that the years having the highest average temperature for July, August, September, and October, with lowest humidity for the same months, are those in which malarial diseases were most prevalent. Dr. Reed's report is dated August 24, 1896. It is accompanied by many valuable tables, but it is not considered necessary to submit them here.

In compliance with letter of instructions from your office dated August 30, 1895, I have the honor to submit the following report concerning the character and prevalence of malarial fevers at the posts of Washington Barracks, D. C., and Fort Myer, Va., during the fall of 1895, together with the result of an investigation into the probable local causation of these fevers.

The receipt of these instructions a few days only before my annual leave of absence rendered it impossible for me to begin this investigation until the first week in October, and during this latter month my duty as recorder and member of the Army medical examining board interfered very much with that thorough and systematic study of the blood of the patients affected with malarial disease which was so much to be desired. Nevertheless, with the assistance of Dr. W. M. Gray, of the Army Medical Museum, and Hospital Steward James Carroll, assistant in the pathological laboratory of the Army Medical School, the microscopical study of the blood of malarial fevers was begun during the first week in October, both at Fort Myer and at Washington Barracks, and continued until about the middle of November.

Fortunately, favorable climatic conditions enabled us to continue our blood examinations during a period of about six weeks. This part of the investigation was intended to decide the varieties of fever, if more than one, prevailing in these garrisons, and to ascertain whether they corresponded with those types which had been found to exist at this season of the year in other sections of the country. Thirty-five cases were thus studied with great care, viz, 16 cases at Fort Myer and 19 cases at Washington Barracks. As a result of these examinations there were found to be present two types of malarial fever at each of these posts, viz, tertian intermittent and æstivo-autumnal fever. At Fort Myer the tertian parasite was found in 15 cases and the æstivo-autumnal parasite in 1 case. On the other hand, at Washington Barracks the tertian parasite was found in 5 cases and the æstivo-autumnal variety in 14 cases. It is not intended that this marked difference in the relative proportion of the two varieties of malarial fever, as brought out by the microscopical examination of the blood, should be taken as representing the actual condition as to prevalence of tertian intermittent and æstivo-autumnal fever at these two stations. This proportion could only be determined by the careful microscopic study of the blood of all malarial cases occuring during the spring, summer, and fall months of any given year. This was, under the circumstances heretofore referred to, impossible of accomplishment. Visits were made to these posts when other duties would permit, and examinations made of the blood of patients who were at the time on sick report. Although I should be inclined to draw the conclusion, as a result of the blood examinations alone, that æstivo-autumnal fever was more prevalent at Washington Barracks than at Fort Myer during October and a part of November, 1895, yet, upon an examination of the reports of sick and wounded for these months at the two posts, I find that the opposite conclusion would be drawn, viz, that Fort

Myer had the greater proportion of æstivo-autumnal fevers. The records show, as regards the cases of æstivo-autumnal or remittent fever, as follows:

Fort Myer, Va.:		Washington Barracks, D. C.:	
October	8	October	3
November	5	November	1
Total cases	13	Total cases	4

The figures as given for Washington Barracks need some modification, since, as shown above, during the period October 1 to November 15 the æstivo-autumnal parasite was found in the blood of not less than fourteen cases under treatment.

It is probable that the medical officers at these stations have relied more upon the clinical features of the cases under treatment than upon the microscopical examination of the blood in arriving at a diagnosis in every case, and, under these circumstances, it would be very difficult, if not impossible, to separate with any degree of accuracy the cases of purely intermittent from those of a remittent character. This difficulty becomes the greater from the fact that the members of the garrison, having access at all times to the use of quinine, frequently resort to this drug prior to their admission to sick report. This practice would probably very much modify the character of the æstivo-autumnal attacks.

Another factor in lessening the severity and duration of these fevers must be the early period at which treatment is begun in all of the cases. That there were æstivo-autumnal fevers in both of these garrisons there can be no doubt; but one looks almost in vain for a chart showing an attack which corresponds in length and severity to those occurring, for instance, in the city of Baltimore. Among the numerous temperature charts kept at Fort Myer during the fall of 1895 I can find none presenting a range characteristic of æstivo-autumnal fever.

I further find that the average time under treatment of all cases of fever during the four months, August 1 to November 31, was, for Washington Barracks, 3.9 days, and for Fort Myer 4.06 days, and that it is the exception for any case of malarial fever to remain on sick report more than one week. This would indicate that either the type of æstivo-autumnal fever is a mild one, or that its short duration is brought about by the early treatment to which all cases are subjected. The latter is probably the proper explanation.

During the time that these observations were being made fresh slides of blood of the majority of cases were brought to the museum and numerous drawings of the different stages of the malarial parasites made by Dr. J. C. McConnell, draftsman to the museum. None of these differed from those given in literature on this subject already published, and hence are omitted from this report.

The flagellation of an ovoid seen in the blood of one of the cases of æstivo-autumnal fever at Washington Barracks is worth recording. While observing this ovoid with quiet pigment decentrally situated in a clump, suddenly the latter was seen to begin active dancing movements, immediately followed by the projection of two rather delicate flagella from one end of the ovoid. These flagella showed the usual active whipping movement, and were unmistakable.

To briefly recapitulate, two varieties of malarial fever were found to exist at Washington Barracks and Fort Myer, namely, intermittent fever and æstivo-autumnal or remittent fever, the proportion of the latter, as shown by microscopical examination, being greater at the former station.

Attention was next directed to the annual prevalence of malarial fevers at these stations. In order to obtain reliable data on this subject, it was decided to go over the hospital records for the total years during which Fort Myer had been garrisoned by troops, including the years during which the signal corps was stationed at this post (then known as Fort Whipple). This was found to cover a period of about twenty-six years, viz, from September 1, 1870, to June 30, 1896. As data for comparison, the prevalence of malarial fevers at Washington Barracks, as shown by the records, was examined into for the same number of years.

Leaving out of consideration, for the time being, the location and relative sanitary surroundings of these posts, it was desired to ascertain which of them showed the highest rate of admission for malarial fevers during this period, and whether there were any years, and if so, how many, in which there was marked agreement or divergence in this respect. It was believed that some light might be thrown upon the etiology of these fevers by noting their annual prevalence at these stations for a long period of years.

For this purpose Table A, herewith appended, has been prepared, showing annual mean strength, cases of malarial fever, and ratio of admissions per 1,000 of mean strength.

An examination of this table will show that malarial fevers have been prevalent at these stations with varying severity during the whole of this period, and that

while there is for certain years some divergence, there is also to be found for the whole period considerable agreement in ratios to the strength of the garrisons.

Beginning with the year 1871, there is found a high admission rate at Washington Barracks, viz, 985.07; and it is further observed that a gradual fall in admissions takes place thereafter for the years 1872, 1873, 1874, 1875, and 1876. Directing attention to Fort Myer, there is seen a like high rate for 1871, followed by a more abrupt fall in 1872 and a gradual fall in ratio of admission during 1873, 1874, and 1875. The year 1876 shows a slight rise in the admission rate at Fort Myer as compared with 1875, the rate being 243.24 for the former and 160 for the latter year, whereas at Washington Barracks the table shows a lower admission rate for 1876 (206.10) than for 1875, when the rate was 285.71. The smaller admission rate for 1876 at the barracks is, however, more apparent than real, since examination shows that, looking forward to the inauguration of President Hayes, the average strength of the garrison was largely increased for the months of November and December of this year—months during which malarial fevers do not prevail. This increased strength during the healthy months necessarily lowers the annual admission rate. The same remark applies to the following year, 1877. The rate at Fort Myer is nearly twice as great as at Washington Barracks, but this is plainly due to the presence of a large garrison at the latter station during the first half of the year (the healthy season) and to the presence of a small garrison during the unhealthy season.

During the years 1878, 1879, 1880, and 1881 the relative prevalence holds good for the two stations, Washington Barracks showing, as usual, the higher admission rate; but this is not true for the years 1882, 1883, 1884, and 1885, during which years, contrary to the rule, there is a higher ratio of admission at Fort Myer than at Washington Barracks. What is the explanation? By consulting the monthly strength of the garrisons it is ascertained that there has taken place a large reduction in the strength of the command at Washington Barracks during the months embracing the unhealthy season. The years 1880 and 1881 had been so unhealthy, by reason of the great prevalence of malarial fevers (I speak from personal knowledge) that a removal of the troops into a summer camp was thought best. This was carried into effect for the years 1882, 1883, and 1884.

This does not explain the higher rate for Fort Myer for the year 1885, as the troops at the barracks did not go into summer camp during the malarial season, nor were there any marked fluctuations in the strength of either garrison during the year. I have been unable to find any satisfactory explanation for this one exception to the general rule of prevalence. I find that the garrison at the barracks, consisting of the Second Artillery, went South during the month of June, 1885, and that the post was regarrisoned during July by a like number of batteries of the Third Artillery, coming from extreme Southern stations, such as Fort Barrancas, Jackson Barracks, Little Rock Barracks, Mount Vernon Barracks, Ala., and Fort Monroe, Va. That these men were more immune to malarial diseases I have no good reason to believe. Indeed, from April to November the year 1885 appears to have been a very mild one for malarial disease at Washington Barracks. The same remark applies to Fort Myer until the last week in August and the first half of September, when there was a sudden outburst of tertian intermittent fever, 27 cases occurring in a garrison having a mean strength of 61 men.

Returning to Table A, it will be seen that for the next ten years, 1886–1895, inclusive, there is a remarkable agreement in the rise and fall of malarial diseases at Washington Barracks and Fort Myer.

The rate of prevalence for these years is steadily higher for the barracks than for Fort Myer, except for the year 1890. This is again owing to the fact that during July, August, and September (the malarial season) the mean strength of the garrison at the former station was much smaller than for the remaining months of the year. The low rate at Fort Myer for 1886 is also due to the small size of the garrison during the malarial season as compared with the remainder of the year, the mean strength for these months being nine men only.

Diagram B, hereto appended, which should be studied in the light of comments already made on exceptional years in Table A, will show much more clearly and accurately the annual rate of prevalence of malarial diseases at these two stations. This diagram, which is based upon the figures obtained by averaging for each year the monthly rates in 1,000 of monthly mean strength, plainly shows that under ordinary conditions the percentage of fevers is always higher at Washington Barracks than at Fort Myer; and, further, that there is a remarkable uniformity in the rise and fall of the annual rates at these posts.

If, during any year, the line indicating the annual prevalence of malarial fevers at Washington Barracks falls below the line marking the annual rate at Fort Myer, as during the years 1877, 1882, 1883, 1884, and 1890, this can be explained by a greatly reduced strength in the command of the former post during the more malarial months. The year 1885, as heretofore mentioned, stands alone as an exception, for which there appears no adequate explanation.

When one considers the small number of troops that have garrisoned these posts during almost the whole of this period, and the matter of individual resistance which must in such small commands play an important part, I think that the relative uniformity in ratios of admissions for such a long period is the more surprising, and points strongly to one conclusion, viz, that the same general sanitary conditions which control the presence of malarial fevers at Washington Barracks exert a like influence over the course of these diseases at Fort Myer. I will, therefore, first consider the etiology of malarial fevers at Washington Barracks:

This post occupies a point of land known as Turkey Buzzard, or Greenleafs Point, which is situated at the junction of the Potomac and Anacostia rivers. It embraces, at present, 69 acres of land. Its surface is nearly a level plane, with the highest ground on the line formed by the main roadway, from which the surface slopes gently to the Potomac River on the western border, affording good surface drainage on this side. The slope of the ground is much less on the eastern half of the reservation, along which, for its entire length, the James Creek Canal flows. Hence the surface drainage on this side is not good, and this remark especially applies to the northeastern corner of the grounds. The average height of Greenleafs Point above the water level of the Potomac River is not more than 20 feet.

The soil consists of a "brown loam or brick clay grading downwards into a bed of gravel" (Professor McKee), and has been slowly formed by deposits brought down by the Potomac and Anacostia rivers.

To the east of Washington Barracks there is an extensive tract of low, badly drained land stretching along the right bank of the Anacostia River. On the western side, and separated from it by the narrow Washington channel of the Potomac, is situated a recently made peninsula of low-lying ground—a continuation of the original "Potomac Flats"—consisting of 621 acres of land, which is at all times above the level of the tides, and for the past five or six years covered with a dense, rank vegetable growth. Farther to the west, across the Georgetown channel, lie other extensive lowlands, forming the western bank of the Potomac. In the immediate vicinity of the barracks, and just across the narrow James Creek Canal, is a low-lying, marshy spot, rather foul from sewage, of a few acres in extent, which is exposed daily at low tides. To the immediate south, across the Anacostia River, there is an extensive area of marshy ground, whose dense vegetable growth is largely exposed at low stages of the tide. It should be observed that the Potomac River, which above the Aqueduct Bridge is a narrow stream with high banks, suddenly becomes much wider and of more sluggish current below this point, and hence an explanation is found for the formation of much of the low-lying marshy grounds situated within and along this river above and opposite the post of Washington Barracks.

Having mentioned one of the probable sources of malarial disease at this station, it will be necessary to turn attention to another possible source, viz, the water supply.

I find that this station from an early period of its history has been furnished with the same supply as the city of Washington, namely, Potomac River water.

I think this would be the proper place in this report to briefly quote the opinions of the various medical officers stationed at Washington Barracks as to the etiology of malarial infection at this post, in order to ascertain whether they refer this infection at any time to the water supply or attribute it to other general causes.

While the majority of the medical officers call attention to the foul condition of the James Creek Canal, which I may say is an open sewer flushed daily by the tides, and express, occasionally, the opinion that the foul odors from this canal may affect injuriously the health of the command, no accusation is lodged against it as a cause of malarial disease. I find no reference to the possible origin of this disease at the barracks until August 31, 1886. In his sanitary report for that month, Maj. W. D. Wolverton, surgeon, United States Army, remarks: "The health of the troops has been affected by mild attacks of malarial fever, due, probably, to the drying out of the low ground along the canal, which was frequently flooded during the early part of the season. That part of the post should be underdrained and raised by filling in, so as to be above the highest tide."

Under date of March 31, 1889, Maj. W. H. Gardner, surgeon, United States Army, remarks: "During the early part of the month James Creek Canal overflowed its banks and submerged the lower portion of the post. The canal is in reality only an open sewer, which drains a considerable portion of the northeast section of the city. There was left upon the overflowed soil quite a considerable amount of sewage, which, it is feared, may give rise to malarial, typhoid, and other fevers as the hot weather approaches, but as yet no deleterious effects have been noticed."

The same medical officer, under date of June 1, 1889, referring to recent very heavy rains during the months of April and May, amounting to more than 20 inches, says: "I feel confident that this unprecedented amount of rain will act as a source of disease at the post and cause a great many cases of malarial fever. In my opinion it would save much sickness and probably some valuable lives if the troops of this command would be removed to some more healthful situation for the hot summer months."

A still greater overflow by the waters of the Potomac and Anacostia rivers occurred June 2, 1889, during which submersion the lower part of the post, known as the "quadrangle," was separated from the other part of the garrison by a "stream of filthy water that was continuous from the west river front across to the James Creek Canal." Surgeon Gardner again recommends a removal of the command during the malarial season.

Under date of November 30, 1889, I find, for the first time, question being raised as to the purity of the water supply. Major Gardner refers to it as being "muddy and impure, and not at all fit for drinking, owing the recent heavy rainfall," and recommends filtering and boiling of the water. During the year 1890, the same medical officer on more than one occasion recommends the filtration of the water so as to protect the troops against dysentery and diarrhea.

Under date of June 30, 1893, Maj. Joseph K. Corson, surgeon, United States Army, says: "Water supply is abundant, apparently good; it contains much sediment at high tides. No disease has been attributed to the water supply."

Under date of August 31, 1893, Surgeon Corson says: "There has been considerable increase of malarial disease, always prevalent at this season of the year. The disease is due to causes common to this region, and not, in my opinion, to any unsanitary condition within the post."

Under date of October 31, 1894, the present post surgeon, Maj. George W. Adair, in commenting upon "the large percentage of malarial fever among the enlisted men, while the officers and their families presented no symptoms of malarial poisoning," attributes this largely to the fact that the men are in the habit of frequenting a path along the James Creek Canal "which leads to a hole in the boundary wall. Here is a highway through an unsanitary marsh, never traveled by officers, and probably most frequently used by enlisted men between taps and reveille, and at a time of the day when the emanations from the soil are most dangerous." He refers to "a strip of about 20 acres of ground on the eastern side of the post which has not good drainage, and is more or less saturated with water."

Under date of March 31, 1896, Surgeon Adair recommends that the weeds along the northeast border of the reservation be cut down and burned, since he believes that this spot forms a breeding ground for malarial germs. He adds: "This jungle is not the only or chief source of the fevers which are so prevalent during the summer and fall, but so large a percentage of the command becomes affected each summer that every source of infection should be removed or modified as much as possible."

It will thus be observed that during this whole period no medical officer calls into question the water supply as a source of malarial disease at this station, and that while a few refer to other general causes, lying outside of the garrison, the majority attribute a good deal of importance to the low marshy part of the reservation lying along the James Creek Canal. This absence of reference to the water supply as a source of malarial disease is not, of course, a proof that the Potomac water is not at fault. Stronger evidence of the wholesomeness of the water supply is found in the marked prevalence of malarial fevers in those sections of the city bordering on the Potomac and Anacostia rivers, and its almost complete absence from the more elevated districts. In other words, while all of the city's inhabitants use the same water supply, those who live in the more elevated sections away from the river front drink Potomac water with impunity, as far as malarial disease is concerned, while those who live on the low plateau bordering both the Potomac and the Anacostia rivers are afflicted annually by malarial diseases to a greater or less extent.

I find by reference to the Report on the Vital Statistics of the District of Columbia, Covering a Period of Six Years ending May 31, 1890, by Dr. John S. Billings, United States Army, that in sanitary district No. 22, bounded by Virginia avenue, South Capitol street, the Eastern Branch of the Potomac, Delaware avenue and First street SW., area 279 acres, population 2,952, and which district is situated just across the James Creek Canal from Washington Barracks, the death rate for malarial fever was nearly three times the average, and that the greatest number of deaths from malarial fever during the six years ending May 31, 1890, occurred in those districts lying immediately along the shores of the Anacostia and Potomac rivers; the highest death rate, which was more than five times the average, occurred in sanitary district No. 7, bounded by H street, Virginia avenue, E, Eighteenth, and B streets NW., lying immediately on the Potomac River opposite Analostan Island; area 180 acres, population 2,102.

I therefore conclude that the source of the malarial fevers at Washington Barracks can be referred to the development of the specific cause of malaria partly in the soil upon which the post is located, and, to a still greater degree, to its development in the extensive marsh lands lying in and along the Potomac and Anacostia rivers.

In contrast to the location of Washington Barracks, which is only a few feet above the level of the Potomac River, and in the immediate vicinity of extensive, low, and insufficiently drained areas of river bottom, Fort Myer, Va., is situated on Arlington

Heights, at an elevation of 240 feet above the Potomac, and at a distance of about half a mile from the right bank of that river.

I extract from a special report, dated June 30, 1893, descriptive of this post, by Capt. John L. Phillips, assistant surgeon, United States Army, the following:

"The geological formation of Fort Myer consists of a series of deposits of loam, sand, and gravel. A layer of loam, containing fine sand and gravel, of the thickness of about 10 feet, resting upon a second layer of coarser gravel, having a thickness of from 10 to 15 feet, and this resting upon a bed of clay. Its situation upon a commanding plateau, which is broken by deep ravines, serves to give Fort Myer excellent natural drainage."

That malarial diseases should prevail at this station would hardly be inferred from an examination of its immediate sanitary surroundings; yet an examination of Diagram B serves to show that for a period covering the last quarter of a century these diseases have annually recurred, and have occasioned much discussion during the last five or six years as to the source of their origin.

I can find nothing in the earlier medical history of the post bearing upon the causation of the malarial fevers at this garrison. I find that the water supply from 1870 to 1886 was obtained from a spring situated at the base of the hill upon which the post is located. It was pronounced by Acting Asst. Surg. L. W. Ritchie, United States Army, who was medical officer to this garrison for more than fifteen years, as "pure and abundant" and "far removed from any contact with sewage."

During the year 1886, in order to obtain a greater supply of water, a well was sunk near the site of the spring, and four additional wells were sunk at a lower elevation, and in a situation which has been referred to as "marshy ground."

During the month of October, 1888, Asst. Surg. H. P. Birmingham, United States Army, forwarded specimens from the sources of supply, viz, "a natural spring," "a driven well," and "a well sunk in marshy ground," to the laboratory of the Surgeon-General's Office for analysis on account of the appearance of a case of typhoid fever in the garrison. According to the chemical report, the water obtained from the spring and from the driven well was found to be of good quality, while that from the well sunk in marshy ground was reported as containing a considerable amount of suspended matter, and not in a condition to be used for drinking purposes.

Under date of June 30, 1889, Maj. R. H. White, post surgeon, reports that the water supply is "wholesome and abundant."

From the monthly sanitary report of the same officer for August, 1889, I quote the following:

"An item of interest in the medical history of the post is the occurrence during the summer of seventeen cases of remittent fever. It is quite probable that this type of fever may be referred to conditions that are common to the wide area hereabouts and that no sanitary defect at the post can be inferred from its presence."

The first reference that I find in the medical history of this post condemnatory of its water supply is under date of June 30, 1891, when the post surgeon, Major White, pronounced the water to be of surface origin, and, on that account, and the scarcity of the supply, suggests that connection be made with the Washington waterworks in order to obtain a purer supply.

Under date of September 6, 1891, the same medical officer requests that an analysis of the water may be made. He states that it is of surface origin, and that the occurrence of certain cases of fever at the station suggests that its water supply may not be altogether pure. If analysis was made at this time the medical history of the post does not give the result.

On December 1, 1891, Major White states that the water has been of wholesome quality, but that the supply has been such as to require economical use. Nearly a year later, September 12, 1892, in a special report he says: "The water now supplied is simply surface drainage, to the impure quality of which may be referred 87 cases of typhoid fever in 1889, 1890, and 1891." I shall again have occasion to refer to this remark.

Under dates of November 30, 1892, February 28, 1893, and March 31, 1893, Capt. J. L. Phillips, assistant surgeon, condemns the water supply in severe terms, and further remarks that "of nearly 200 men admitted to sick report during July, August, and September, 1892, more than 50 per cent of them were admitted for disease probably due to the polluted water supply." This and the preceding condemnations of the water supply led to measures for obtaining another and purer water for the post.

It is interesting to note that under date of October 1, 1893, the post surgeon reports that the health of the command has greatly improved during the latter half of the month, which he attributes to the heavy frosts that have occurred. The water supply, however, has remained unchanged.

Under date of November 1, 1894, Capt. E. A. Mearns, assistant surgeon, reports that the sole water supply for the post is obtained from the Potomac River near the western end of the Aqueduct Bridge.

I find that during the latter part of the month of October, 1894, a chemical examination of the Potomac water, both at the pumping station and that contained in the

water tank, was made by Dr. W. M. Mew and, independently, by the chemist of the Naval Museum of Hygiene. Both report the supply as good and potable.

I also find in the medical history of the post that during the month of November, 1894, "Columbia" filters were attached to the supply pipes in the officers' quarters, 14 filters in all, and that on January 10, 1895, "Pasteur" filters were attached to the water pipes in the men's barracks and mess hall. It will be observed that from this latter date the command was drinking Potomac River water filtered through Pasteur filters.

On April 19, 1895, the post surgeon recommends that the drinking water used in the garrison should be sterilized by boiling. He recommends this precaution inasmuch as the supply of the post is taken from the Potomac River opposite the entrance of a sewer which drains a large section of Georgetown, and fears that on this account the supply will be contaminated by sewage.

July 26, 1895, the post surgeon states that at present writing boiled water only is being used by the command, and the same remark is contained in the monthly sanitary report dated August 31, 1895.

September 12, 1895, the post surgeon again calls attention to the necessity of boiling the water used for drinking purposes, to which the post commander replies that if the troops had their own company messes this could be done, but that with the consolidated mess it is very difficult to carry out the post surgeon's sanitary recommendation.

October 29, 1895, Captain Mearns submitted a special report to the post adjutant on the prevalence of malarial fevers at Fort Myer, from which I make the following extracts: "Malarial fevers have been the bane of the post since its origin; they are not confined to this garrison, but the paludal poisoning is felt all along the first plateau of the Virginia side of the Potomac River. * * * There are individuals on the environs of this post who, though native born and enjoying immunity, have for the first time become affected this season, which has been a very prolific one for the propagation and distribution of the specific poison of the fevers at this post. * * * To determine which of the two means of conveying the poison at this post was the worst, it was desirable to place the command on sterilized water for potable purposes. There are isolated individuals about the post who do not use any but boiled water for potable purposes, and the results from these few cases would point to other sources of infection, though the water supply is a chief factor in the production of the fevers. * * * It is reasonable to suppose that the percolate from any permeable material is pregnant with the chief ingredient contained in such material; hence the water supply should be suspected. * * * It is self-evident that until we exclusively use a potable water supply that is beyond question as to its purity it is merely a matter of speculation whether or not our present water supply is or is not the cause of the malarial fevers at this post."

The foregoing references contain all that there is in the medical records of the post relating to the water supply of Fort Myer. From these it will be seen that from September, 1870, to the year 1886 this post was supplied with spring water, which was always pronounced wholesome in quality, and to which no bad effects were attributed as far as the health of the command was concerned. In 1886, in order to increase the supply of water, the spring itself was enlarged, walled up, and covered over; a well was driven about 10 feet lower than the spring, and further down the hillside, at a distance of about 100 yards, in lower ground, four other larger wells were sunk, and thereafter referred to always as "wells sunk in marshy soil." The water from these three sources furnished the supply from 1886 to November 1, 1894, from which date the post has been wholly supplied with Potomac water. By reference to Diagram B it will be seen that during the last four years of spring-water supply, viz, 1882, 1883, 1884, and 1885, Fort Myer had more than its annual average of malarial cases, but that during the following six years, viz, 1886, 1887, 1888, 1889, 1890, and 1891, notwithstanding the addition of a worse supply of water, a large part of which was obtained from the "wells sunk in marshy soil," the rate of admission for malarial disease was very low, lower, indeed, than for any other six consecutive years in the history of the post. During five years of this period the rate was also very low for Washington Barracks.

I find by examination of the medical records that during July (latter part), August, and early part of September (September 5) 12 cases of remittent fever were under treatment, one of which was fatal (no autopsy). September 6, 1891, Major White requests that an analysis of the water be made, basing this request on the occurrence of certain cases of fever at the station, and the doubt which had thereby been raised in his own mind as to the purity of the water supply. The consolidated report for the month of September, 1891, contained the following remarks: "The cases of continued fever specified in the preceding pages have not been influenced by quinine, and if the phrase typho-malarial be inadmissible, the term typhoid must be used to designate them." In the same connection, the sanitary report for September says: "This fever * * * may be called typhoid." The occurrence of

frost having as usual put an end to the fever cases, the post surgeon pronounces the water supply in the November Sanitary Report as "of wholesome quality."

Under date of April 12, 1892, the Surgeon-General called the post surgeon's attention to the remarks contained in the consolidated report for September, 1891, and in the sanitary report for the same month, which remarks I have quoted above, and said:

"No cases are recorded on the September register as 'continued fever,' but those diagnosed as 'remittent' are assumed to be the ones in question. Fifteen cases of remittent fever in all appear upon the reports from Fort Myer from July to December, 1891, and in view of the remarks above quoted it is desired to change the diagnosis in those to which the remarks apply to 'typhoid.' A memorandum herewith indicates the cases of remittent appearing upon the register. Please designate which of them are regarded as typhoid."

In compliance with this letter, the diagnosis of the twelve cases of "remittent fever" admitted prior to September 6, 1891, and three cases admitted later to sick report was changed to "typhoid fever."

This correction was made more than six months after the cases had been admitted to hospital. I may here remark that such a number of cases of typhoid fever occurring in a small garrison would naturally lead to the condemnation of the water supply.

During the year 1892 malarial fevers prevailed to an increased extent, as compared with the preceding year, at both Washington Barracks and Fort Myer.

September 12, 1892, in a special report the post surgeon of the latter post says: "The water now supplied is simply surface drainage, to the impure quality of which may be referred 87 cases of typhoid fever in 1888, 1889, 1890, and 1891." This remark has led me to discredit the accuracy of the diagnosis in the 15 cases occurring in the fall of 1891, since I find that it absolutely wipes from the record every case of intermittent as well as remittent fever occuring during the years 1888, 1889, 1890, and 1891, save one. This hardly seems allowable, even though many of the cases were rebellious to quinine. Nor do I find that the diagnosis was changed in the remaining 72 cases to typhoid fever. Hence, in making up the percentage for 1891, in Diagram B, I have added 15 cases of remittent fever to the malarial admissions, making the figures for the year read 156.06 instead of 69.36.

The increased ratio of admissions for the year 1892 caused an investigation to be made of the water supply at Fort Myer by a board of experts.

The following quotation is taken from the Report of the Surgeon-General of the Army for the year 1893, page 56:

"For many years back remittent fevers have prevailed with more or less intensity at Fort Myer, Va., and have been attributed to the low grounds of the Potomac and of its tributary valleys. The post is situated on an elevated plateau, which is screened by fine trees from the malarious exhalations in its neighborhood. Soldiers affected by malaria were supposed to have contracted their disease by exposure to pernicious miasms while passing after nightfall through the low grounds in returning to their post from the city. During last autumn the number of cases was so great as to call especial attention to the conditions, and a medical inspection of the post was ordered. It was found that in September the garrison of 290 men had 85 cases of sickness, of which 52 were cases of remittent fever. Women, children, and civilian employees were affected in like proportion. The attacks were controlled readily by quinine. This local prevalence of malarial fever was attributed by the inspectors to malarious water in the shallow wells from which the post was supplied. These wells are situated in a ravine in front of the post and are fed by its subsoil drainage. During seasons of rain and snow the supply suffices for the use of the garrison, and is held to be fairly good in quality, but at the time of the prevalence of the remittents the inflow into the wells was small and of unsatisfactory quality, as shown by its free ammonia, chlorides, nitrites, nitrates, and organic matter. The use of this water in its fresh state for drinking purposes was interdicted. Directions were given that it should be boiled before being used; and recommendation was made that the post be supplied by connecting it with the Washington (D. C.) mains. Congress failed to authorize this connection, and the post continues dependent on its wells. During the coming autumn the water will have to be boiled or thoroughly filtered to prevent a recurrence of the remittents which were so prevalent in September last."

I further quote from the same annual report:

"It is of interest to observe that while the garrison at Fort Myer, Va., was suffering from remittent fever the troops stationed at Washington Barracks, D. C., on the low grounds on the other side of the river, also were affected with malarial fevers, only in the latter instance the disease was of the intermittent form. The presence of malarial exhalations in this locality accounts for the prevalence of the disease. The insalubrity of this post has been materially lessened of late years in proportion to the progress of reclamation of the Potomac marshes."

These conclusions were based upon a report made by Maj. Charles Smart, surgeon,

United States Army, and Dr. William M. Mew, of the Army Medical Museum, on the water supply and fevers of Fort Myer.

From the report of Major Smart and Dr. Mew, which is incorporated in the annual report for 1893, I also quote:

"In considering the excess of fever in September, it is to be remembered that an unusual prevalence has been manifested at other points than at Fort Myer. At Washington Barracks, for instance, there were, up to the 28th, just as many cases of malarial fever, to wit, 52, as at Fort Myer, but the garrison had a somewhat greater strength, 380 men. In July Washington Barracks had 13 and in August 17 cases.

"There is, however, one notable difference in the character of these two posts, i.e., remittents exclusively prevailed at Fort Myer, intermittents at Washington Barracks; and this has a bearing on the probability of unwholesomeness of the water at the former post, for when malarial fevers are recognized as due to malarious waters the fever is generally of the remittent type.

"In view of these observations it is evident that an adequate supply of good water should be obtained for Fort Myer. Such a supply would probably put an end to its remittent fevers, and the elevation of the post would probably keep it free from the intermittents which infest such low grounds as those of Washington Barracks."

The report from which I have quoted was based upon a careful examination of the sanitary condition of Fort Myer and a thorough chemical examination of its water supply, and hence I am reluctant to disagree with the general conclusion of this report, viz, that the malarial fevers at Fort Myer during the year 1892 were due to its unwholesome water supply. I think that the occurrence, on the one hand, of a large excess of intermittent fever at Washington Barracks, occasioned by emanations from the marshes (hence air-borne), and the prevalence of remittent fever, on the other hand, at Fort Myer, brought about by the use of unwholesome water, would be of very great import if true; but I do not believe that this position can be sustained.

Certainly if the almost exclusive prevalence of remittent fever during the year 1892 was occasioned by an unwholesome water supply, the same water supply should produce remittent fever in excess over intermittents in 1893 and 1894. On the contrary, I find that during these years, when malarial diseases were largely increased, intermittent fevers prevailed almost exclusively at Fort Myer. Indeed, a careful examination of the medical records of the post will show that only during Major White's incumbency as post surgeon did remittent fevers prevail to any great extent at this station. During all the other years intermittents largely predominate, as at Washington Barracks, and remittents only appear, few in number, during the later fall months.

It is hardly necessary for me to remark that remittent or æstivo-autumnal fevers appear in a malarious climate chiefly during August or September, and this occurs irrespective of a good or bad water supply.

Since with an unchanged water supply intermittent fevers prevailed almost exclusively during the years 1893 and 1894, the question arises, Were these not occasioned by emanations from the Potomac Flats rather than by the quality of the drinking water? Fortunately, a change of water supply made in November, 1894, enables a more correct answer to be given to this question than would otherwise have been possible, and to my mind throws much light on the etiology of malarial diseases at Fort Myer.

During the year 1895 this post was supplied with Potomac water, the old supply being entirely cut off. In addition, beginning with January, 1895, the enlisted men drank water which had been filtered through Pasteur filters, as a greater precaution against malarial and typhoidal infection; officers and their families drank water filtered through Columbia filters, and which was afterwards boiled. I do not intend to say that all of the enlisted men drank only water filtered through Pasteur filters. Soldiers, like other people, are apt to be careless about strictly carrying out sanitary measures. Hence it would be more correct to say that the majority of the garrison drank, as a rule, water filtered through Pasteur filters, and, therefore, water free from the malarial parasite. What was the result of this change from the old supply to filtered (for the men) and boiled (for officers and families) Potomac River water? The records show that malarial fevers were more prevalent at Fort Myer during this year than they had been during the preceding twenty-three years. I have been unable to ascertain how many cases of fever occurred in the families of officers who were drinking boiled filtered water, but I find as many as nine officers admitted to sick report for malarial disease during the fall of this year. All of these used only boiled filtered water. I further find that, for the present year, one officer (the post surgeon) and four enlisted men of the Hospital Corps, who drink only boiled filtered water, have already experienced attacks of intermittent fever.

It should be noted that the rate of admissions at Washington Barracks, where unboiled and unfiltered Potomac water was used for drinking purposes, shows, also, a higher rate for the year 1895 than for the preceding twenty-three years.

This occurrence of a higher admission rate for malarial diseases, with a new water supply, raises a grave doubt, naturally, whether the old water was the channel through which malarial infection reached the garrison of Fort Myer.

That this water during the period 1886–1894 was largely surface water is, I think, beyond dispute; and, as such, it was entirely advisable to stop its use; but the fact of its being surface water does not prove that it occasioned the annual outbreaks of malarial disease. With a better water supply, about whose malarious qualities there has never been any suspicion as far as I can ascertain, the same character of diseases were yet more prevalent. This would strongly point to some other source of infection, and I believe this can be found in the marsh lands of the Potomac. In other words, I am of the opinion that malarial fevers at Washington Barracks and Fort Myer have a common origin. If the rate is generally lower at the latter post, it is probably to be explained by its greater elevation and distance from the Potomac.

In attempting to discover why the years 1893, 1894, and 1895 have been so prolific in malarial affections at these two stations, I have gathered the statistics relating to the amount of dredged material that has been deposited each year on the reclaimed area of the Potomac River improvement, thinking that this might have some influence. The work done is fully set forth in Table C, which was kindly furnished by Maj. Charles J. Allen, Corps of Engineers. An examination of this table will show that the years during which the greatest amount of dredging was done were, as a rule, years in which malarial diseases prevailed to only a slight extent. It must not be overlooked, however, that only during the past six years has this extensive reclaimed area been above the influence of the tides, and covered with growing vegetation. As the material of which it is composed is the same as that of which the natural flats were slowly made, there is no good reason why, in its present condition, it should not contribute its share to the causation of malarial fevers.

In this connection, Diagram B, on the following page, shows that malarial fevers were just as prevalent at Washington Barracks in 1871 and 1872, and again in 1880 and 1881, as they have been during the past three years; hence I am unable to state that this extensive improvement in the Potomac River has had any perceptible effect upon the course of malarial diseases at these garrisons.

I think Diagram D, herewith submitted, will prove of interest in this same connection. It embraces the six years having the highest and six years having the lowest malarial rates at Washington Barracks, and would seem to indicate that the years having the highest average temperature for July, August, September, and October, with lowest humidity for the same months, are those in which malarial diseases are most prevalent, while those years whose summer and fall months show a temperature ranging below the mean and a higher humidity are characterized by a less prevalence of malarial diseases.

Diagram E, with accompanying tables, upon which it is based, for Washington Barracks, and Diagram F, with accompanying tables, for Fort Myer, are herewith submitted. These diagrams show not only the annual malarial range for all cases admitted for malarial disease, but for the new cases of fever as well.

In making up the table for new cases, patients who were admitted during the summer months and readmitted a number of additional times during the fall months were not considered as new infections. In the same way, patients who had been on sick report during the preceding fall and reappeared in January, February, and March were considered to be suffering with the original infection and not readmitted as new cases.

This report is also accompanied by Diagram G, showing the cases of malarial fever in each 1,000 of mean strength (annual rates) during the years 1882, 1883, and 1884 of those troops that went from Washington Barracks into summer camp. It plainly shows the good results to be obtained from transferring a garrison from a malarial to a nonmalarial region.

There is also submitted a diagram (H) which shows the monthly average of cases of malarial fever among white and colored troops at Fort Myer, Va., from June, 1891, to September, 1894, and a second diagram (I) showing cases of malarial fever at Fort Myer from June, 1891, to September, 1894, among white and colored troops in 1,000 of mean strength. It will be observed that the prevalence of malarial diseases among the colored troops is less than one-half the rate which prevails among the whites. There is also appended a diagram (J) showing rainfall. Table K gives mean temperature from 1872 to 1895, and Table L mean relative humidity.

In conclusion I desire to state that in the preparation of diagrams and tables for this report I have received valuable assistance from Mr. C. J. Myers, chief clerk of the Army Medical Museum.

DIAGRAM B.

Diagram showing for Washington Barracks, D. C., and Fort Myer, Va., from January 1, 1871, to December 31, 1895, inclusive, the annual rate of cases of malarial fever, obtained by averaging for each year the monthly rates in 1,000 of monthly mean strength.

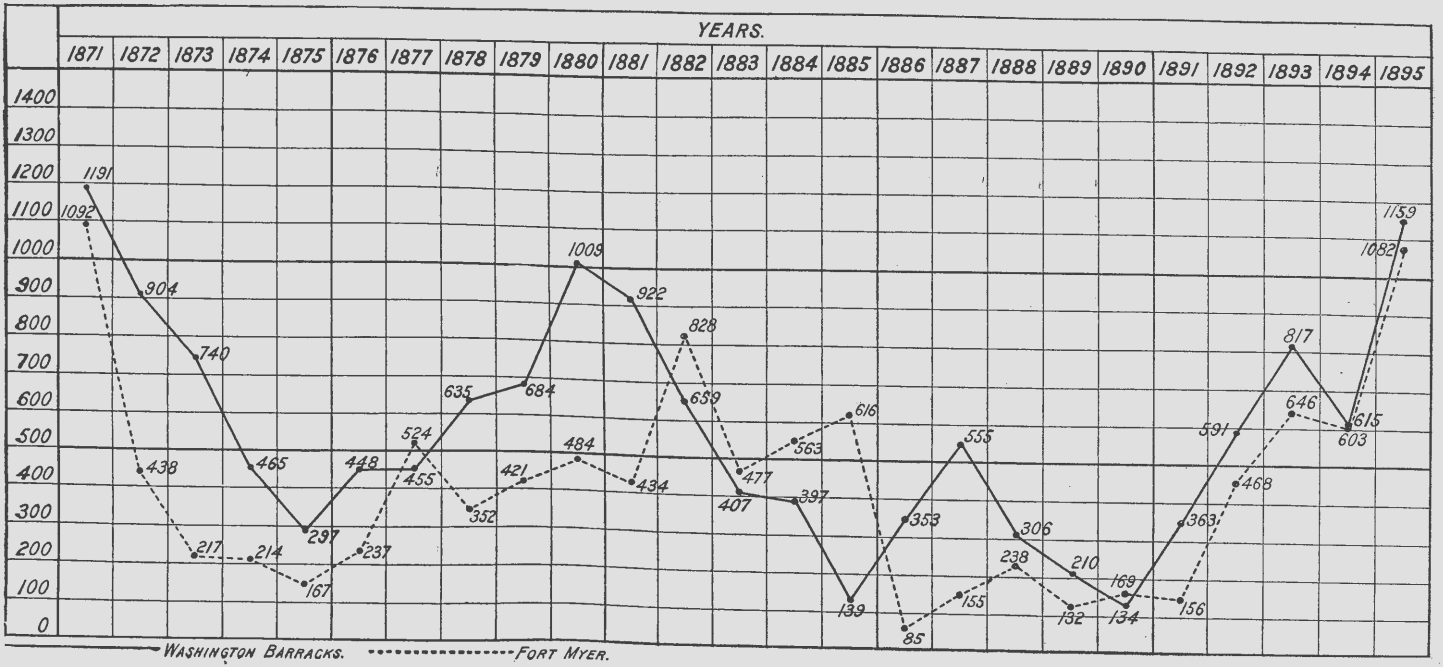


TABLE A.—*Showing for Washington Barracks, D. C., and Fort Myer, Va., for the years 1871 to 1895, inclusive, the mean strength, the cases of malarial fever, and the ratio per 1,000 of mean strength.*

Year.	Washington Barracks, D. C.			Fort Myer, Va.		
	Mean strength.	Cases of malarial fever.	Per 1,000 of mean strength.	Mean strength.	Cases of malarial fever.	Per 1,000 of mean strength.
1871	67	66	985.07	76	89	1,171.05
1872	48	44	916.66	106	48	452.83
1873	50	37	740.00	131	30	229.00
1874	47	22	468.08	124	26	209.67
1875	35	10	285.71	75	12	160.00
1876	131	27	206.10	74	18	243.24
1877	272	67	246.32	57	30	526 31
1878	89	78	876.40	76	31	407.89
1879	124	85	685.48	64	25	390.62
1880	110	112	1,018.18	75	38	506.66
1881	250	224	896.00	75	29	386.66
1882	175	75	428.57	71	58	816.90
1883	178	83	466.29	54	30	555.55
1884	186	45	241.93	57	31	543.86
1885	260	37	142.30	56	37	660.70
1886	268	99	369.40	44	6	136.36
1887	267	149	558.05	64	18	281.25
1888	264	80	303.03	138	33	239.13
1889	251	47	187.25	129	18	139.53
1890	255	31	121.56	137	24	175.18
1891	310	109	351.61	173	27	156.06
1892	332	186	560.24	236	110	466.10
1893	287	247	860.62	259	166	640.93
1894	316	192	607.59	251	144	573.70
1895	363	425	1,170.79	270	295	1,092.59

The recent increased prevalence of malarial fevers, chiefly intermittents, at the United States Military Academy, West Point, N. Y., led to an investigation and report by Maj. Charles Smart in June last. He found from the records that malarial fevers have occurred every year to some extent, and in 1880 to nearly as large an extent as in 1895–96, affecting civilians in the neighborhood as well as the persons living on the military reservation. He regarded the increase as not due to insanitary conditions at the post, but to the occurrence of warm weather (a mean temperature of 60° F.) at an early period of the spring or before vegetation had become vigorous, and to the continuance of a high temperature in the autumn after vegetation had lost its vigor. Under these conditions the fever cause is exhaled into the air, and the ameboid micro-organisms to which malarial infection is ascribed were found in the blood of persons examined at West Point. Dr. Smart contends that the malarial cause is not only exhaled from the soil and propagated by the air, but that it is washed from the luxuriant soil by surface waters on their way to the streams and ponds, and may be propagated by the drinking water. He therefore recommended, first, general medical cautions for protection against exposure to air, and, second, filtration of the water supply to remove the particulate cause, suggesting the building of a filter bed having an area of one-fourth acre in connection with a large reservoir now being constructed; but as this would necessarily take time, he recommended for current needs the issue of efficient porcelain tube filters in such numbers as would furnish 1 gallon of water daily per person for use as a supply for drinking. His report is as follows:

The medical records of West Point show that during the calendar year 1895 there were 172 cases of malarial fever among cadets and 115 among officers and soldiers. These numbers are equivalent, respectively, to rates of 595 and 298 per thousand of strength, and may be compared with 74, the average rate of the Army for that year, and with 35 for the cadets and 44 for the officers and soldiers as the rates per thousand of strength for the calendar year 1894.

This increased prevalence in 1895 assumed a greater importance when it was found from recent medical records that there is a prospect of a largely increased malarial rate for the coming season. In 1895, notwithstanding its high rate, the malarial influence did not begin to manifest itself until July, while this year these manifestations began much earlier. The first case of the present year was recorded on March 30, and from that date to June 18 132 cases have been taken into the cadet hospital for treatment; and a similar malarial prevalence has been experienced by the officers and soldiers of the military post.

From July 6, 1895, to June 18, 1896, the medical register of the cadet hospital shows the occurrence of 282 cases of intermittent fever, generally quotidian in type, and of 28 cases of remittent fever, 2 of which were fatal. The prevalence, by months, may be stated as follows:

Month.	Intermittent.	Remittent.	Total.
July, 1895	10	0	10
August, 1895	64	0	64
September, 1895	54	16	70
October, 1895	16	3	19
November, 1895	6	8	14
December, 1895	1	0	1
March, 1896	2	0	2
April, 1896	26	1	27
May, 1896	70	0	70
June 1 to 18, 1896	33	0	33
Total	282	28	310

The duration of the intermittent attacks averaged three days; of the remittent, ten to twenty days. The intermittents presented the characteristic symptoms of what is popularly known as chills and fever, a chill more or less severe, followed by stages of febrile reaction and perspiration, with a tendency to a recurrence of these phenomena, which recurrence was generally prevented by the free administration of quinine. I verified the diagnosis of several of these cases under treatment in the cadet hospital during my stay at West Point, and determined the presence of the plasmodium malariæ by microscopic examination of the blood. No case of remittent fever was under treatment during the period of my stay, but the thermographic charts of the cases on record were submitted to me, and from an examination of these charts I have no hesitancy in accepting the cases so recorded as cases of remittent malarial fever.

If the sickness indicated by the above statements had been additional to the regular sick rate of the post, the increased sickness in the command would have attracted prompt attention; but these malarial fevers took the place of the influenzas and catarrhs of the winter season, and of the ephemeral fevers, tonsillitis and pharyngitis of the early spring, one set of febrile diseases subsiding as the other became prevalent. Influenza prevailed in the winter months, yielding to ephemeral fevers as the weather became milder, and these to malarial fevers as warm weather set in. The ephemeral fevers of the early spring and late autumn had the duration of the intermittents, and oftentimes it was difficult in individual cases to distinguish the character of the disease by its mere symptomatology. The presence of the plasmodium in the blood, or the efficacy of quinine as a remedial agent, determined in these cases, as a rule, the diagnosis of malarial as distinguished from ephemeral fevers. In fact, these ephemeral fevers assumed a character of malarial periodicity as the warm season advanced, but with no ordinarily great increase of the general sick rate over that which would have been recorded from the ephemeral fevers alone. During the present season, however, 70 cases of intermittent fever recorded in May, as compared with 16 cases of ephemeral fever, with no malarial cases, in the corresponding month of 1895, could not fail to attract attention to the marked change in the character and prevalence of these febrile attacks.

It was found, however, by a reference to the medical records of West Point that the presence of malarial fever in the spring and autumn has been, within limits, a constant occurrence, and even that its prevalence to an extent such as was experienced in 1895–96 has not been unique in its history, for in the year 1880 there were recorded 121 cases among the officers and soldiers and 56 cases among the cadets, equivalent to rates per thousand of strength of 528 and 209, respectively.

I did not pursue the history of malarial fever at West Point beyond 1880, as this year furnished a general prevalence at the post nearly as great as that given by the calendar year 1895. In 1880 the average prevalence of malarial fevers in the Army as a whole was much greater than it is now, 186 per thousand of strength, as compared with 74 in 1895. This decrease is certainly due in great part to the abandonment of

posts in notoriously unhealthy—i. e., malarial—localities; but no small part of it must be credited to the greater care given of late to the drainage, sewerage, and water supply of the malarious posts that continue to be occupied. It was my privilege to meet Col. C. T. Alexander of the medical department during my visit to West Point. This officer was post surgeon of the Military Academy during the endemic prevalence of the fever in 1880. Its occurrence then, however, did not impress him as constituting any unusual condition, fresh as he was from service in connection with more serious developments of malarial poisoning at Western posts.

While the records of the post show that the causes of malarial fever have affected officers, soldiers, and cadets every year during the spring, summer, and autumn, and that in certain years these causes have been more malign than in others, it was found that a similarly varying prevalence and intensity affected not only the families of officers and enlisted men and other civilians at the post, but the residents of the civil settlements in the vicinity. In the village of Highland Falls, for instance, a certain number of cases occur every year during the period of prevalence at the military post, and at the present time there is greater prevalence in the settlement than is usual so early in the season of the year. This was reported to me by Dr. Brown, the health officer of the village, who informed me, also, that only a small number of the cases that occur come under medical observation, as the people are so familiar with the disease and its remedy. The pharmacist of the village corroborated this by the information that the call for quinine this year was already quite considerable.

This extended prevalence intimates that the cause or causes of the fevers are not to be found in any unsanitary condition which is local or peculiar to any of the persons quartered on the military reservation, and, as a matter of fact, there is little in the nature of unsanitary conditions to be found at this station. In the language of the surgeon of the post, "The ordinary conditions affecting the health of the individuals residing on the reservation are almost ideal, as they are well housed, well clothed, and well fed. The disposal of the refuse of the post is made under proper supervision and, with the exception of small quantities of waste water occasionally thrown on the ground by the members of the families of enlisted men and officers' servants, is satisfactory. The drainage of the land is very good and the sewerage system ample and complete."

The few points that might be instanced as susceptible of improved conditions are well known to the local authorities, who have remedial measures under consideration. The most notable of these is the damp site of the barracks of the cavalry detachment and the musty and unventilated state of the space underlying the flooring. Fevers have occurred at several of our military posts where this subfloor space has become damp and foul from organic decay in the absence of free communication with the external air, and where the warmth of the interior of the building has drafted up this soil air through the seams of the flooring. In the present instance, however, the flooring is sound, and the greatest care is taken of the condition of the underlying space consistent with the original faulty construction; but no care can prevent the soil from becoming saturated with moisture in rainy weather and continuing damp for a long time afterwards. It is suggested that the site be drained, the surface concreted and asphalted, and the subfloor space freely ventilated.

The causation of malarial fevers, according to our present knowledge, is associated with that fermentation in the soil which gives rise to the growth of vegetation. The conditions essential to this fermentation are, first, organic matter in the soil; second, moisture; and third, a temperature of 60° F. There are few soils so poor as not to have enough of organic matter for vegetable growth in the presence of the other essential factors, and there are few places in the United States that do not have at some season a sufficiency of moisture in the soil to permit of this fermentation if the needful temperature is present; so that this fermentation which renders possible the germination and growth of the annual vegetation depends practically on the occurrence of a temperature of 60° F. With a luxuriantly growing vegetation this soil fermentation is harmless to man, but in the absence of a vegetation corresponding in luxuriance to the energy of the fermentation malarial fevers are developed among the people of the locality. Hence the malarious character of certain sandy and barren tracts, and of lands where the vegetation has been wilted, or destroyed by overflow. In the tropics the dry season is healthy, but as soon as the first rains fall malarial fevers occur, and continue until the surface of the country is covered with vegetation. During the vigorous life of the tropical vegetation there are few fevers, but as soon as this life wilts and decays at the close of the fruiting season, malarial fevers again appear, and continue with virulence until the advent of the dry season, when the soil, sun dried and hard baked, ceases to ferment. In temperate climates medical observers have for ages back been accustomed to recognize spring and autumnal malarial fevers, which correspond with those tropical fevers that occur respectively at the beginning and at the close of the rainy season. If in the spring we have the coincidence of organic matter and moisture in the soil, with a temperature of 60° F., but without a corresponding luxuriance of

vegetable growth there will be an occurrence of malarial fevers among the people. If the advance of the seasonal temperature is slow, giving ample time for the growth of vegetation to keep up with the energy of soil fermentation, the season will be healthy, but if the onset of warm weather be sudden and early, so that the temperature of 60° F. prevails in advance of vegetation, the season will be unhealthy.

An examination of the malarial records of the United States Academy at West Point for the years back to 1880, in connection with the meteorological records of the post for the same years, shows that in 1880 and in 1896 there had been this sudden and early onset of warm weather in the spring. In the former year the mean temperature rose from 49° for April to 66° for May, and in the latter from 50° for April to 64° for May. On the other hand, in the years characterized by comparative absence of malarial fevers at West Point the advance of the warm season was slow, as in 1891 and 1894, when the mean temperature for May was in both seasons only 48° F., and the malarial prevalence among the cadets equivalent to only 43 and 35 per thousand of strength.

Correspondingly, in the autumn, if the warm weather is prolonged after the decadence of the annual vegetation, the season proves a sickly one.

Again, if at any time the vegetable growth which is natural to the surface becomes destroyed, or if the relation between the vegetation and the soil fermentation be in any way disturbed, there will be malarial developments, as when new ground has been cleared for agricultural, engineering, building, road making, or other purposes. Nothing of this kind has recently been done at West Point, so that the present prevalence of malarial fevers must be regarded as in great part due to climatic conditions. The harmful resultant of these climatic conditions was until lately regarded as an exhalation from the soil, a miasm, an influence, impalpable, gaseous, or ethereal; but since the discovery of the plasmodium in the blood of affected individuals the essence or germ of the disease must be regarded as a particulate substance susceptible of growth like any other mass of ameboid protoplasm under suitable conditions.

It must be remembered, however, that malarial fevers are by many sanitarians regarded as propagated by means of surface water supplies. The evidence on which this belief is founded is strong. Such fevers have occurred on only one ship of a fleet, which ship was the only one of the fleet supplied with bad water. Malarial fevers prevail in nonmalarious districts when the water supply is surface drawn from a locality where soil fermentation is active; and more convincing than all is the acknowledged fact that malarial fevers have ceased in localities notoriously insalubrious when the surface water supply has been replaced by a pure filtered water from deep wells. The life history of the plasmodium malariæ, which is recognized by the medical profession as the cause of periodic fevers, has not been followed outside of the human body, but that its history is connected with soil fermentation, as above stated, seems certain, and there appears, therefore, no reason for supposing that it may not be washed from the soil by surface waters. It is particulate, and therefore separable by filtration. Thus the immunity of certain people who use deep well water may be accounted for, and thus we may predicate of certain others that they would be less affected by these fevers were their water supply filtered.

The only troops unaffected by malarial fevers at West Point in the autumn of 1895 were commands temporarily stationed there for target practice. They came from the posts in New York Harbor and remained usually from ten days to two weeks. Their camp was supplied with water from the post's system, but their drinking supply was usually obtained from a spring near their camp. Moreover, it has been observed by the medical officers on duty at West Point that families of officers at the post have suffered less than others on the reservation, and this comparative immunity is credited to the greater care given by the families to boiling or filtering the water used as a supply for drinking.

The water supply of the post is derived from three sources in the highlands back from the river, but all the waters are of the same general character. They fall upon a rich organic soil, the quality of which is amply demonstrated by the luxuriance of the vegetable growth which clothes its surface. In winter and spring two streams—the Cascade and Crows Nest, which make a steep descent from the highlands—suffice for the supply of the post. Their waters are collected at present in a reservoir (the Delafield), from which they are in part passed through a filter before distribution. In summer these two sources fail, when recourse is had to the supply from Round Pond, a large basin of somewhat dark-colored water, which, when required, is led by a conduit to the Delafield reservoir. The filter bed covers 1,400 square feet and consists of gravel with only 1 foot of sand on top. If filtration were properly carried on through this bed its daily capacity would not exceed 70,000 gallons, but double this quantity of water is usually passed through it, the filtration being correspondingly insufficient. About one-third of the supply of the post is distributed without passing through the filter. I made an analysis of water from the Cascade, Crows Nest, Round Pond, and Delafield reservoir, and of that which had passed through the filter. The waters of the Crows Nest and Cascade gave better results on analysis

than that of the Round Pond, and better than that of the reservoir into which they were flowing, an anomaly explained by the fact that at the time the reservoir contained some of the Round Pond water. The filtered water showed an improvement over that taken directly from the reservoir. Chemically, all of these are fair samples of upland surface waters, free from any suggestion of typhoid fever infection, but open to the suspicion of malarial possibilities which attaches, as above stated, to such waters.

In 1879 and 1880, while examining water supplies in the Southern States in connection with the prevalence of yellow fever, my attention was attracted to the frequency with which certain low forms of life were found in the microscopic examination of the sediment of such surface waters and foul cistern waters as had been suspected of causing remittent fevers. These lowly microscopic forms consisted of small transparent and colorless masses of jelly-like protoplasm, presenting more or less sluggish ameboid movements. They are known to microscopists as rhizopods, and vary in form from the ameba and difflugia with thick protrusions from their mass to others with fine ray-like filaments. So constantly since then have I found these appearances in waters which on other grounds were considered to be of doubtful quality that I would hesitate to authorize the use of any water containing them. They are present in the surface waters constituting the West Point water supply. These waters are clear and practically free from visible suspended matters or sediment. The ameboids might escape detection in them if looked for only in the trace of sediment which collects in twenty-four hours at the bottom of a vessel of this water, but they may readily be separated for microscopical observation by means of the centrifugal action of a rotatory machine.

The hæmatozoön of malarial fever is a minute plasmic body similar apparently in constitution to these ameboids of the water, but whether they are correlated is unknown. This adds, however, to the argument on behalf of an efficient filtration of suspected surface waters.

In so far as the malarial fevers now prevailing at West Point are caused by climatic conditions, or by the presence in the air of some product of soil fermentation induced by climatic conditions, there is nothing to be said that is not already well known to medical men and to most people who have been residents of malarious districts. The regulation of diet, exercise, etc., need scarcely be mentioned, as these are essentials of the curriculum and discipline of the Military Academy. The upper floors of dwellings should be used as sleeping rooms in preference to the lower floors. Necessarily the cadets when in camp are more exposed than when in barracks. The exposure is minimized by the excellent drainage of the site, the flooring of the tents, and the raised bunks. Orders have been issued to prevent lying out on the grass at night, which, it is understood, was in sultry weather the custom of some of the cadets. All unnecessary exposure to the night air, and particularly when fasting, should be avoided. Hence the recommendation of the surgeon that hot coffee or hot milk be issued to the guard reliefs between sundown and sunrise is a judicious one. Breakfast should be served as soon as possible after reveille. It has been ordered that breakfast shall precede sick call during the present encampment, which ends August 28, but as the season of remittent fevers is always prolonged through September and sometimes through October, it would be well to continue the early breakfast hour after the camp is broken up. The remedial and prophylactic virtues of quinine, Fowler's solution, and other antiperiodics may be used under the direction of the local medical officers.

As to the condition of the water supply, purification by filtration is considered imperative. At the present time work is in progress on a reservoir for the collection of the running waters of the Cascade and Crows Nest streams during the season of their free flow, with additions when necessary from the Round Pond. The reservoir is intended to hold 75,000,000 gallons, and when finished will give the post a water supply assured as to quantity. It should be assured as well as to quality. It should be filtered before distribution, not so much for the improvement of its chemical character as for the removal of the ameboids, or of the particulate cause of the periodic fevers which is more or less intimately associated with them. In the United States we are not so careful of the purity of our water supplies as are the people of Europe, and in consequence we have an excess of typhoid, malarial, and so-called typhomalarial fevers. The laws of Germany direct specifically the filtering of all surface waters before they are delivered for public consumption. In England and Continental Europe the filter bed is an integral part of the water system when the water is not from naturally filtered spring or deep well sources. In many sanitary matters we are a generation behind the people of Europe, and in this matter of pure water supplies we are especially backward. The city of London has had filtered water for more than two generations.

In this country we build basins, really for storage, and assume that the sedimentation which takes place in them and the chemical purification which is understood to be a result of continued storage will give a satisfactory purity. This assumption

is seldom, perhaps never, warranted. If warranted anywhere, it would seem that the new reservoir at West Point would give the garrison of that post a strong claim to the warranty, for the reservoir will admit of sedimentation and storage for a period of eight months, giving ample time not only for the settlement of clay, sand, and other mineral particles, but for the destruction of all dead and decaying organic matters by the bacteria of nitrification. From it we would get a supply of satisfactory purity as determined by chemical analysis, but it would continue to retain the same malarial possibilities which it possessed as it ran down the mountain ravines into the reservoir. This may readily be proved. The water of Round Pond has not been drawn upon to any extent for the use of the post since last summer. It has been sedimenting and improving by nitrification and accumulating by the excess of rainfall over evaporation from the surface during the past eight months, yet the ameboid forms which I have described were found in water taken from below the surface of this pond at a point near its center (reached by boat) where the water was 20 feet deep. Filtration, as practiced in Europe and as preached by the sanitarians of this country, is the only known general remedy in a case of this kind.

There are methods of mechanical or rapid filtration by which the water is forced under pressure through sand in iron cylinders and the filtering sand is washed every few hours by a reversal of the current. Usually in these systems a solution of alum, iron, or other coagulant of albuminoid or protoplasmic matter is added to the water prior to its entrance into the cylinders. A mechanical "plant" of this kind will transform a Potomac River turbidity into a liquid that is beautifully clear and sparkling. Many small towns, chiefly in the Southern States, have adopted this method of rapid filtration; and two years ago Davenport, Iowa, established waterworks of this kind, and is well satisfied with the results. Sanitarians generally, however, do not feel sure of the efficiency of rapid filtration, as there have been few bacteriological examinations of the unfiltered and filtered waters. Moreover, in the opinion of engineers, the slow or natural filter beds as built originally in England, and as now used in all European cities, are cheaper in the long run.

I therefore urge on behalf of the future healthfulness of the United States Military Academy that there be constructed a filter bed on the English model in connection with the reservoir intended for the future water supply of the post. The present requirement of the garrison is said to be about 333,000 gallons daily, but in works of this kind present construction should provide for a probable extension of service. The filter beds should therefore have a capacity of 500,000 gallons daily. To permit of this they should have an area of one-fourth of an acre, and should contain 6 feet of filtering material, broken stone, gravel, and sand, the last screened to 1 mm. or less in diameter. They should be underdrained to draw off the filtered water into a distributing basin, and be provided with proper facilities for the inflow of the water from the reservoir. They should also be housed or otherwise well protected from the frosts of the winter season. The sand should constitute 3 or 4 feet of the thickness of the filtering layer, and in process of cleansing the surface it should never be scraped down to less than 2 feet. The depth of water on the beds should be regulated so that filtration should be uniform and not much in excess of 2 gallons per square foot per hour, or 500,000 gallons as the daily output. The waters to be filtered are so freely oxygenated that there would be no need to let any part of the bed lie fallow for aeration. Filtration would, therefore, be continuous, and there is so little clay or other substance of a choking character in the water that the filter would run for many weeks at a time without the need for any material scraping of the surface sand.

The cost of such a filter bed depends on local conditions; and we have little experience of this kind in the United States. In Europe the average cost is known to be $45,000 per acre for open beds with one-third added for covering when protection is needful. The filter bed, 2½ acres in extent, recently constructed at Lawrence, Mass., cost $67,000, but no housing was given to the bed. At Ilion, N. Y., the 3,040 square feet of filter cost a little over $7,000, and the two beds at Hudson, N. Y., aggregating 32,000 square feet, cost about $55,000. From these figures it is assumed that a properly protected filter of 500,000 gallons capacity could be constructed at West Point for about $25,000, but the able engineer officers at this station are better fitted than myself to give precise figures.

I would urge, however, that whatever the estimated cost, an allotment be made or an appropriation secured from Congress to enable this work to go on in connection with the work on the reservoir now in progress. A large expenditure for the collection and storage of a water supply should always be supplemented by that percentage of increased expenditure which will purify the water and protect the health of the community in the future; otherwise a bad bargain for the community will be made by the official who authorized the large expenditure without the supplemental increase.

But this work, if allotted or appropriated for, looks only to the future, and the improvement of present conditions has to be considered. To meet the exigencies of the present time the living albuminoids of the water used for drinking must be destroyed by boiling or by chemical means, or be removed by filtration.

Boiling is efficient in destroying the potency of malarial and other disease germs in water, but it leaves the water flat and unpalatable. It is difficult to get men to drink this boiled water when they can get other water more conveniently by turning a spigot. Distilled water produced by attaching a condensing coil to the ice machines supplied by the Medical Department to certain posts has been used with advantage; but this makes the drinking water supply dependent on the ice production, and is therefore expensive. But the experience gained in this way has shown the lessened prevalence of malarial fevers at posts in Texas where the condensed water has been used.

Chemical means involving the coagulation of the protoplasm by alum, iron, or other germicides would no doubt be efficient; but our experience in these methods has been limited merely to coagulation as an accelerant of subsidence, or as a preliminary to filtration in particularly turbid waters.

No doubt attaches to the efficiency of filtration after distribution of the water, provided the filtration is properly conducted. By filtration is meant not merely the removal of visible turbidity, but the removal of the germs that require the microscope or bacteriological methods for their discovery. The efficiency of certain porcelain cylinders has been demonstrated. In the French military service much benefit has been derived from their use at posts where an unfiltered supply is delivered. Surgeon-General Sternberg appears to have acknowledged the value of filtration through similar cylinders of American manufacture by the purchase and issue of a number for use in post hospitals. I would therefore recommend that instead of boiling or condensing the water for use in the cadet and company quarters, these filters be issued and used until the post water supply is perfected by the completion of the permanent system above mentioned.

So far as the cadets are concerned, Colonel Ernst has informed me that he can and will provide them with water filtered through the Pasteur-Chamberland or Columbia filters purchased from the mess fund; and that orders will be issued that no water for drinking will be used except that which has been so filtered and provided. He has, however, no fund from which to purchase similar filters for the other members of the garrison. I therefore recommend that efficient filters be provided by the Quartermaster's Department for the company barracks and officers' and soldiers' quarters in such numbers as to give each person 1 gallon a day, and that when such provision is made the use of unfiltered water be strictly prohibited. Until then the use of boiled water, cooled and aerated by pure ice, should be encouraged. The water of the spring near the barracks of the cavalry detachment might be utilized also pending the arrival of a supply of filters. This spring might indeed obviate the necessity for the use of filters in the barracks and quarters in its vicinity. It might be used, so far as it goes, as a source of supply until filtered water can be distributed from the perfected waterworks.

If the recommendations of this report be carried into effect, I feel confident that the epidemic of fever cases which at present promises to be in excess of that prevalent for many years back will be lessened materially; and that, although the climatic conditions may be favorable to the development of malarial fevers, in future years the post will have no such record hereafter as has been registered during the present spring.

In conclusion, I desire to express my thanks for courtesies received and for information and valuable assistance to Col. O. H. Ernst, Corps of Engineers, superintendent of the United States Military Academy; Maj. George H. Torney, surgeon; Capt. James L. Lusk, Corps of Engineers, and Capt. J. B. Bellinger, quartermaster.

DIARRHEAL DISEASES.

These diseases have been diminishing gradually in prevalence. The admission rate was only 85.14 per thousand of strength as compared with 94.77 during the preceding year and with 129.26 as the average annual rate of the preceding decade. Their prevalence was greatest in the Department of Texas, 146.50; least in the Department of the Columbia, 57.54. As a rule the cases were trivial, the rate of noneefficiency for the year having been only 0.78 per thousand of strength. Of the large posts, Forts Myer and Monroe, Va., had the largest admission rates, 218.52 and 210.81, respectively, but their nonefficiency was only 1.81 and 1.79, and the average duration of each case only 5.02 and 3.10 days. The greatest noneefficiency occurred at Fort Clark, Tex., and Fort Grant, Ariz., 3.29 and 2.20, with an average duration of 5.89 and 6.08 days per case. The absolute number of cases of acute dysentery recorded was 42, one of which proved fatal.

VENEREAL DISEASES.

The admission rate for venereal diseases, 73.72, during the calendar year 1895 was less than that of the preceding year, 80.43, and less than the average annual rate, 76.32, of the preceding decade. The noneffi-ciency associated with all these rates did not vary much, being a little over 5 per thousand of the strength. The relative prevalence was greater among the whites than among the negroes, the admission rate of the latter having been only 52.26. In 1893 the admission rate of the colored troops fell below that of the white, and it has so continued since then.

The Department of Dakota had the lowest rate, 44.44, closely followed by the Department of the Columbia, 45.90; the Department of Texas had the highest rate, 138.

The admission rate for syphilis during the year was 11.15, for gonorrhea 46.02, and for chancroidal sores 16.55. The absolute number of cases of syphilis was 281, of which 3 ended fatally. The largest admission rate was given by Fort Ringgold, Tex., 374.30, with 25.18 constantly sick per thousand of strength. Fort McIntosh, which claimed second place in order of prevalence, with 265.54 admissions, had the largest nonefficiency, 32.95. Fort Brown, Tex., and Columbus Barracks, Ohio, were the only other posts which had the admission rate larger than 20 per cent of the strength present.

ALCOHOLISM.

The admission rate for alcoholism, 30.11 per thousand of strength, is a slight improvement on that of the previous year, 30.94, but a great improvement on the average annual rate, 44.20, of the preceding decade. The rate of the colored troops was as usual low, 6.47. Fort Preble, Me., had the highest admission rate, 188.41 per thousand of strength. Fort Omaha, Nebr., Fort D. A. Russell, Wyo., Fort Niobrara, Nebr., and Fort Hancock, Tex., were the only other posts which had the admissions in excess of 10 per cent of the strength present. Credit should be given to the following posts for having no record of alcoholism during the year: Boise Barracks, Idaho; Fort Buford, N. Dak.; Fort Canby, Wash.; Jefferson Barracks, Mo.; Fort Porter, N. Y.; Fort Robinson, Nebr.; San Diego Barracks, Cal., and Fort Stanton, N. Mex. (See Table XVI, page 175, for the record of each post in this respect.)

In February last Col. Dallas Bache, chief surgeon, Department of the Platte, invited the attention of the general commanding the department to the prevalence of alcoholism at certain of the posts. He submitted the statistics for 1895, but claimed that these did not give full expression to the evils arising from drunkenness as they did not include the diseases and injuries in the causation of which alcoholism was an admitted factor, nor the charges in which drunkenness is alleged which were brought before general, garrison, and summary courts during the year. This report was referred by the department commander to commanding officers of posts in the following terms:

> Knowing that the vice of intemperance seriously impairs the efficiency of any organization in which it prevails, the department commander is extremely anxious that no effort be spared for reducing it to the narrowest possible limits. In this effort he feels assured of the cordial support of officers of all grades. It is his judgment that the following are among the most effective means for combating the evil:
>
> First. No soldier who has shown an undue fondness for strong drink should be reenlisted at any post in this department, or receive a discharge in which this defect is not plainly set forth. Acquaintance with a soldier's duties does not compensate for the pernicious effects, direct or indirect, produced by the drunkenness of old soldiers.

Second. Advantage should be taken of the provision of Article III, section 1, of General Orders, No. 16, Adjutant-General's Office, series of 1895, for expelling every man from the Army found to be addicted to intemperance. The cooperation of company and post commanders and also of courts-martial is requested for bringing about such expulsion.

Third. The chief surgeon's approval of the method of Asst. Surg. W. H. Arthur, which deals with drunkenness as with acute poisoning, and is described on page 43, Surgeon-General's Report for 1895, is concurred in by the commanding general.

Fourth. The temptation for indulging in ardent liquors should be guarded against on the one hand by keeping the men occupied in sustained military work, by which is not meant desultory routine drills of an hour's duration, but exercises that take up the greater portion or all of the interval between breakfast and dinner, and on the other hand by making ample provision for manly sports and other rational recreation through the agency of the exchange or otherwise.

The general feels confident that persistent and consistent application to the abovementioned remedies, and of such others as will readily suggest themselves to officers, will speedily result in a better showing for the regiments serving at Forts Omaha, Russell, and Niobrara, and greatly conduce to their well-being and effectiveness.

He avails himself of the occasion to congratulate the garrisons of Forts Robinson, Meade, and Washakie upon the excellent record for sobriety which they have established for themselves, as shown by the chief surgeon's statistics.

Colonel Bache's report.—I have the honor to present for the consideration of the department commander statistics showing the prevalence of alcoholism at the various posts in this department for the calendar year 1895.

At a time when alcoholism in the Army at large is on the decrease, and the beneficent effects of the post exchange in this regard are especially cited, it seems opportune to contribute carefully compiled statistics upon this subject, both to encourage systematic effort toward the restraint of alcoholism where such has been made and to call the attention of those in authority to the need of an application of some drastic remedy where the tendency to drink appears unabated.

A few explanations of this appended statement are necessary, as otherwise the figures in some cases may seem discordant. For instance, the days lost at Fort Niobrara are greatly in excess of the number lost at the two preceding posts, both as to the total and average for each admission. This is due to the fact that for the greater part of the year the surgeon at that post has made a sustained effort to cure or remove the alcohol habit in such enlisted men as presented evidence of a sincere desire to rid themselves of this vice. Nineteen cases were thus admitted, or retained after admission for other causes for the time necessary in each case, generally three weeks. Again at Fort Robinson, and for the latter part of the year at Fort Washakie, the command was composed entirely of negro troops, who, in addition to a greater temperance than white troops, invariably show a racial tolerance of alcohol, or a so-called immunity to its chronic effects. It is also necessary to state, to prevent misconception, that only such cases are included in this summary as are entered upon the monthly reports of sick and wounded under the diagnosis of acute or chronic alcoholism, excluding in this way many instances of injury and disease where alcoholism was an admitted and controlling factor. There is therefore no margin of doubt or liberty for individual interpretation, and no question as to the sincerity of the diagnosis.

In order to have a standard gauge by which we may judge the high and low water mark of alcoholism and its intermediate fluctuations, I take the figures for the Army at large, as given in the report of the Surgeon-General for the calendar year 1894, the ratio of admission per thousand of mean strength being 30.94; the maximum of any one post 339.62 per thousand, an exceptional case, and the minimum 2.60 per thousand. The ratios for Forts Omaha, D. A. Russell, and Niobrara, as given in the department table, are 120.2, 114.9, and 100.2 per thousand of strength, respectively. Were these figures for 1895 inserted in the Army table for 1894, these posts would stand Nos. 3, 4, and 7, their actual standing in that table being 8, 9, and 10, in a list of 97 posts and stations. That is, these posts maintain positions giving the highest admission rates for alcoholism, with a tendency to increase this undesirable distinction. It does not seem necessary to further emphasize this showing, covering a period of two years, and therefore fairly excluding accident, as other than deplorable, and certainly as a fair field for inquiry and restraint.

The whole number of days lost by alcoholism at the three posts cited, having a mean strength of 1,344, is one thousand three hundred and eighty-seven, while the remaining troops in the department, with a strength of 1,156, lost but twenty three days. This contrast is sufficiently sharp even when we deduct the excess of time required by the prolonged curative treatment described at Fort Niobrara.

There are, however, several features of special interest developed in this inquiry, not readily shown in a tabular statement, which deserve critical attention, because they seem to indicate where discipline or cure for alcoholism may be best applied, and to some extent define where admonition and medical treatment should cease and cogent discipline begin.

Taking five years as the term of enlistment applicable to these cases, out of the 124 separate entries for alcoholism, 47 were serving a first enlistment, 33 a second, 19 a third, 10 a fourth, 8 a fifth, and 7 a sixth, the whole period from one to thirty years being covered. I think it is clear, without entering minutely into the average strength of each class for these periods in the Army, that intemperance among the men of long service is marked.

I find also that out of the total number of admissions, 158, 2 men were admitted five times each, 1 four times, 3 three times, 17 were admitted twice, and the remaining 101 but once. The average length of service of those who were admitted twice or more is 13.8+ years; of those who have but one admission, 8.6+ years. The lesson taught by these figures is one which might have been anticipated, that exercising every precaution at enlistment to exclude men who give histories or bear evidence of alcoholic excess or habits, it is of the first importance to inculcate and promote sobriety in the young soldier by example, by occupation, by healthy amusement, and the removal of temptations; and this failing to discipline, to assist medically for the cure of an incipient habit; but beyond this limit it seems that prompt and unrelenting elimination of the multiple drunkard by trial is the only just remedy for the service and the only punishment that may halt the procession. Otherwise these men of increasing service, gathering the sympathy naturally attached to this condition, finally disappear through disability discharge, often pensioned for some intercurrent injury or disease, enter the Soldiers' Home, or retire. In the interval the example is pernicious, the service is defrauded, and once the changes from alcoholism are established the soldier is utterly unreliable for any stress of service.

There is no anxiety on my part to exaggerate the importance of this subject to the efficiency of the Army; and, as had been said, the entries in the table under discussion are for the diagnosis of frank alcoholism alone. In this way there have been excluded 30 cases of disease and injury, entailing an additional loss of three hundred and fifty-two days, where alcoholism was a plain or admitted factor. To this supplement Fort Omaha contributes 10 cases, with a loss of one hundred and twenty-six days; Fort D. A. Russell 7 cases, and one hundred and ten days; Fort Niobrara 6 cases, seventy-three days; Fort Robinson 1 of seven days; Fort Washakie 6 cases, thirty-five days, and troops in the field 1 case with a loss of one day. All these of undisputed parentage, the injuries involving the most serious loss of time.

But were a serious confirmation of this subject needed, beyond the medical view of the damage through alcoholism to the effective strength of the Army, it can be had in the simple statement that the records of the judge-advocate of this department for 1895 show that 124 men entered on the medical reports for alcoholism furnish 73 trials (14 by general courts, 3 by garrison courts, 56 by summary courts) for offenses in which drunkenness is alleged, and 122 trials for other offenses. Besides this exhibit, there were entered 142 trials by summary court for drunkenness alone or for offenses involving drunkenness of men not entered on the tabular statement for alcoholism. It is probably within the truth to say that trials involving drunkenness or for offenses growing out of the same will number 20 per cent of the whole number of trials in commands where alcoholism is marked.

As was stated earlier in this paper, alcoholism is decreasing in the Army, the ratio of admission to strength having within a few years fallen from 41 to 30 per thousand, and from 56 per thousand in the decade ending 1889. Something of this betterment is doubtless due to improvement in the class of recruits, much by weight of opinion is credited to the post exchange, something belongs to the higher level of sobriety in communities at large; but advances along these lines must be slow and fractional, and it is evident from the statistics before us that, notwithstanding these retarding forces, we have to deal with local influences of temptation and submission which give the excessive rates for alcoholism shown.

The patient medical effort at redemption pursued at Fort Niobrara is interesting in several aspects. It has dealt mainly with voluntary applicants for relief, who are not otherwise entered for alcoholism. It thus presents a question as to how far the public service should suffer an average loss of three weeks for each case, and whether preventive measures by authority could not have lessened this extraordinary demand. The effort, however, has been in the interest of a permanent temperance, personal and by example. Its danger lies in the substitution of a confidence in medical assistance for an exercise of will, and in the tolerance of the formation of this habit by authority which itself comes to rely on the same aid.

I believe that with few exceptions the victims of alcoholism are drinkers of whisky, and therefore no restrictions in the exchange will avail, other than those which prevent obvious excess in the less stimulating drinks sold there. Usually the graduate in whisky does not care for beer, but how far the latter may be, with certain temperaments, a school for the former, I can not say. That the post exchange with its sale of moderate stimulants promotes general temperance I am exceedingly doubtful, although it may reduce the sum in the pronounced grades of alcoholism.

My judgment on this question is that, assuming care in the selection of the recruit, the responsibility of promoting and maintaining sobriety and temperance rests

primarily with the company officers, through example and various encouragement, this assistance relying in turn on ascending authority; that cases of alcoholism passing into the hands of the medical officer should be treated initially as those of acute poisoning, vigorously, after such a method as is described by Asst. Surg. W. H. Arthur (Report of Surgeon-General, 1895), attempts to remove the alcohol habit being reserved for carefully selected cases where relapse is not probable, and above all I am of the opinion that the inveterate multiple drunkard should be unrelentingly eliminated by the sentence of a court. The example of such men, their constant immunity, is absolutely bad, and there can be no compensating value in intelligence or other soldierly worth, because drunkenness is the disintegration of all values, moral and physical.

I do not know the conditions existing at Fort Meade, but its showing on the subject under discussion, although it includes but six months of the calendar year, is admirable, less than 1 per cent of admissions to the strength of the command. The admission figures given for the three other large posts in the department, 12, 11, and 10 per cent, are in melancholy contrast. It seems possible to clear this record.

Alcoholism statistics, Department of the Platte, 1895.

Station.	Mean strength.	Admissions.	Percentage of admissions to strength.	Days lost.	Number of individuals admitted.	Average number of days lost by each individual admitted.
Fort Omaha, Nebr	491	59	12.02	332	42	7.90
Fort D. A. Russell, Wyo	409	47	11.49	248	32	7.75
Fort Niobrara, Nebr.*a*	449	45	10.02	807	43	18.77
Camp Pilot Butte, Wyo	26	1	3.85	5	1	5.00
Fort Washakie, Wyo	88	1	1.14	1	1	1.00
Fort Meade, S. Dak	450	4	.88	15	4	3.75
Fort Robinson, Nebr	419					
Field	168	1	.60	2	1	2.00
Department	2,500	158	6.32	1,410	124	11.37

a Nineteen under treatment for cure of habit.

The patient medical effort at redemption to which Colonel Bache refers in his report as in progress at Fort Niobrara was undertaken by Asst. Surg. T. S. Bratton. On March 20, 1896, he reported 52 cases as having been treated. Eight of these relapsed in from one to six months after leaving the hospital. Of the others, 10 treated in March, April, May, and June, 1895, had not relapsed up to the date of his report. A like favorable account is given of 13 who left the hospital during the period July to October, and of 2 who left in November and December. In 19 cases treated during the present year the result is uncertain, as sufficient time has not elapsed to demonstrate it. Company officers at Fort Niobrara testify to the improved conduct of men whose reputation was formerly bad, and consider that in many cases the whole tenor of the individual life has probably been changed for the better by the course of medical treatment, and the post commander, in transmitting these views, indorsed his opinion to the same effect. Dr. Bratton's report is brief. Its interest lies in the table of cases and the letters which accompany it:

Dr. Bratton's report.—I have the honor to report the results of the treatment of 52 cases of alcoholism by hypodermic injections of strychnine and atropine. As the action of these remedies in alcoholism is quite well known to the profession, it is not deemed necessary to dwell on the modus operandi. To ascertain fully the antidotal effects of these drugs nothing was given, as apomorphine and whisky, to create nausea and disgust for the taste of whisky, but, on the contrary, the stomach was quieted and brought to its normal condition as soon as possible.

Each patient on entering the hospital was given 0.3 calomel and 0.6 of bicarbonate of soda, as a routine, to clean out the alimentary canal. If nausea existed, it was relieved by 1 c. c. each of tincture capsicum and spirit. menthæ pip. at a dose, repeated, if necessary, every hour or two. Hot milk with lime water in small

quantities frequently repeated was also used with the best results in cases of irritable stomach.

As soon as the calomel acted, the injections of strychnine and atropine were begun. The usual dose was strychnine sulphate 0.001, atropine sulphate 0.0005. The patient was kept in a condition in which there was dryness of the throat and slight dimness of vision. This, of course, required an increase or decrease of the dose, according to the susceptibility of each individual. Some could stand larger doses, others required less. The strychnine was increased or decreased in the same proportions and did not produce any symptoms of poisoning, though some very large doses were given. These injections were continued three weeks, and at the end of that time each patient was given enough of elixir of iron, quinine, and strychnine to last a week, 3.7 c. c. three times a day, and sent to duty. During the first week in the hospital compound tincture of gentian was given to increase the appetite. The patients were encouraged to take exercise in the hospital grounds. The object in view was to strengthen their nervous systems.

The inclosed table gives the results up to date.

To arrive at some estimation of the value of the treatment to the service, I wrote for and received the inclosed letters.

The treatment of some of these cases was carried on at different times in this hospital by Dr. McCreery, Dr. McElderry, and Dr. TenEyck.

Many of the cases were voluntary. Some were given a choice by their company commanders of either taking the treatment or having charges preferred against them that would cause their discharge for drunkenness. All the relapses occurred among the latter class.

Asst. Surg. E. L. Munson tried in one case the apomorphin and whisky treatment, to which Dr. Bratton refers in the beginning of his report.

Dr. Munson's case.—Sergt. P. C., Tenth Cavalry, has always been considered by his superior officers as an able, trustworthy, and painstaking man when sober, but for the past ten or twelve years he has been in the habit of indulging in a debauch at intervals of three to six weeks, these debauches lasting days or even weeks, and thus greatly impairing his efficiency and reliability. He was an irregular rather than a steady drinker, and was fully aware of the evils incident to his habits, but, while anxious for reform, fully appreciated that this could never be accomplished by his own unaided efforts. He had on several occasions received sedative treatment from me during the late winter and spring of 1894–95, was in hospital for alcoholism during April, 1895, and finally, on May 9, 1895, through the kindness of the post surgeon, Dr. C. B. Byrne, was placed in hospital under a treatment outlined by me, which in nine days resulted in cure. He entered hospital after a debauch of a week's duration, unable to converse intelligently, breath foul, tongue coated, and tongue and extremities tremulous. There was considerable gastric irritation with constipation; a cathartic of magnesium sulphate, with black coffee and strong beef tea, was given at once. A hypodermic injection, consisting of the sulphates of strychnine 0.002, atropine 0.0005, and morphine 0.008, was ordered to be given daily, and at these times the patient was allowed to drink all the whisky or brandy he desired, which was considerable during the first thirty-six hours of treatment. Following the administration of the alcoholics the hydrochlorate of apomorphine was given hypodermically, beginning with a dose of 0.004, gradually increased to 0.006, the intention being to produce an intensifying nausea which would finally result in actual vomiting. He was repeatedly impressed with the idea that the medicines administered were incompatible with alcohol, and that their continued use would result in an intolerance by the system to alcoholics.

All craving for liquor disappeared at the end of the second day, and on the third day whisky was extremely distasteful, but was ordered continued as before in doses of 30 to 40 c. c. On the fourth day the atropine and morphine were discontinued and the dose of strychnine increased to 0.008, which appeared to be about the limit of tolerance, and this treatment was maintained for three days. On the seventh, eighth, and ninth days the whisky was omitted once daily; at this time distilled water was injected instead of the apomorphine, and the suggested idea that the nausea and vomiting previously experienced were due to an antagonism between the medicines and alcohol was thus strengthened. At the end of the nine days the above treatment was stopped, a tonic, of nux vomica, cinchona, and gentian, was ordered to be taken for a fortnight, and the patient discharged from the hospital. At this time he was nauseated at the thought, sight, or smell of whisky, and this condition has continued up to the present time—a matter of eight months. According to his own testimony and that of his superior officers, he has not touched a drop of liquor of any kind since his treatment, his former habits and inclinations appearing to have been broken off and the cure to be complete. The treatment here employed, although empirical, has certainly brought about an unexpectedly successful result, and it would seem as if this method, in selected cases, were worthy of a more extended trial.

The cure is of course due to suggestion and to the association of ideas, combined with the effect of whatever tonic and antialcoholic properties that are possessed by strychnine.

RHEUMATIC AFFECTIONS.

The admission rate was somewhat larger in 1895 than in the previous year, 64.08 per thousand of strength, as compared with 63.33, but the discharges for disability numbered only 12, as compared with 24. The improvement in the health of the troops of late years may be seen by comparing these figures with the average annual admission rate of the decade 1884–93, 83.34 with 55.2 discharges for disability. The Department of the Platte had the highest admission rate, 92.95, Fort Omaha, Nebr., among the large posts being the post with the largest rate, 158.54. In constant sickness from rheumatic affections this post was, however, exceeded by Alcatraz Island, which had 8.32 of the command constantly sick, and Fort Wingate, N. Mex., with 6.20, by Fort Walla Walla, Wash., with 5.84, and by Fort Brown, Tex., with 5.29. In 1894 Fort Wingate had the largest rate of nonefficiency. The rebuilding of this post on a drier site will no doubt lessen the prevalence of these affections among the troops constituting its garrison.

TUBERCULOSIS OF THE LUNGS.

The rates for tuberculosis of the lungs were smaller this year than last—admission, 2.42; discharge, 1.06; death, 0.37, as compared with 2.96, 1.59, and 0.61. They are considerably smaller than those of previous years, for the prevalence of consumption among the members of the Indian companies gave high rates as the average of the previous decade. It is to be noted, also, that during the past two years the rates for consumption among the colored troops have fallen, so as to be much lower than those for the whites, whereas formerly they were much higher. The absolute number of cases during the year was 62 cases among white troops, with 29 discharges and 10 deaths, and 4 cases among the negro troops, with 1 discharge and 1 death.

PNEUMONIA AND PLEURISY.

There were 80 cases of croupous pneumonia, with 14 deaths, and 8 of catarrhal pneumonia, none fatal, during the year. Six of the cases, none fatal, occurred among the colored troops; 7, of which 2 were fatal, among officers. The figures, when reduced to rates, show a gradually lessening prevalence, the admission rate for the calendar year 1895 being 2.98, for 1894, 3.43, and for the average rate of the years of the previous decade 4.29.

Seventy-one cases of acute pleurisy were reported during the year, 67 among the white troops, with 2 deaths and 2 discharges, and 4, none fatal, among the negro troops.

INJURIES.

The rate of admission for injuries, 272.69, is larger than in 1894, when this rate was 244.21; it is larger also than the average annual rate of the previous ten years, 257.37, but, although the relative number of cases was increased, there was no corresponding increase in their severity, for the nonefficiency, 8.46, was somewhat less than that, 8.74, of the decade cited. All the rates for injury were a little higher among the

white troops than among the negroes. The Departments of Texas and of the Missouri had the highest rates: Admission, 336.52 and 306.01, respectively, and nonefficiency, 9.48 and 10.62. The posts which had the largest rates were all cavalry posts, showing manifestly that the care and use of horses involve risk of injury. The largest admission rate was reported from Fort Myer, Va., 607.41, with a nonefficiency of 15.24; but Fort Riley, Kans., took first place for constant disability with a rate of 18.54, although its admission rate was only 519. Four deaths and 1 discharge for disability were recorded at this post; 3 of the deaths were from gunshot injuries. Fort Ethan Allen, Vt., took second place both as to admissions and nonefficiency, its rates being 537.78 and 17.74.

Contusions and sprains constituted one-half of the total number of injuries reported, making a ratio of 136.57 admissions per thousand of strength. Gunshot injuries were responsible for a total of 60 cases, 3 of which were fatal; but this does not include 13 suicides, 1 homicide, and 4 cases in which death occurred while the individuals were not on sick report. The large number of 61 cases of hernia was reported during the year, the average annual number for the preceding six years having been only 25.5. Thirty cases of sunstroke and 58 of exhaustion from fatigue or exposure were reported, none of them fatal.

The total number of deaths was 44, 3 of which occurred among colored troops. Twenty-one of the deaths resulted from gunshot injuries, 11 from drowning, 5 from crushing, 3 from hanging, and 1 each from freezing, fracture, dislocation, and incised wound. One of the deaths by gunshot injury was homicidal, and this was the only case of homicide during the year, as contrasted with 10 cases during the year 1894.

Nineteen cases of suicide were reported, as compared with 18 during the previous year. The largest number at any one post was 2, at Fort Brady, Mich. Four occurred in the month of July, 3 in each of the months April and August, 2 each in January, May, and September, and 1 in each of the other months of the year. Thirteen of the deaths resulted from gunshot injuries, 3 from hanging, and 3 from poison (morphin 2, chloral hydrate 1). In 6 cases the cause was reported as unknown, in 3 mental aberration, in 1 family troubles, in 1 to escape punishment while under charges, and in 8 cases alcoholic excesses were concerned in the causation. Eleven of the suicides were enlisted men of the infantry, 4 of the cavalry, 3 of the artillery, and 1 of the Subsistence Department. Four were under 25 years of age; 2, 25 to 34 years; 9, 35 to 44, and 4 over 45. Four had two years of service, 2 four years, 1 nine years, 7 twelve to twenty years, and 5 over twenty years. Eleven were natives of the United States, 5 Germans, 1 Canadian, 1 Irish, 1 Dane.

The total number of discharges for disability on account of injury was 64, 5 of which occurred among the colored troops. Nineteen resulted from hernia, 18 from gunshot wounds, 10 from fractures exclusive of gunshot, and the others from various injuries.

CIVILIANS ATTACHED TO THE ARMY.

The civilian attachés of the Army comprise the families of officers and enlisted men, servants, employees of the various departments and their families, and all persons not included in the personnel of the Army who are allowed to reside at military stations or to accompany military commands. The average number of these present during the year was: Adult males, 2,110; adult females, 5,449; children, 5,776;

total, 13,335. The deaths that occurred among them are shown in the following tabular statement:

Diseases.	Adult males.	Adult females.	Children.	Total.
Infectious diseases, general	6	12	23	41
Local infections *a*	.....	1	4	5
Diseases of general nutrition	.....	1	10	11
Nervous system, diseases of	1	1	3	5
Digestive	.....	6	16	22
Circulatory	2	3	3	8
Respiratory	.....	.....	8	8
Genito-urinary	.....	7	.....	7
Total from disease	9	31	67	107
Unknown	.....	.....	1	1
Total from all causes	9	31	68	108

a Deaths from local infections (not entered under diseases of organs) are as follows: Acute peritonitis: Children, 1. Pneumonia, croupous: Female, 1; children, 3.

MARRIAGES AND BIRTHS.

On the reports were noted 20 marriages—5 of officers, 14 of enlisted men, 1 of civilian attaché. The births reported numbered 384—male, 189; female, 195. Eighty-four were children of officers, 275 of enlisted men, 25 of civilians. Fifteen Indian children—6 males and 9 females—born at Fort Sill, Okla., are included in the total.

Two labor cases reported during the year may be submitted here as of interest:

Symphyseotomy by Asst. Surg. J. R. Kean, Key West Barracks, Fla.—On the morning of September 14, 1895, Dr. Maloney, of Key West, sent for me for consultation in the case of Mrs. J. H., a stout young primipara who had been in labor all night. I found a large hard head presenting nearly in the transverse diameter with occiput to the left. It had failed to engage in the superior strait and the finger could feel it impinge at every pain against the symphysis pubis, the antero-posterior diameter of the pelvis being apparently insufficient. Chloroform was given and the forceps applied first by Dr. Maloney and afterwards by me, but no amount of traction would cause the head to engage. Symphyseotomy was then decided on, and Dr. Maloney being much fatigued, asked me to perform it. The pubes was shaved and the woman's buttocks brought to the edge of the bed, her legs being supported by two assistants. A vertical incision a little over an inch long was made, slightly overlapping the upper border of the symphysis, and the slight hemorrhage being checked, the joint was severed in its upper part by the scalpel guarded by the left index finger, a probe-pointed bistory being used from behind forward for the lower half of the joint and the subpubic ligament. The bones separated about 2 inches and a dead infant was easily delivered by the forceps applied by Dr. M. Its weight was 9¾ pounds, and the head was large and firmly ossified and showed no sign of molding either from uterine pressure or from that of the forceps. The maternal wound was closed with three stitches of silk and a band of adhesive plaster was firmly applied about the pelvis, for which was afterwards substituted a stout canvas band with leather straps. The subsequent care of the case was entirely in the hands of the family physician and I only saw her once during convalescence, but he informed me that she had no fever and the wound soon healed. There was motion in the joint and a waddling gait as late as ten weeks after the operation. She declined surgical interference for this condition, and it soon after disappeared, leaving her perfectly well in every respect.

The case is considered of interest only as showing that this operation is not always difficult and can be performed with the simple instruments contained in a pocket case, those used in this case being a scalpel, probe-pointed bistory, one pair of hemostats, and a needle.

Triplets: Report by Asst. Surg. A. N. Stark, Fort Sam Houston, Tex.—Mrs. S., wife of a soldier of Troop A, Fifth Cavalry, and mother of one single child and two sets of twins, was taken with labor pains at 2 a. m. September 22, 1895, and, after a very difficult labor, gave birth at 1 p. m. the same day to a female child weighing 7 pounds. The prolonged and intense efforts in the expulsion of this child so exhausted the

mother that opiates were administered to insure sufficient rest for the recuperation of the uterine power. At 11 a. m. the following day evidence of labor returned, and after a few powerful efforts a second child, also female, weighing 7½ pounds, was born. In half an hour this was followed by a third child, male, weighing 8½ pounds. The placentæ followed shortly afterwards, weighing together 4½ pounds.

The special feature of this case is the enormous aggregate weight of the children, 23 pounds, which, added to the weight of the placentæ, makes a total of 27½ pounds. Another striking feature is the wonderful reproductive capacity of the parent, viz, one single child, two sets of twins, and one set of triplets.

INDIAN PRISONERS.

The Apache prisoners of war were transferred from Mount Vernon Barracks, Ala., to Fort Sill, Okla., in October, 1894. The excessive mortality that prevailed among these Indians during their stay in Alabama was one of the chief reasons for effecting this transfer. In 1887–88, the first year of their confinement, their death rate was only 54.64 per thousand living, and during the second year only 48.96; but during the third and fourth years the rates ran up to 109.69 and 142.84, nearly one-half of which was due to tubercular diseases. At this time great improvement was made in their condition. A new village was built for them, and they were placed under the most vigilant sanitary supervision, with the result of bringing the death rate in 1891–92 down to 109.75, next year to 80.93, and in 1893–94 to 98.36. On their transfer to Fort Sill they were placed in camp about a mile from the post. Since then they have been employed in building houses, plowing, herding, and other work connected with establishing their homes in the new locality. Asst. Surg. J. D. Glennan reported their condition as much improved at the end of the first year of their stay. The death rate continued high, 83.05 per thousand living, but a large part of this rate was referable to infection at Mount Vernon Barracks. Of a total of 25 deaths, 17 were due to tubercular diseases and only 8 to other causes. One case of syphilis, also brought from Alabama, was among the deaths. But for the tubercular infection the death rate among these Indians would not be high. Only two cases of consumption were reported as having come on the sick list during the year. This will necessarily lessen the mortality hereafter. The next report from this Indian settlement will probably show a marked benefit resulting from the change of climate and mode of life.

List of special reports received from medical officers from June 30, 1895, to June 30, 1896.

MEDICAL REPORTS.

Name.	Rank.	Report.
Appel, D. M	Major and surgeon	Melancholia; encephaloid cancer, death, autopsy.
Arthur, William H	Captain and asst. surgeon	Pulmonary tuberculosis, death, autopsy; malignant diphtheria, antitoxin treatment.
Bache, Dallas	Cql. and asst. surg. general	Prevalence of alcoholism in the Department of the Platte.
Banister, J. M	Captain and asst. surgeon	Diphtheria at Fort Leavenworth; diphtheria, antitoxin treatment.
Benham, R. B	do	Ichthyol in the treatment of carbuncle.
Bratton, T. S	1st lieut. and asst. surgeon	Treatment of alcoholism by the hypodermic injection of strychnin and atrophin.
Bushnell, G. E	Captain and asst. surgeon	Typhoid fever of Wyoming.
Carter, E. C	do	Ulceration of colon, death.
Clarke, J. T	do	Influenza at Fort Washakie.
De Witt, Calvin	Major and surgeon	Diphtheria at Fort Leavenworth; fevers at Fort Leavenworth.
Fisher, H. C	1st lieut. and asst. surgeon	Diphtheria at Fort Yates.
Fisher, W. W. R	Captain and asst. surgeon	Typhoid fever.
Frick, E. B	do	Experiments in photography with the cathode ray; 9 photographs.
Girard, J. B	Major and surgeon	Religious monomania.
Harvey, P. F	do	Influenza at Plattsburg Barracks; grave constitutional disturbance of the nervous system following local inflammation of the throat.
Ives, Frank J	Captain and asst. surgeon	Acute tetanus; amaurosis.
Jarvis, N. S	do	Hour-glass contraction of uterus.
Kean, J. R	do	Symphyseotomy; ataxic paraplegia.
Kieffer, C. F	1st lieut. and asst. surgeon	Diphtheria at Fort Omaha (18 cases); diphtheria at Fort Omaha (47 cases).
Kilbourne, H. S	Major and surgeon	Fevers at Fort Clark.
Lippitt, W. F	Captain and asst. surgeon	Diphtheritic laryngitis, antitoxin treatment.
Macauley, C. N. B	do	Multiple abscess of liver, death; scarlet fever at Fort Apache.
Mason, C. F	do	Dermatitis venenata caused by the tops of the common parsnip; dermatitis exfoliativa, photograph accompanying; diphtheria and the antitoxin treatment; malarial fevers, 16 thermographs; acute tubercular phthisis; acute pleurisy.
Maus, L. M	Major and surgeon	Fevers at Fort Sam Houston.
McCaw, W. D	Captain and asst. surgeon	Fevers at Fort Ringgold; perforating appendicitis, death, autopsy.
McElderry, Henry	Major and surgeon	Remittent fever, thermographs; diphtheria at Fort Niobrara; typhoid fever, thermograph.
Merrill, J. C	do	Mild melancholia.
Munson, E. L	1st lieut. and asst. surgeon	Bronchocele among the Indians; chronic alcoholism.
Poindexter, J. D	Captain and asst. surgeon	Diphtheria in vicinity of Fort Riley.
Powell, J. L	do	Typhoid fever.
Price, C. E	Major and surgeon	Case of birth of deformed child.
Reed, Walter	do	Report of test made of Jewell water filter.
Robinson, S. Q	do	Ulcerative colitis; fevers at Fort Reno; febricula.
Shaw, H. A	1st lieut. and asst. surgeon	Chronic nephritis, 2 cases, death; pneumonia, 1 case, death.
Smith, A. M	Captain and asst. surgeon	Fevers at Fort Reno.
Stark, A. N	1st lieut. and asst. surgeon	Case of triple birth.
Stone, J. H	do	Diphtheria, antitoxin treatment.
Taylor, B. D	Major and surgeon	Typhoid fever, death, autopsy; sarcoma, death, autopsy.
Tesson, L. S	do	Rubeola at Fort Ethan Allen.
Torney, G. H	do	Malarial fever at West Point.
Wakeman, W. J	Captain and asst. surgeon	Chronic dysentery, vesico-intestinal fistula, death, autopsy.
Ware, I. P	1st lieut. and asst. surgeon	Measles.
Wells, G. M	Captain and asst. surgeon	Diphtheria, antitoxin treatment.
White, R. H	Major and surgeon	Typhoid fever, thermographs.
Wilson, W. H	1st lieut. and asst. surgeon	Diphtheria at Fort Leavenworth; acute mania.
Winne, C. K	Major and surgeon	Remittent fever, clinical chart; typhoid fever, thermograph; pneumonia, clinical chart; typhoid fever, clinical chart.
Wood, M. W	do	Continued fever, thermograph; spotted fever in the vicinity of Boise Barracks.
Woodson, R. S	1st lieut. and asst. surgeon	Chronic rheumatic arthritis.

List of special reports received from medical officers from June 30, 1895, to June 30, 1896—Continued.

SURGICAL REPORTS.

Name.	Rank.	Report.
Adair, G. W.	Major and surgeon	Appendicitis, operation.
Arthur, W. H.	Captain and asst. surgeon	Compound comminuted fracture of femur, run over by a trolley car, double amputation, death.
Banister, J. M.	do	Operation for the radical cure of hernia; three cases of operation for radical cure of hernia.
Bradley, A. E	do	Trephining for inveterate headache; nerve grafting, or transplantation for paralysis, resulting from injury to musculo-spiral nerve.
Carter, E. C	do	Deligation of left common carotid for aneurism following gunshot wound.
Crosby, W. D.	do	Operation for radical cure of hernia.
De Shon, G. D.	1st lieut. and asst. surgeon	Multiple fracture, lower extremities.
Ebert, R. G.	Captain and asst. surgeon	Operation for radical cure of hernia.
Fisher, H. C.	1st lieut. and asst. surgeon	Pistol-shot wound of chest.
Flagg, C. E. B	do	Abrasion of hand, septicæmia.
Gardner, E. F	Major and surgeon	Infected wound; insect bite; gunshot wound of foot, tetanus; fracture of skull, death.
Girard, A. C.	do	The Krag-Jörgensen rifle, its effects on the skull; gunshot wound of head by the modern service rifle, death, autopsy; amputation of thigh.
Glennan, J. D.	Captain and asst. surgeon	Incised wound of abdomen.
Gorgas, W. C	do	Amputation of thigh.
Greenleaf, C. R.	Lieutenant-colonel and deputy surg. general.	Use of the "X ray" to determine the location of a pistol ball.
Hallock, H. M.	1st lieut. and asst. surgeon	Appendicitis.
Harris, H. S. T.	Captain and asst. surgeon	Appendicitis, operation, recovery.
Harvey, P. F.	Major and surgeon	Lipoma; fracture of skull, death, autopsy.
Havard, V.	do	Hernia.
Hoff, J. VanR.	do	Premature explosion of gun, death, autopsy, two reports; gunshot wound of chest; cœliotomy.
Jarvis, N. S.	Captain and asst. surgeon	Bimalleolar fracture of ankle. Report of surgical cases: (1) Multiple stricture of urethra; (2) fracture of thigh; (3) ganglion of wrist; (4) dislocation of shoulder, reduced by Kocher's method; (5) immediate suture of lacerated perineum in three cases.
Kneedler, W. L.	do	Histories of four surgical cases: (1) Abdominal section for intestinal obstruction; (2) gunshot wound of thigh; (3) carcinoma of breast, amputation; (4) carcinoma of ear, amputation.
Lauderdale, J. V.	Major and surgeon	Peritonitis, intestinal obstruction, death.
Lynch, C.	1st lieut. and asst. surgeon	Gunshot wound of pelvis.
Mason, C. F.	Captain and asst. surgeon	Gunshot wound of forearm; sulphonal poisoning; appendicitis, operation, recovery.
Maus, L. M.	Major and surgeon	Gunshot wound of head by Krag-Jörgensen rifle; death, autopsy. Reports of three cases: (1) Operation for radical cure of hernia; (2) acute multiple neuritis; (3) purulent otitis.
McElderry, H.	do	Operation for radical cure of hernia.
Pope, B. F.	do	Amputation of thigh.
Price, C. E.	do	Amputation of finger; anesthesia obtained by the Scheleich method.
Robinson, S. Q.	do	Operation for radical cure of hernia; two reports.
Schraml, Joseph	Hospital steward	Dislocation of left shoulder.
Strong, Norton	Captain and asst. surgeon	Lacerated wound of forearm; amputation of arm.
Taylor, B. D.	Major and surgeon	Epithelioma of lip, death, autopsy.
Vickery, R. S.	do	Caries of inferior maxilla.
Winter, F. A.	1st lieut. and asst. surgeon	Intestinal obstruction, cœliotomy, death.
Worthington, J. G.	Major and surgeon	Appendicitis, operation; death, autopsy.

SURGICAL OPERATIONS.

During the year 1895 the Medical Department of the Army reported 338 surgical operations, 78 of which were necessitated by injury and 260 by disease. The number, character, and results of these are shown in the following statement:

Nature of operation.	Disease or injury.	Total.	Recovered.	Died.	Remarks.
Removal of tumors		**29**			
Enucleation	Sebaceous, 10; encysted, 7; lipoma, 2; fibroid, 3; fleshy, 1; epithelioma, 1; tubercular, 2; polypoid, 2; bony, 1.	29	29	.....	Neck, 6; cheek, 3; nose, 1; ear, 1; finger, 1; toe, 1; eye, 1; foot, 1; thigh, 2; shoulder, 2; scalp, 2; palate, 1; chin, 1; back, 1; lip, 1; eyebrow, 1; ilium, 1; abdomen, 1; chest, 1.
Opening of abscesses		**27**			
Incision	Adenitis, 2; cellulitis, 1; tubercular, 1; ischio-rectal, 4; liver, 1; tonsillar, 1; venereal, 1; sting of insect, 1; sebaceous, 1; caries, 2; punctured wound by rusty nail, 1; lacerated wound, 1; subcutaneous, 8.	25	24	1	Toe, 1; epididymis, 1; perineum, 4; buttock, 1; alveolar, 2; ear, 1; tonsil, 1; abdomen, 5; chest, 1; groin, 2; hand, 1; arm, 1; elbow, 1; wrist, 1; feet, 2.
Curetting	Suppurating sinus	2	2	.....	Leg, 1; groin, 1.
Operations on the eye		**15**			
For cataract		2	2	.....	
For pterygium		4	4	.....	
Enucleation		2	2	.....	
Iridectomy		1	1	.....	
Foreign bodies		4	4	.....	
For cystic tumor		1	1	.....	
For chalazion		1	1	.....	
Operations on the nose		**28**			
For nasal polypi		2	2	.....	
For deflected septum		5	5	.....	
For hypertrophied septum		1	1	.....	
For hypertrophy of turbinated bones.		1	1	.....	
For hypertrophied membrane		11	11	.....	
For ecchondrosis		3	3	.....	
For fracture of nasal bones		3	3	.....	
For exostosis		1	1	.....	
For ulcer		1	1	.....	
Operations on the mouth		**5**			
Removal of the tonsils		4	4	.....	
Amputation of the uvula		1	1	.....	
Operations on the veins		**2**			
For varicocele		2	2	.....	Excision, 1; ligation, 1.
Operations on the arteries		**1**			
Ligation of subclavian	Axillary aneurism	1	1	.....	
Operations on the nerves		**1**			
Drop wrist		1	1	.....	Resection of musculo-spiral nerve; transplantation from sciatic nerve of dog; no improvement; discharge for disability.
Operations on the digestive organs.		**66**			
For fistula in ano		5	5	.....	
For fissure of anus		1	1	.....	
For prolapse of rectum		1	1	.....	
For ulcer of rectum		1	1	.....	
For hemorrhoids		47	47	.....	Incision, 19; ligation, 16; dilatation of sphincter, 2; clamp and cautery, 5; cautery, 1; thermo-cautery, 1; clamp and ligature, 1; injection of tumor, 2.
Laparotomy	Appendicitis, 6; intestinal obstruction, 1; for radical cure of hernia, 4.	11	8	3	Halsted's operation, 1; Bassini's operation, 1; not stated, 2.

Surgical operations—Continued.

Nature of operation.	Disease or injury.	Total.	Recovered.	Died.	Remarks.
Operations on the lymphatic glands.		**28**			
Removal of glands	Venereal, 16; bubo nonvenereal, 3; nonspecific adenitis, 3.	22	22	.....	
Curetting	Venereal, 6	6	6	.....	
Operations on the urinary organs.		**20**			
For stricture of the urethra:					
Internal urethrotomy	Gonorrhea, 5	5	5	.....	
Incision	Gonorrhea, 3	3	3	.....	
Dilatation	Gonorrhea, 4; traumatic, 1.	5	5	.....	
Divulsion	Gonorrhea, 1	1	1	.....	
Meatotomy	Gonorrhea, 1	1	1	.....	
Contracted meatus		1	1	.....	
Fistula of urethra	Gonorrhea	2	2	.....	
For urethral caruncles	Gonorrhea	1	1	.....	
For calculus in urethra		1	1	.....	
Operations on the generative organs.		**20**			
For phimosis	Gonorrhea, 4; congenital, 4; chancroids, 2; herpes præputialis, 3; not stated, 2.	15	15	.....	
For paraphimosis	Chancroidal	1	1	.....	
For contracted frænum	Congenital	1	1	.....	
For hydrocele		3	3	.....	Aspiration, 2; Volkmar's operation, 1.
Operations on the bones		**7**			
Removal of portions	Osteoma, 1; callus, 1; necrosis, 2; fracture, 1; trephining for inveterate headache, 1.	6	6	.....	Cranium, 2; inferior maxillary, 2; foot, 1; humerus, 1.
Reduction and manipulation of fractures.		1	1	.....	Femur, 1.
Operations on the joints		**34**			
Reduction of dislocations		31	31	.....	Hip, 1; shoulder, 21, elbow, 4; clavicle, 1; hand, 1; wrist, 1; ankle, 2.
Aspiration	Synovitis	1	1	.....	Knee, 1.
Resection of joint		1	1	.....	Finger, 1.
Disarticulation of joint	Lacerated wound of fingers.	1	1	.....	
Operations on the limbs		**24**			
Amputation for injury:					
Arm	Premature explosion of blank cartridge, 1.	1	1	.....	Primary, 1.
Forearm	Premature discharge of cannon, 1.	1	1	.....	Primary, 1.
Hand	Accident, circular saw, 1.	1	1	.....	Primary, 1.
Fingers	Injury, 9; gunshot, 4.	13	13	.....	Primary, 10; secondary, 3.
Thumb	Injury, 1; gunshot, 1.	2	2	.....	Primary, 2.
Feet	Gunshot, 1	1	1	.....	Primary, 1.
Toes	Injury, 1; gunshot, 1.	2	2	.....	Secondary, 2.
Amputation for disease:					
Finger	Whitlow, 2; anchylosis, 1.	3	3	.....	Primary, 2; secondary, 1.
Operations on the tendons and muscles.		**1**			
Incision and stretching of tendon.	Explosion of fulminate of mercury.	1	1	.....	
Operations on the skin, etc.		**30**			
Ingrown nails		19	19	.....	
Removal of nails		2	2	.....	
Removal of foreign bodies		9	9	.....	

RADICAL CURE OF HERNIA.

In September, 1895, after fully considering the results attained by surgical treatment in the radical cure of hernia, together with the small amount of risk involved in the operation as now conducted under

careful aseptic supervision, I came to the conclusion that the operation might be made available to preserve good soldiers, although ruptured, in the service, and to lessen the number of men discharged for disability and subsequently pensioned for hernia. The annual loss of men by rupture has always been considerable. During the six calendar years ending December 31, 1894, 153 men were discharged. I did not consider that the progress of surgery warranted a resort to operative proceedings in all cases, but felt confident that surgical interference would enable many to continue in the military service or earn their livelihood with comfort in civil life who are now discharged and pensioned for hernia. Accordingly, on September 9, 1895, the following was published from Headquarters of the Army, A. G. O., as Paragraph II of Circular No. 9 of that date:

II. TREATMENT OF ENLISTED MEN WHO HAVE BEEN RUPTURED IN THE LINE OF DUTY.

Cases of hernia suitable for an operation should receive surgical treatment, which, by the most approved modern methods, is successful in a large proportion of the cases operated upon, and in skillful hands is attended with little risk.

Operations for the radical cure of hernia will be performed, with the consent of the soldier, by medical officers specially designated by the Surgeon-General of the Army.

Medical officers will report cases of hernia considered favorable for operation to the Surgeon-General.

If the case is considered unsuitable for operation, or if an operation is declined by the soldier, the fact will be noted upon the certificate of disability. (Decision Acting Secretary of War, Aug. 14, 1895, 19166, A. G. O., 95.)

Since then 29 cases of hernia have been treated by operation with the most satisfactory results, so far as can be determined at this early date. This gives an excellent promise of future benefit in cases that have been hitherto regarded as permanently disqualified for military service. The cases are tabulated below, and special reports by the operators are herewith submitted:

Cases operated on for the radical cure of hernia.

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
H. H	Pvt., M, 3 Art	36	L. ing. obl., 2½ yrs	Sept. 29, 1895	Lieut. Col. W. H. Forwood, Washington, D. C.
R. L. Z	Pvt., K, 3 Art	29	R. ing. obl., 3 yrs	Oct. 18, 1895	
L. S	Corp., F, 6 Inf	28	R. ing. dir., 1¼ yrs	Jan. 19, 1896	
L. B	Pvt., C, 4 Art	26	R. ing. obl., 1 yr	Apr. 19, 1896	
J. S	Pvt., G, 5 Art	34	R. ing. obl., 5 yrs	May 10, 1896	
D. L	Pvt., G, 17 Inf	26	R. ing. obl., 1½ yrs	June 7, 1896	
J. B. C	2 lt., 2 Cav	26	L. ing. obl., 3½ yrs	July 24, 1896	
M. H	Discharged	60	R. fem., 20 yrs	Aug. 3, 1895	
L. C. S. *a*	do	46	L. ing., 4 yrs	Sept. 12, 1895	
N. B. P	do	32	L. ing. obl., 10 yrs	Jan. 5, 1896	
A. H. M. *b*	Cadet, appointed	20	R. ing. obl.	June 19, 1896	
L. W	Pvt., Ord	35	L. ing. obl., old	Jan. 7, 1896	Capt. J. M. Banister, Fort Leavenworth, Kans.
C. C	Pvt., F, 19 Inf	23	L. ing. obl., 4 mos	Jan. 9, 1896	
P. F	Pvt., D, 11 Inf	40	R. ing. obl., 1 mo	Mar. 26, 1896	
J. Y	Pvt., A, 19 Inf	31	do	Apr. 3, 1896	
J. T	Pvt., D, 20 Inf	26	R. ing. obl., 2½ yrs	Apr. 8, 1896	
A. N	Mus., F, 6 Cav	25	L. ing. obl., 1½ yrs	June 27, 1896	
P. K	Mus., 8 Inf	21	L. ing. obl., 2 yrs	Dec. 12, 1895	Maj. H. McElderry, Fort Robinson, Nebr.
A. P. W	Sergt., I, 9 Cav	33	R. ing. obl., 1 yr	July 15, 1896	
A. E. R	Sergt., E, 9 Cav	31	L. ing. obl., 1⅓ yrs	July 28, 1896	
J. C. W	Pvt., D, 9 Cav	22	R. ing. obl., 3 mos	Aug. 2, 1896	
W. B	Pvt., H, 10 Inf	47	R. ing. obl., 2⅔ yrs	Dec. 10, 1895	Maj. S. Q. Robinson, Fort Reno, Okla.
C. W. J	Mus., H, 1 Cav	23	R. ing. obl., 1 mo	May 28, 1896	
E. B	Pvt., B, 25 Inf	23	L. ing. obl., 1 yr	Feb. 18, 1896	Capt. W. D. Crosby, Fort Missoula, Mont.
W. M	do	25	R. ing. ind., 2 mos	May 20, 1896	
C. H	Pvt., D, 4 Inf	30	L. ing. obl., 2 mos	June 9, 1896	
F. W. H	Pvt., C, 14 Inf	25	L. ing. dir., 3 mos	Feb. 25, 1896	Capt. R. G. Ebert, Vancouver Barracks, Wash.
G. L	Pvt., A, 1 Inf	35	R. ing. obl., 11 mos	July 18, 1896	Capt. G. L. Edie, Presidio of San Francisco.
L. M. S	Pvt., band, 5 Cav	25	R. ing. obl., 9 mos	Dec. 7, 1895	Maj. L. M. Maus, Fort Sam Houston, Tex.

a Two sacs, 1 oblique and 1 direct.

b Associated with retained testicle, congenital.

DEPUTY SURGEON-GENERAL FORWOOD'S REPORT.—I have the honor to submit the following brief report on operations done by me, under the provisions of paragraph 2, Circular No. 9, A. G. O., September, 1895. During ten months since the issuance of that circular one officer, one noncommissioned officer, and five privates of the Army have been sent to me and operated upon for the radical cure of hernia. In addition to those on the active list I have operated within the present year upon three discharged soldiers and one cadet appointed to the Military Academy, making a total of eleven Army cases. Let me call attention to the fact that these cases are of a distinct class, viz, adult males, which, for statistical purposes, should never be mixed or confounded with those of women and children.

The method carried out in these operations and in those of all adult males treated for inguinal hernia at this hospital during the last two years has been uniformly the same, and differs but slightly from that known as the Bassini operation. The modifications, if they may be so called, consist in clamping the sac flat and sewing it off in three or more divisions according to width, at a depth and on a line with the normal curve of the pelvic peritoneum; in reducing the cord in all cases by excision of the pampiniform plexus of veins and in bringing this reduced cord well outward and upward into a notch in the fibers of the internal oblique and transversalis, where it is secured and carried over with these muscles toward Poupart's ligament, giving increased obliquity to its course and additional security against recurrence of hernia. I have used stout kangaroo tendon for the sac and for sewing the deep muscles and either very light tendon or fine catgut for suturing the external oblique. The skin incision has been closed either with silkworm gut or, with what is probably better, buried sutures of fine catgut. No flushing of the wound was done during operation. Blood was removed with gauze pads previously boiled or with ordinary surgical sponges cleansed and sterilized in pure formalin. After the cut surfaces had been neatly brought together the parts were given a final cleansing with 1 per cent trikresol and 1:1000 bichloride. The surface was then dried with ether and the line of incision sprayed with iodoform dissolved in ether and a perfectly dry sterile gauze and cotton dressing applied and secured with a double spica of the groin to which was added a suspensory bandage for the scrotum. The first change of dressings may usually be made at the end of a week. The patients were kept in bed thirty days from the time of operation, after which they sat up and walked about the porches and grounds, gradually increasing the exercise for a few weeks longer before returning to duty. Violent exertion should not be permitted until after the lapse of three or four months from the time of operation.

All cases of hernia selected and sent to me so far have been very suitable ones for radical treatment, without which the men would have remained permanently disabled for the military service. The immediate result of the operations has been entirely successful in every case. The men have suffered but little pain or inconvenience; ten are completely cured and the eleventh has passed his first week without an unfavorable symptom. It is a rule among operators that two years must have elapsed without any symptom of recurrence before a case of hernia can be recorded as permanently cured. The number of such cases in adult males operated on by modern methods that have passed the two years test is not yet sufficiently large to lead to safe conclusions as to the exact percentage of recurrences that may be expected, but the evidence of experience so far accumulated seems to indicate that in suitable subjects and with proper care and thoroughness the operation for the radical cure of hernia may be made one of the safest and most practically valuable in the whole list of capital operations. The Medical Corps of the Army is demonstrating its utility as a means of restoring to duty young officers and soldiers ruptured in the service who would otherwise be added to the retired list and the pension rolls.

It may be of interest in this connection to note briefly a few points in the technique of the operation which require especial attention in order to insure ultimate success. The main security against recurrence of hernia after operation in my opinion lies in the proper treatment of the hernial sac. The common predisposing cause which leads to hernia is a congenital pouching of the peritoneum into the inguinal, femoral, or umbilical rings. Imperfect obliteration of the vaginal process of the peritoneum carried down with the testicle is of very frequent occurrence. The time of life at which rupture appears in such instances, if at all, is determined by the extent and location of the defect and the exciting cause to which each patient is subjected. When there is no pouch or depression on the inner surface of the peritoneum into which the abdominal viscera can become engaged and subjected to special pressure, no hernia is likely to appear except from extraordinary violence. The prime object in operation, then, is to obliterate all trace of peritoneal pouch at the point of rupture and to leave a smooth surface over which the viscera may glide in the normal movements of the body. The operation which does not contemplate the complete obliteration of the hernial sac and its firm closure on the normal line of the peritoneum ought not to be considered in the radical cure of hernia. By tying off in small sections with silk or stout tendon firmly secured, closure of the sac may be made to occur at the right depth and on the proper line. The dense glazed surfaces of an old hernial sac that have been

kept in contact under the pressure of a truss for years without healing are not likely to heal very securely when merely puckered together or twisted into a rope and tied around with a bit of catgut. If the sac be tied so as to leave any portion of it remaining in a pouch behind the ligature, the operation is defective, and conditions favorable to a recurrence of the hernia are left, no matter what other precautions may be taken.

The veins of the cord, especially on the left side, are often superfluous and more or less varicosed. By trimming these away the cord is not injured but improved for the purposes of the operation. It becomes more pliable and more readily transposed to its new position. By doing this, and by carrying the cord well outward into a notch made in the fibers of the internal oblique and transversalis muscles and securing it there, we get about all the advantages of Halsted's method without placing the cord above the external oblique. The internal and external portions of the cord are thus brought to an acute angle with each other and both assume the maximum obliquity to the line of visceral pressure from the abdomen. There is no excuse for pulling the testicle up out of its place during an operation for inguinal hernia.

The fibers of Poupart's ligament are easily split and separated if care be not taken while applying sutures to close in the gap between it and the conjoined tendon and muscles. To avoid this accident the curved needle should pass entirely through the external oblique, going out on one side of the ligament and back on the other, so as to include the whole of it in the loop of the thread. The aponeurosis of the external oblique, when it comes to be separated from the tissues above and below, has but a very meager supply of blood, and therefore should be treated with the utmost gentleness, avoiding all tension of sutures and rough handling of every kind.

ASSISTANT SURGEON BANISTER'S REPORT.—Before reporting the cases to be referred to in this report, I think it best to describe in detail my method of operating, and the system of aseptic technique which I have pursued, as by so doing useless repetition can be avoided in the detailed report of the individual operations. In order that the operation for the radical cure of hernia may be successful, absolute asepsis is essential, as owing to the necessary tension to which the tissues are subjected by the deep-buried sutures one of the cardinal principles of modern surgery is violated, and any infection of the wound will surely be followed by suppuration and sloughing of the buried sutures, with a failure of the final object for which the operation was undertaken, besides subjecting the patient to grave danger of septic peritonitis.

The system of asepsis which I have rigidly carried out in my operations at Fort Leavenworth can be easily followed at any army hospital, and since there has not been the least pyogenic infection of any of my hernia wounds, I think it important to describe this system in detail.

System of asepsis.—Small pads of hygroscopic gauze were prepared in advance of each operation for sponges and placed in a covered sterilized vessel. Larger pads of bichloride gauze (22 cm. long, 20 cm. wide, and about 1 cm. in thickness) were made and placed in a second vessel—the usual glass jar with close top. Iodoform gauze, in strips, was prepared by rubbing powdered iodoform into hygroscopic gauze with a sterilized glass rubber. These strips were packed into sterilized culture tubes which were covered with aseptic cotton, the latter being securely tied over the mouths of the tubes. These tubes, which were to be used as iodoform sprinklers, were placed in the sterilizing oven and kept at a temperature of 100° C. for one hour and a half. It was found by experiment that the iodoform was decomposed when the temperature went above 105° C. I adopted this latter method at the suggestion of Lieut. Col. W. H. Forwood, deputy surgeon-general, U. S. A. On the day of the operation the glass jars for dressings were boiled; the gauze sponges, gauze pads, and all bandages and towels to be used in the operation were thoroughly steamed in Arnold sterilizers, together with the absorbent cotton intended as a covering for the gauze dressing. These dressings were then removed from the steam sterilizer, each set being enveloped in a sterilized towel, and placed in a large sterilized tin boiler with cover, in which they were baked in the kitchen range until thoroughly dry. The dressings were then removed, each set still in its own sterilized towel, which was not opened, and placed in the jars prepared for them. The towels to be used during the operation were left in the closed tin boiler and in it carried to the operating room to be removed as needed. Catgut ligatures were prepared by the Von Bergmann method. Kangaroo tendon was soaked in ether for forty-eight hours, the ether being changed at the end of the first twenty-four hours, next placed in a solution of bichloride of mercury in ether (1:1000) for twenty-four hours, and finally stored in absolute alcohol containing 5 per cent of carbolic acid, in which solution it was left until the operation. The silk ligature material was wound on sterilized glass spools and boiled with the instruments. The latter were boiled in a 1 per cent solution of sodium carbonate just before the operation, and at the last moment were removed from the vessel in which they were boiled and placed in sterilized trays containing a solution of carbolic acid, 1:40. My principal assistants and myself wore linen suits, linen operating aprons, and canvas shoes, the arms being bare to the elbow. Hands and forearms were rendered aseptic by washing with green soap

and freshly boiled water, scrubbing with sterilized brushes, rubbing with alcohol, and then treating them by immersion in saturated solution of potassium permanganate until the skin was stained the color of mahogany; next they were soaked in saturated solution of oxalic acid to decolorize, then in normal salt solution, and finally in solution of bichloride of mercury, 1:1000.

The patient was prepared as follows: The night before the operation a saline purge was administered and only a little milk allowed as food. Next morning he was given a thorough bath, all the hair was shaved from the pubes, scrotum and abdomen, and the latter, after a thorough scrubbing, covered with a wet bichloride dressing. He was then put to bed again, and no food of any description was allowed on the day of the operation, which as a rule was performed at 2 o'clock p. m. When etherized and brought into the operating room the antiseptic dressing was removed from the patient's abdomen, which was scrubbed with green soap and freshly boiled water, then with ether, and finally with solution of bichloride of mercury, 1:1000. The patient's legs were wrapped in blankets, and his body covered with sterilized towels, only the immediate site of the operation being uncovered. During the operation only dry, sterilized gauze pads were used in the wound to absorb the slight oozing of blood which occurred, and these pads were drawn from their receptacle by an assistant with a pair of sterilized forceps, in the grasp of which they were handed to my principal assistant or to me. No chemical whatever was used in the wound except in two cases, when, after uniting the incision in the external oblique aponeurosis, bichloride solution was poured into the wound before closing the skin incision. This procedure was contrary to rule, and was done in each of the two cases for a special reason. No provision whatever was made for drainage in any wound. After closure of the skin incision and careful cleansing and drying of the skin in the immediate field of operation, sterilized iodoform, from the tubes before mentioned, was sprinkled over the wound by pulling out the end of the gauze with sterilized forceps and shaking it over the parts. Then pads of sterilized gauze (dry) were thickly applied over the region of the wound, and held in place by sterilized gauze bandages. Next a layer of the sterilized absorbent cotton was placed around the abdomen and thigh after the manner of a spica, reenforced with thin strips of wood (previously steamed) to fix the thigh, and the whole well covered with sterilized cotton bandages. The patient would then be put to bed, and the wound not examined for one week, when the same dressing would be reapplied minus the strips of wood.

Method of operating.—I commence my incision either at the spine of the pubes or at the upper extremity of the proposed wound, in accordance with the side upon which the hernia exists. Commencing then at the spine of the pubes, say, the incision is carried upward and outward somewhat parallel to Poupart's ligament, and is made to involve the skin and superficial fascia. Any large vein that is exposed is seized on either side by clamps and divided between them, or, if divided, the ends are grasped at once by the clamps, which are left attached until the end of the operation. Having clearly exposed the aponeurosis of the external oblique muscle, the deep layer of the superficial fascia is rapidly separated from it on the outer side until Poupart's ligament is well uncovered, and on the inner side well over toward the margin of the rectus abdominis muscle. The external abdominal ring is then cleared and a grooved director inserted, upon which the aponeurosis of the external oblique muscle is divided parallel to and to the extent of the skin incision, the length of the latter varying from 3 to 4 inches. This division of the external oblique lays open the inguinal canal. Then the skin and divided aponeurosis being put on the stretch with retractors, the canal is well exposed. The first landmark will be the arching fibers of the internal oblique muscle. If the bowel is contained in the sac a tumor will of course be seen extending from the lower border of the internal oblique downward for a variable distance. If, however, the bowel has been reduced, which will generally be the case, only the infundibuliform process of the transversalis fascia will be seen emerging from beneath the lower border of the muscle mentioned, and covered possibly by a few fibers of the cremaster muscle.

The infundibuliform fascia is grasped with mouse-toothed forceps just below the internal oblique, and is opened rapidly by blunt dissection down to the hernial sac, which, unless very thin, will be readily recognized by its white color. It is important to commence this search for the sac as near the internal ring as possible. The sac having been reached, it is grasped with the forceps and the transversalis fascia divided downward and upward as far as possible to clearly expose it. The sac is then held up in the grasp of the forceps, and the spermatic cord separated from it to a small extent behind by means of the fingers. Through this opening a blunt hook is passed, and the sac, while being held upon the latter, is separated from the cord throughout its whole extent, and is freed from all attachments, well up to and within the margin of the internal abdominal ring. The base of the sac is then held up between two pairs of forceps and opened slightly between them. The finger is then introduced for exploration. If the sac is empty, it is ligated with silk, the needle transfixing the sac close to the ring, and the ligature being tied around one half of

the sac and then back around the other half. The sac is then divided about half an inch to the distal side of the ligature, and the stump allowed to retract into the abdominal cavity. The cord is then raised on a blunt hook and dragged into the upper and outer angle of the internal ring, where it is held. I then run my index finger under the conjoined tendon to loosen up its slight attachments to underlying tissues so that it may be brought down to meet Poupart's ligament with as little tension as possible. Poupart's ligament being thrown into bold relief by traction on the outer flap of the external oblique by properly placed retractors, and the cord being held up as before mentioned, the conjoined tendon is sutured to Poupart's ligament closely around the cord at its emergence from the abdominal cavity, thus forming a new internal ring. This is one of the vital points of the operation.

In my last operation I made the attempt to still further strengthen this point by passing a separate suture through the transversalis fascia, fastening the latter closely around the cord beneath the conjoined tendon, so that this locality was protected by two separate sutures, one beneath the other. From this point the conjoined tendon is sutured to the back of Poupart's ligament as near to the pubes as possible by a row of interrupted sutures, which are cut short and buried. If the conjoined tendon becomes very weak and attenuated in the lower portion of the wound, it is well to utilize the margin of the rectus abdominis muscle and fasten it to Poupart's ligament by a suture or two. I have had to do this several times. The cord is now laid upon its new floor formed by the union of the conjoined tendon to Poupart's ligament, and the aponeurosis of the external oblique is united over it by a row of interrupted sutures, the lower suture completing the external abdominal ring. The hæmostatic forceps are now removed from the divided vessels in the skin and superficial fascia (I have never applied a hæmostatic forceps below the external oblique), the necessary ligatures, if any, applied, and the skin wound closed by a row of interrupted sutures. The wound is then dressed as before described. The material used for the deeper sutures is of vital importance for these sutures. Kangaroo tendon should invariably be used. Catgut is appropriate for the sutures in the external oblique and skin, though I prefer silkworm gut for the external or skin wound. Not being an absorbable material, silkworm gut, if used for the skin wound, is removed at the time of the first dressing, one week after the operation.

After the operation all cases should be kept in bed for three weeks. In the operations to be presently enumerated my principal assistant was Capt. W. F. Lippitt, assistant surgeon, U. S. A., who was also responsible for the dressings. First Lieut. W. H. Wilson, assistant surgeon, U. S. A., was in charge of instruments and ligatures during the first two operations, this function being performed in the remaining cases by First Lieut. J. H. Stone, assistant surgeon, U. S. A. That these officers performed their duty faithfully is proved by the fact that there was not a single stitch abscess in any of the cases, and that healing in every case was virtually by first union.

Report of cases.—Case I. First Class Private L. W., Ordnance detachment, St. Louis powder depot, age 35 years, reported for operation for the radical cure of hernia on December 30, 1895. Diagnosis: Incomplete oblique inguinal hernia on the left side. The Bassini operation was performed on January 7, 1896. The wound healed by first union with the exception that two catgut sutures in the skin incision yielded, the superficial wound in this locality healing by granulation. The wound was aseptic from first to last. The highest temperature reached in this case was 100⅗° F. This soldier returned to his proper station on February 8, 1896, without a truss, the operation having been perfectly successful.

Case II. Private C. C., Company F, Nineteenth Infantry, Fort Brady, Mich., age 23 years, reported for operation on December 30, 1895. This man was affected with an incomplete oblique inguinal hernia on the left side, together with a marked varicocele on the same side. He complained more of the varicocele than of the hernia. The Bassini operation was performed on January 9, 1896, and the varicocele was radically treated at the same time by ligating all of the veins of the cord except one or two, after the method of Halsted, and excising them. These veins were ligated en masse near the internal ring and again as near the testicle as possible, and the intervening portion excised. The highest temperature reached after this operation was 100⅗° F. The wound healed by first union, and the soldier left for his proper station on February 28, 1896, with both hernia and varicocele cured.

Case III. Private P. F., Company D, Eleventh Infantry, Fort Apache, Ariz., age 40 years, reported here for operation on March 22, 1896. The diagnosis in this case was oblique inguinal hernia, incomplete, on the right side. The Bassini operation was performed on March 26, 1896. A large fold of omentum was found in the sac, which was ligated in sections and excised, the stump being returned into the abdominal cavity. The highest temperature reached in this case was 100⅘° F. The wound healed by first union, and the soldier left en route to his proper station on May 13, 1896, with his hernia cured.

Case IV. Private J. Y., Company A, Nineteenth Infantry, Fort Wayne, Mich., age 31 years, reported for operation on March 30, 1896, with an incomplete oblique inguinal hernia on the right side. The Bassini operation was performed on April 3, 1896.

The sac was of the congenital variety, and was consequently divided into two portions, the lower portion being sutured around the cord to form a tunica vaginalis and the upper portion being treated as the ordinary sac. The highest temperature reached after this operation was 100° F. The wound healed by first union, the soldier leaving for his proper station on May 29, 1896, with his hernia cured.

Case V. Private J. T., Company D, Twentieth Infantry, Fort Leavenworth, Kans., age 26 years, was operated upon by the Bassini method on April 8, 1896, the diagnosis in his case being incomplete oblique inguinal hernia on the right ride. The sac was of the congenital variety, and was treated as mentioned in the description of Case IV. The highest temperature reached in this case was $100\frac{1}{5}$° F. The wound healed by first union, and the soldier was returned to duty on May 17, 1896, in order that he might take advantage of a furlough which had been granted him. The hernia in this case was cured.

Case VI. Mr. D. M. S., a civilian from Waterville, Kans., who had been sent to me (for operation) by his attending physician, was operated upon at the Cushing Hospital, Leavenworth, by the Bassini method, on May 30, 1896. The diagnosis in this case was complete oblique inguinal hernia on the right side. The bowel in this case had been strangulated three times, being reduced with great difficulty each time by taxis. When the canal was opened and the sac exposed it was found to be of the congenital variety also, and was treated accordingly. This patient was 35 years of age, and his hernia had existed since his twelfth year. The highest temperature after this operation was $99\frac{5}{10}$° F. The wound healed by first union, and the patient insisted upon leaving the hospital in four weeks. This operation was entirely successful, and Mr. S. writes that he is perfectly well. It is interesting to note here that this was the third successful case in which the hernial sac was of the congenital variety.

Case VII. Trumpeter A. N., Troop F, Sixth Cavalry, Fort Leavenworth, Kans., 25 years of age, was operated upon by the Bassini method on June 27, 1896. The diagnosis in his case was incomplete oblique inguinal hernia on the left side. The highest temperature in this case was $100\frac{1}{5}$° F. The wound has remained absolutely aseptic from first to last, and has healed by first union, except in one portion of the skin incision of small extent, where the wound gaped slightly, healing here being by granulation. This soldier left his bed at the end of three weeks, and his case can be pronounced a success. He will be returned to duty in three weeks from this time.

SURGEON MCELDERRY'S REPORTS.—I. In compliance with letter of instructions from your office, of date December 18, 1895, I have the honor to respectfully submit the following special report of the operation for the radical cure of his left oblique inguinal hernia, performed by me upon the person of Private P. K., band, Eighth United States Infantry:

On the day before the operation all gowns, towels, sheets, dressings, sutures, and ligatures were sterilized in the Arnold sterilizer for four hours. Gowns, towels, and sheets were wrapped in towels before being put in sterilizer and after sterilization were put in metal boxes. Dressings were removed from sterilizer with sterile forceps and put into sterilized glass jars. Sutures and ligatures were further sterilized, just before use, by boiling in 1 per cent carbonate of soda solution for fifteen minutes. The iodoform used for iodoform collodion was soaked twenty-four hours in 1:1000 aqueous bichloride, then in sterile water. Protective used in dressing was soaked for twenty-four hours in 1:1000 bichloride, then rinsed in sterile water just before use. The room was thoroughly cleaned. All furniture was scrubbed with green soap and water, well flushed with water and finally with 1:1000 bichloride. The room was kept shut up for twenty-four hours before the operation. Instruments were scrubbed and thoroughly cleaned in hot soap suds, then flushed with water, and just before the operation boiled ten minutes in 1 per cent carbonate of soda solution. They were kept in sterile water during the operation. All basins, dishes, etc., were thoroughly scrubbed with soap and water, flushed with water, filled with 1:1000 bichloride, and allowed to stand twenty-four hours. When needed for use they were emptied and rinsed thoroughly with sterile water. Water, the only fluid used for irrigation and for sponges and instruments, was sterilized by boiling two hours in cotton-stopped flasks the day before the operation, then resterilized three hours in the Arnold sterilizer on the day of operation. The patient's skin was shaved, scrubbed with green soap and hot water, flushed with sterile water, washed with alcohol and ether, and covered with a 1:1000 bichloride (moist) dressing on the day before the operation.

The operation was performed December 12, 1895. Sulphuric ether was first used to anesthetize the patient, but as it was found apparently impossible to thoroughly bring him under its influence within a reasonable time, chloroform was finally used, with the desired effect. In all, about 240 c. c. of ether and about one-fourth of this quantity of chloroform were used, the time required to produce complete anesthesia being about thirty minutes. When the patient was under the influence of the anesthetic it was found that the sac had receded into the abdomen and could not be forced down again, although it had been since his arrival at the post well down in the inguinal canal.

The operation was performed by me exactly after the method of Bassini, as described in detail by John A. Wyeth, M. D., on pages 875–877 of the International Encyclopædia of Surgery, Ashhurst, volume 7, Supplement, except, of course, that as the sac was not in the canal it was not tied or cut off. I was ably assisted during the operation by Lieut. Henry R. Stiles, assistant surgeon, who also kindly personally superintended the sterilization of the sutures, dressings, and instruments. The wound in the skin was hermetically sealed with sterilized iodoform collodion, except at its lowest part, where a small portion of rubber tissue was inserted about an inch to act as a drain. It was then dressed with the ordinary iodoformized and sterilized gauze dressing. The wound was not irrigated during the operation. No sponge was used during the operation, sterilized gauze balls being employed instead.

The wound was not dressed until December 20, the eighth day, when the incision was found healed, except at the lowest part, where the rubber drain entered, this drain having come away in the dressings. The continuous silk suture in the skin was carefully removed and the wound washed in sterile water, dusted with iodoform, and again dressed with iodoform and sterilized gauze. At the second dressing, December 26, the fourteenth day after the operation, three points of suppuration were found in the line of the cicatrix—one at the upper end, one about its middle, and one at the lower end of its middle third. The patient was kept in bed for six weeks, as recommended after such operations, the wound being dressed about every other day after the fourteenth day after the operation. On January 7, 1896, two of the retained silk sutures came away, one—a double suture—through the upper fistulous opening, which then healed. The other suture came away through the middle fistula. On January 24 another suture came away through the lower fistula, and on January 28 two other sutures came away, one through each of the fistulous openings.

No other sutures having come away, on April 29, upon the advice and recommendation of the chief surgeon, Department Platte, an operation was performed for the removal of the retained sutures. Upon cutting through the portion of the cicatrix immediately over and between the fistulous tracks the end of a silk suture was readily found and removed. It seemed to have been retained by some fibrinous bands, as it was found impossible to remove it by traction. Its loop was cut, when it readily came away. No other retained suture could be found, and, as it was not considered advisable to cut the tissues any further, the wound was sutured and dressed antiseptically. The tissues themselves having been flushed with 1:2000 bichloride solution, most of the wound healed by first intention and the rest gradually healed by granulation. The patient was returned to duty May 8, 1896.

II. Mr. T. B., a citizen living about 40 miles northeast of this post, was admitted June 11, 1896, by authority of the post commander, upon the written recommendation of the surgeon of the post, as required by Army Regulations. At the time of his admission he was suffering from an inflamed, irreducible, left oblique inguinal hernia. He had fever and was hardly able to walk. He stated that the inflammation of the parts had been caused by a physician at Deadwood, S. Dak., to whom he had applied for treatment, who had lanced the tumor. This had occurred nine days previous. Pus was being discharged from the incision made by the lancet at the dependent part of the scrotum and the parts were all very tender and inflamed. The patient was placed in bed and lead and opium lotion applied to the inflamed parts.

On June 20, 1896, the patient had been free from fever for several days, the incision had healed, and the discharge of pus ceased. He was placed under the influence of chloroform by Hospital Steward Parker and Bassini's operation for the radical cure of his hernia was performed by me, assisted by Asst. Surg. Charles Lynch.

The hernial sac was closely adherent to the vaginal sac and also to the whole inguinal canal, and considerable difficulty was experienced in dissecting it loose. In doing so the upper part of the vaginal sac was accidentally torn open where it was adherent to the hernial sac. It was, however, sutured up with aseptic catgut. The sac, after having been dissected up and opened, was found to contain only omentum. This omentum having been pushed back into the abdomen, the sac was twisted, pierced, and ligated with aseptic kangaroo tendon. Five buried sutures of kangaroo tendon were used to sew up the floor of the inguinal canal. A continuous suture of aseptic catgut was used for sewing up the tissues over the cord and also for the skin. A small drain of aseptic rubber mackintosh was inserted in the upper end of the wound. Iodoform collodion was painted over the entire line of incision, except over the drain. The wound was then dressed with aseptic, sterilized dressings.

The wound was re-dressed for the first time on June 27, and was found entirely healed, except where the drain was inserted and at the middle of the incision, where one of the catgut sutures, which were not chromatized, had evidently given way. At this point there was a separation of the skin about one-fifth of an inch wide and one-fourth of an inch long. There apparently had been no suppuration after the operation, the dressings being only stained with a reddish serum. The drain was removed and the wound dressed, as before, with aseptic dressings. At the next dressing, July 5, the wound was found healed its entire length; considerable induration was found about the cord. The patient was kept in bed three weeks after the

operation. After that he got up and walked about the post, and on July 22 he was discharged from hospital cured, the induration about the cord having greatly diminished. No impulse could be felt on coughing.

III. Sergeant W. was admitted July 12, 1896. On the evening of July 14 castor oil was given; the parts were washed with soap and water, and a pad of bichloride, 1:2000, was applied. Next day he was put under the influence of chloroform, and Bassini's operation for the radical cure of a right, irreducible, oblique, inguinal hernia was performed by me, assisted by Asst. Surg. Charles Lynch.

The hernial sac was adherent to the inguinal canal about halfway down to the testicle. It contained omentum, which was easily replaced in the abdomen. The sac was then twisted, transfixed with a double ligature of aseptic kangaroo tendon and tied off on both sides. Five buried aseptic kangaroo tendon sutures were used in suturing the inguinal canal and continuous catgut sutures for the aponeurosis of the external oblique muscle and the skin. The wound was dressed with sterilized dressings. No drain was used.

On July 21 it was re-dressed for the first time, and the wound was found healed, except at the center, where the catgut sutures had given way and the skin gaped slightly. The wound was re-dressed for the second time July 30, it was then entirely healed. The patient was allowed to sit up on July 31, and is now rapidly convalescing. No impulse can be felt on his coughing, and the operation appears to have been a perfect success.

IV. Sergeant R. was admitted July 25, 1896, suffering from a reducible, left oblique, inguinal hernia. A full dose of castor oil was given the night before the operation. On July 28, the parts having been shaved, scrubbed, and washed with bichloride solution, ether, and alcohol, the patient was placed under the influence of chloroform, and Bassini's operation was performed by me, assisted by Asst. Surg. Charles Lynch. As at the time of the operation the sac was not down in the canal, it was not ligated or cut off. Four aseptic kangaroo tendon sutures were used for suturing the inguinal canal and continuous catgut sutures for the aponeurosis of the external oblique muscle and also for the skin. No drain was used. Iodoform collodion was painted over the sutured wound, except at the lower end. Sterilized dressings were used.

On August 3 the wound was re-dressed for the first time and found entirely healed. Patient has no fever and is apparently doing well.

V. Private W. arrived at this post August 1, 1896. He was given a full dose of castor oil on the same evening. Next morning he was placed under the influence of chloroform, and Bassini's operation for the radical cure of a right, oblique, inguinal hernia was performed upon him. The sac was not down in the canal, and it was therefore not tied or cut off. A hydrocele of the cord present on the side operated upon was opened and the fluid evacuated.

Four deep, buried aseptic kangaroo tendon sutures were used in suturing the floor of the inguinal canal, and continuous, aseptic catgut sutures in suturing the aponeurosis of the external oblique muscle and the skin. No drain was used. Iodoform collodion was painted over the entire line of incision in the skin. Sterilized dressings were used. The patient is doing well.

ASSISTANT SURGEON ROBINSON'S REPORT.—I. I have the honor to report that on the 10th of December, 1895, I did a Halsted's operation for the radical cure of hernia on Private W. B., Company H, Tenth Infantry. The following extract from Maj. W. H. Gardner's letter of September 23 is pertinent:

"He is a fair subject for the operation. His age is 47 years and 1 month, height 67½ inches, weight 165 pounds, chest at rest 39 inches. He is rather too fat and too old, but is in fair condition. His heart sounds are normal, and he shows no evidence of tuberculosis or syphilitic taint. His rupture is on the right side (scrotal), is not very large, and the prolapsed gut is retained well by an elastic truss, but comes down in the scrotum without the truss, by straining at stool, coughing, or any violent exertion. The injury, according to his statement, occurred in line of duty, and was first discovered by the examining surgeon October 23, 1891, the date of the present enlistment. I am informed by his company commander that he is a good soldier, a reliable man, and one who is most exemplary and temperate in his habits."

This is unquestionable except in the matter of age and habits. Private B.'s company commander, who has known him for a long time, is inclined to believe that his age is more than above stated, and it was learned from some other source that my conclusion, drawn from his appearance, that he had used liquor freely, was correct. He is a man of intelligence, and was without fear of the operation, making in these respects an admirable patient. I undertook the operation with some reluctance. For my first case, and for one of the earlier cases under the new policy, the indications for operation were not so decided nor the subject so satisfactory as might have been desired, although the anatomical conditions were favorable. The preliminary treatment consisted of free purgation with calomel, followed by magnesia sulphate, strychnine sulphate by the mouth in 0.002 doses thrice daily, a light diet which did not include milk, and confinement to bed. The strychnine was given for the double

purpose of strengthening the heart and preventing paralysis of the intestines. The result was satisfactory. There was but little distention of the bowels after the operation, and the hollow below the costal arch was never effaced. The patient was instructed to drink 3 pints of hot water in the twenty-four hours preceding the operation. The pubes and scrotum were shaved the day before, and the area of operation disinfected in the usual manner; but, for fear of causing pustulation, aseptic instead of sublimated gauze was applied. The cleansing was repeated after etherization and the sublimate washed away with sterilized salt solution. The hands of the operator and assistants were prepared by Furbringer's method. Gauze towels were used instead of marine sponges. Ether was given by Hospital Steward Lommel. It required 500 c. c., and this large amount explains in part the persistent nausea.

The operation was in all essentials Halsted's. The incision was carried well up to the level of the anterior spine, the muscular layers and the transversalis fascia being cut with scissors after the latter had been separated about the margins of the internal ring. This was easier than cutting on a director (Bassini) or carrying the original incision through to the peritoneum (Halsted). The thin sac was isolated with little difficulty from the surrounding tissues, and was tied with catgut and cut off after opening it and finding no omentum or intestine adherent. The quilted suture is recommended, but the stump was so small that it could have no wedge action. The vas deferens and its accompanying vessels, freed from the pampiniform plexus, which was tied and removed, was brought out at the upper limit of the incision. I would again make less use of fingers and Allis's dissector in this part of the work and use scissors more freely. The tissues were handled too much. The deep wound was united by six or seven quilted sutures of Van Horn and Ellison's kangaroo tendon, with two interrupted sutures at gaps. A large bite of muscle was taken, the lower sutures catching the rectus. A handled needle, although larger than was desirable, proved very convenient. It takes much practice to be certain where the point of a large Hagadorn is going. The left forefinger protected the iliac vessels. The deep epigastric was not felt. The skin was united by a subcuticular suture of silver wire, which was not withdrawn until the twelfth day. The wound was flushed once with salt solution after the deep stitches had been placed and again after closing the skin. It took about two hours to complete the operation and the dressing. With another and similar case I could reduce this time very materially. The dressing was freshly sterilized gauze, cotton wadding, and gutta-percha tissue to prevent contamination from urine; the whole firmly bandaged and immobility sought by anterior and external pieces of binder's boards in the absence of anything better. I should be inclined, in a second case, to seal at least the lowest part of the wound with iodoformized collodion, as it is hard to keep the dressings from working upward.

The ether vomiting was not violent, but the nausea was very distressing and prolonged into the third day. After twenty-four hours a teaspoonful of hot water was given hourly; before that nothing; after fifty hours, calomel in fractional doses, followed by Seidlitz powders. The bowels moved toward the end of the third day, and coincident with this was the cessation of the nausea, which began to abate after the first few doses of calomel. A few teaspoonfuls of oatmeal gruel and hot tea were taken about the forty-eighth hour, but it was not until after the bowels moved freely that any nourishment worth mentioning could be retained. Then solid food, such as broiled chicken, raw oysters, toast, and crackers, was given with the most satisfactory result. The patient slept only by fitful snatches for the first two nights, but his wakefulness was not due to pain in the wound. He complained once of a dragging sensation about the umbilicus, but it did not continue. No morphine was given. The persistence of the vomiting would have been alarming had it not been for the pulse rate.

There was an evening rise of temperature on the fifth day, which was repeated at 1 p. m. on the sixth. As a matter of prudence, although the pulse remained at 64, and the patient expressed himself as feeling well, and his tongue and skin corroborated his statement, the wound was examined. It had completely united except at the lower end, where for a space of an eighth of an inch the skin had been infolded. There had been a pretty free oozing of blood-stained serum, but no redness, tension, or still less pus. The elevation of temperature was probably due to the same factors that caused the primary rise; perhaps if the tissues had been cut more and torn less it would not have occurred. The aseptic gauze was replaced by sublimated. The subcuticular wire was removed on the twelfth day; on the fourteenth the patient was permitted to lie on his side; later, to be propped up in bed, and to get up for the first brief period on the twenty-first day after the operation. The subsequent course has been uneventful. In a crowded civil hospital this patient would have been discharged at the end of two weeks. In this instance it is needless to jeopardize the ultimate cure by haste, and the man will probably be continued on sick report for at least three weeks longer.

II. In March, 1895, after violent horse exercise, Private C. W. J., H, First Cavalry, felt pain in the right groin and noticed a swelling. Some months later, after similar

exertion, the left groin became painful. He wore trusses "off and on." So much local tenderness resulted from the excessive pressure of the two trusses, worn at the time of reporting to me, that it was several days before a satisfactory examination could be made, and the diagnosis of the transfer slip—"oblique inguinal hernia, right side"—verified. From the patient's statements and my own observation, the hernia but little more than emerged from the external ring. On the left side the rings were large, but there was no actual protrusion. For three days preceding the operation there was a slight elevation of temperature, probably due to a subacute bronchitis, which, aggravated by the ether, was the cause of some annoyance later. The patient received the preliminary treatment which Joseph Price teaches is so important in operations involving the abdominal cavity, daily baths, a light diet, which did not include milk, 0.002 of strychnia thrice daily, and free purgation by salines. Several pints of hot water were given by the mouth to replace that lost by the bowels, for the purpose of mitigating the post-operative thirst.

I operated on May 28, by Bassini's method. The sac was not well defined, being scarcely more than a bulging of the peritoneum into the ring. After separating it from the margin of the ring, opening and tying off with catgut, so little stump remained that there was nothing to cut away. There were no adhesions of bowel or omentum. The large, internal ring required seven sutures of kangaroo tendon. The cut edges of the aponeurosis of the external oblique were united by interrupted sutures of catgut and an attempt made to close the skin incision by Halsted's subcuticular stitch. The silver wire was too large for the very thin skin, and complete approximation necessitated additional sutures of catgut. I believe it to be the best stitch, however. The catgut was Fowler's, in glass tubes, as furnished by the medical supply depot, and the kangaroo tendon was purchased from Van Horn & Ellison, New York. Sterilized silver foil was applied next to the wound, after which came the usual sterilized gauze, cotton, and splints.

After treatment: Sixty c. c. of hot water, a teaspoonful at a time, were allowed the next morning, May 29, about twenty hours after the operation, followed in the afternoon by a like quantity of thin gruel. On the 30th, tea and toast; on the 31st, after the bowels had been freely moved by fractional doses of Rochelle salts, broiled chicken. On June 1, an attack of colic would have given rise to apprehension had not the pulse rate remained unaltered. Squibb's mixture and a turpentine enema afforded speedy relief. Ordinary diet on June 3. At no time was there any paralysis of the intestine, and the abdominal wall was always concave. The patient vomited but once. Morphine, except as an ingredient of the Squibb's mixture, was not given. The dressings were changed on the seventh day and the wound found to have united nicely. The patient was permitted to sit up in a reclining chair at the end of three weeks and to walk to his meals after a month. I have this day recommended that he be sent to his proper station.

So far as the immediate results are concerned, the operation is an unqualified success. A little induration about the cord, due to effusion of blood, is constantly becoming smaller. Pain in the inguinal region of the other side has ceased entirely, but in view of the fact that the left rings are weakened, I have recommended a transfer to the infantry. It is not advisable for this man to undertake full duty for at least another month.

I was assisted in this operation, as in my previous Halsted, by Capt. A. M. Smith, assistant surgeon. Steward Lommel again administered the ether.

ASSISTANT SURGEON CROSBY'S REPORT.—I have the honor to make the following report in regard to cases of hernia operated upon by me:

I. Private W. M., Company B, Twenty-fifth Infantry, admitted March 24, 1896. Operated upon May 20; Bassini's method. The wound was perfectly aseptic. Duty July 6, 1896.

II. Private C. H., Company D, Fourth Infantry; admitted June 2, 1896. Operated upon June 9, 1896; Bassini's method. The wound was perfectly aseptic. I reported this case for return to station (Fort Spokane) July 17, 1896.

In my opinion the result in both of the foregoing cases is entirely satisfactory.

ASSISTANT SURGEON EBERT'S REPORT.—Private F. W. H., Company C, Fourteenth Infantry, was admitted December 20, 1895, for left oblique inguinal hernia. He remained in hospital and quarters, wearing truss, until February 23, 1896, when he was taken into hospital for preparatory treatment for operation. The parts were prepared for operation with the usual aseptic precautions. The operation was performed with the assistance of Drs. William Stephenson, U. S. A., and J. C. Perry of the Marine-Hospital Service, and in presence of Chief Surg. W. D. Wolverton, on February 25, 1896, at 2.30 p. m. It required thirty minutes to bring the patient under ether. The hernia, which had been diagnosed "oblique," was found to be "direct." After separation of the sac, it was ligated, excised, and returned into the abdominal cavity. The conjoined tendon and Poupart's ligament were firmly united by continuous catgut suture, the cord and its vessels being brought out at the upper angle. No attempt was made to unite the superficial fascia as a separate layer; it was included in the interrupted silk-worm sutures of the skin. The patient was

returned to bed about 4 p. m., temperature normal, slight vomiting from ether occurring. Urine was withdrawn by catheter twice during the night.

February 26, 8 a. m., temperature 99°; pulse, 63; respiration, 20. After eating a slight breakfast, he at 10 a. m. complained of intestinal colic, which was not relieved by carminatives and enemata, but required a hypodermic of morphine, 0.016. At 9.15 p. m., temperature 100.4°; pulse, 89; respiration, 21. February 27, 8 a. m., temperature 100°; pulse, 93; respiration, 23. At 4 p. m., temperature 101.2°; pulse, 115; respiration, 24. At 9 p. m., temperature 100°; pulse, 115; respiration, 20. Rochelle and Epsom salts were administered by mouth every two hours in doses of 8 grams. Rectal tube was introduced several times, permitting the escape of gas, which gave decided relief for the time. To relieve pain three hypodermics of morphine, 0.016 each, were required in twenty-four hours. February 28, 8 a. m., temperature 100.6°; pulse, 116; respiration, 20. At 4 p. m., temperature 99.8°; pulse, 108; respiration, 24. At 9 p. m., temperature 99.8; pulse, 109; respiration, 21. Epsom salts in concentrated solution, 16 grams every three hours, was continued. A high enema through rectal tube of concentrated solution of 120 c. c. of Epsom salts and 60 c. c. of glycerin at last produced free evacuation of the bowels, with relief from intestinal colic. His food was restricted to a limited amount of milk, with salol and pepsin after each glass. The rectal tube was used several times with relief. Three hypodermics of morphine, 0.008 each, sufficed. February 29, 8 a. m., temperature 100°; pulse, 91; respiration, 20. At 4 p. m., temperature 100°; pulse, 97; respiration, 23. At 9 p. m., temperature 99.6°; pulse, 85; respiration, 20. Rectal tube used twice. Two hypodermics, 0.008. March 1, 8 a. m., temperature 99.2°; pulse, 81; respiration, 18. At 4 p. m., temperature 100°; pulse, 97; respiration, 21. At 9 p. m., temperature 99.2°; pulse, 77. Owing to patient drinking about 1½ pints of milk from midnight to noon, symptoms of colic reappeared with increase of temperature. Recourse was had to rectal tube with enema of salts and glycerin.

The further history of case requires no special detail. At no time was there tenderness on deep pressure indicative of general or marked local peritonitis, which was feared. The wound was examined on February 28, and was found in perfect condition; redressed on March 2, owing to loosening of bandages from restlessness of patient. On redressing on March 7, two small superficial stitch abscesses were found. The deeper tissues healed aseptically, but one more superficial stitch abscess suppurated. The wound was perfectly healed in seventeen days. During convalescence the patient became affected with influenza, but this did not interfere in any way with the result of the operation.

ASSISTANT SURGEON EDIE'S REPORT.—I have the honor to report that Private G. L., Company A, First Infantry, was operated upon by me, assisted by Dr. R. H. White, United States Army, July 18, 1896. Hospital Steward Christian Schmidt administered the ether. Halsted's operation was the one selected. When the sac was opened it was discovered that a piece of omentum was adherent to it; the detachment of this piece of omentum from the sac was the only difficulty experienced in the operation. Kangaroo tendon was used for the deep sutures, catgut for the superficial ones. A plaster of paris dressing was put on over the ordinary sterilized dressings for better security and immobilization. The highest temperature reached was 100°, on the second and fifth days after the operation. After that time the temperature was about normal. When the first dressings were removed two weeks after the operation, the upper end of the wound was found gaping open, as two of the superficial stitches had given way; the rest of the wound had united per primam. A strong catgut suture was used to bring together the upper part of the wound, and a small gauze drain was inserted. This last was unnecessary, as the wound healed rapidly and without the slightest suppuration. The man is now walking about, and apparently the operation is a success.

There was not the slightest tension in any part of the wound, and the catgut used, I believe, was of first-rate quality, although smaller than I will use again in a similar case. The breaking of the stitches is accounted for by the man's own violence before the plaster dressing had hardened. It took the combined assistance of two attendants to hold him in the bed, and a hypodermatic injection of morphine was necessary to quiet him. He had been ordered to report here on the 1st of June, 1896. He presented himself on the 10th, in a most dilapidated condition, suffering from alcoholic gastritis, insomnia, and severe nervous disturbances. About the 1st of July, some time during the night, he left the hospital and went to San Francisco on another two days' spree. After that time I thought that he was cut off from liquor, but I have since been convinced that liquor was smuggled to him. This probably accounts for his violence when coming from under the influence of the ether.

SURGEON MAUS'S REPORT.—Private L. M. S., band, Fifth Cavalry, entered the post hospital December 4, 1895, suffering from complete indirect inguinal hernia of the right side. The rupture occurred March 4 of the preceding spring, while doing mounted duty. His horse became unmanageable, and after being considerably jostled in the saddle he was finally thrown. It is supposed that the injury was caused by the pommel of the saddle. Immediately after the accident the patient reported at the

post hospital, when an incomplete hernia was discovered, the tumor at that time being about the size of an English walnut and located above Poupart's ligament. A truss was adjusted, but worn with difficulty. On account of his inability to blow the cornet, which was his instrument, he was assigned to the bass drum. At the date of his entrance into the hospital, December 4, 1895, the hernia was very large, complete, and held in position with difficulty by trusses.

Operation for radical cure was performed December 7, three days after admission. An incision was made over the hernial tumor and the sac carefully dissected away from the cord. The sac was now drawn down, tied, and cut off about 1 inch below the internal ring. The stump was then transfixed (after MacEwen) with catgut suture and caught between the columns of the internal ring, four sutures being used. On close examination the right testicle and cord were found to have undergone atrophy as a result of orchitis from mumps. For this reason the superfluous veins were not ligated and removed (after Halsted) nor the cord transplanted (after Bassini). The cord consequently was left undisturbed and the incision closed by means of deeply embedded kangaroo sutures and superficial ones of silk. The wound healed thoroughly and patient left hospital February 11, 1896. Upon his discharge from the hospital he was again assigned to a wind instrument and has been doing duty ever since. He reported for examination a few days ago; no return of the hernia. I regard the cure as complete.

Six cases of appendicitis were reported during the past year as having been treated by operative proceedings. Four of these ended in recovery, two in death. There was also a case of fatal perforation, which might have ended differently but for the objection of the patient to surgical interference. An army medical officer was the patient in one of the successful cases, the operator being Dr. William T. Bull, of New York. The usual incision was made, but neither the appendix nor the cæcum was found. The operator then enlarged the wound, and by the aid of retractors explored the left side of the abdomen, with the result of finding that there was only small intestine there, and that the sigmoid flexure entered the pelvis on the right side. Beyond the upper angle of the wound, toward the liver, an adherent mass was detected, and the incision extended upward revealed the cæcum and appendix. The other successful cases were reported by Surg. George W. Adair and Asst. Surgs. Charles F. Mason and H. S. T. Harris. In Dr. Adair's case the patient, a recruit, reported sick February 3, 1896, six days after joining his battery. He acknowledged that he had suffered from an attack of appendicitis two months before his enlistment, and that an operation then urged by the attending surgeons was declined by his friends. He stated his willingness to undergo the operation now, if it was considered necessary. He was treated with salol and warm fomentations. On February 10 he was so much improved that he went to the dining room for dinner and supper, but at 10 p. m. he was seized with severe pain, and at 8.30 next morning the temperature was 101.6°, the abdomen tympanitic, the pain severe, and the tenderness acute and extended over the right side. A hot bath was given, and the abdomen was scrubbed with green soap, shaved, and covered with towels saturated with bichloride solution preparatory to operation.

A full report of the case follows:

At 2 o'clock p. m. etherization was begun, and twenty minutes later an incision 4 cm. long was made in the direction of the fibers of the external oblique and about midway between the umbilicus and the anterior superior spine of the ilium. The exposed peritoneum was carefully opened, when some reddish serum and pus escaped. At the lower angle a thread of catgut was passed through the peritoneum and transversalis muscle and its ends were secured by forceps, which were allowed to hang outside.

This incision brought into view the omentum, deeply congested below and gradually shading off into a normal appearance above. On introducing a finger the iliac fossa and region outside of the incision were found empty. From above was brought down and quickly replaced a knuckle of deeply congested small intestine. The omentum, followed downward, was found to be adherent at some point below.

To facilitate further exploration, the incision was extended at its lower end until it impinged upon the rectus muscle, having now a length of 7½ cm. This opened vessels that it required some little time to control.

It was now found that a mass wrapped up in omentum was firmly adherent under the internal inguinal ring. By patience, time, and more force than was desirable, this mass was peeled from the abdominal wall by the fingers working from below upward, and brought out of the external wound. Partly by tying and cutting, partly by tearing, the omentum was separated from the mass, exposing the longitudinal bands of the cæcum, at the end of which was the appendix with two-thirds of its circumference sloughed away. This emerged from a greenish, gangrenous surface on the end of the gut, having the diameter of a 25-cent piece. The appendix formed a ring about an inch in diameter, its extremity being buried in new tissue along the back of the cæcum.

Holding the mass well away from the incision, it was first flushed with normal salt solution and then a solution of peroxide of hydrogen was poured slowly over it until all bubbling ceased. After this an attempt was made to liberate what is ordinarily the free extremity of the appendix. The mes-appendix was ligated and divided. By an incision along its axis, and by forcing a knife handle between it and the gut, the appendix was peeled out of its bed for a considerable distance. Then, considering the raw surface of this deep sulcus more objectionable than the firmly compressed appendix, a fine silk ligature was tied around the latter and the free portion divided, leaving the tip, of unknown length, buried in the tissues. While doing this a hard fecal impaction about the size of a pea was forced out—the only foreign body found.

The attachment to the cæcum was next considered. After careful inspection, the thickness of tissue seemed to justify the attempt and the appendix and the gangrenous surface on the end of the gut were sliced off, exposing the glistening fibrous coat of the intestine. No opening into the gut could be found, but an attempt, only partly successful, was made to roll adjacent peritoneum over the cut surface by Lembert sutures. The ends of the suture that seemed most secure were left long and secured by forceps. The gut was now returned to the abdominal cavity under the outer end of the incision, the ends of the Lembert suture resting in the extreme angle.

The glass nozzle of an irrigator was now passed down toward the pelvis and warm salt solution poured through. It was found that there was a free oozing of blood from the surface from which the adherent mass had been torn. Compression of the abdominal wall between the fingers and thumb controlled it temporarily, but the surface was too far below the incision for useful access with instruments. Very hot water was poured through the irrigator and the bleeding speedily ceased.

Then folded hygroscopic gauze, about the width of two fingers, and nearly as thick as a finger, was introduced, one end reaching well below the raw surface beneath the inguinal ring and the other projecting through the middle of the external incision. The upper and lower thirds of the external incision were now closed, first by continuous sutures, including peritoneum, and deep muscular layer, then by continuous sutures approximating the outer muscle, and lastly by interrupted sutures through the skin and fascia—two on either side of the gauze drainage. Except the silk one around the appendix all sutures used in the operation were of catgut. In bringing together the superficial muscle the long ends of the Lembert suture were threaded and passed through the muscle and tied as an interrupted suture, bringing the abraded end of the cæcum snugly against the abdominal wall. Aristol was dusted over the line of closed incision, several layers of hygroscopic gauze placed over the wound, over this absorbent cotton, and all were secured by a roller bandage.

To counteract the shock that began to be noticeable a hypodermic injection of strychnine was given and the patient put in bed with hot bottles at his feet. Three hours had elapsed since beginning to give the anæsthetic. The operation itself lasted two hours and forty minutes. The patient was given a teaspoonful of water every fifteen minutes, increased to 2 teaspoonfuls after the nausea from ether ceased. Later this was varied by lemonade and beer. The last was found more satisfying by the patient. One 5-grain pellet of salol was given, as it has been recommended to prevent intestinal fermentation. As this one was recovered in apparently good condition from a stool a few days later, such treatment is considered useless and therefore bad.

Nothing else was given by the stomach until the 17th, when milk was cautiously begun and supplemented later by a gruel of milk and arrowroot. For five full days the alimentation was exclusively by the rectum. Every six hours from 2 to 4 ounces of a mixture of predigested gruel of milk and arrowroot, with half an ounce of brandy, was introduced into the sigmoid flexure through a soft catheter. These enemata were always retained and produced no irritation. They were discontinued as soon as feeding by the stomach was resumed as a sure resource in case of gastric trouble.

The first dressings were removed on the 13th, forty hours after the operation. They were saturated with a sanious and purulent serum and gave off a very perceptible odor. The parts of the wound above and below the gauze drainage were quite firmly

united, in fact, the gauze was constricted into a neck, necessitating care in its removal, which was effected by drawing first one layer of gauze and then another. In the depth of the wound there was no resistance, the gauze being unctuous from the discharge. The wound was flushed out with salt solution, a small tent of gauze introduced, and the wound covered as before. The dressing was repeated daily, but the tent was omitted after the 15th.

On the 15th, to correct a persistent odor, after flushing with salt solution hydrogen peroxide was poured into and around the wound. This was a little too efficient in its pursuit of pus, as the skin and fascia at the upper end of the wound, that had appeared firmly united, were found gaping the next morning. The muscular union was intact. After a few days, as this gaping threw strain upon recently united parts below, two secondary sutures of silkworm gut were introduced and secured prompt union.

For two days a solution of carbolic acid was cautiously used after the flushing with salt solution, but a change in the appearance of the urine hinted at danger. Then a 1 per cent solution of boracic acid in camphor water was tried and found so satisfactory that its use as a disinfectant was continued while the wound remained open.

On the twentieth day after operation the wound had closed except a shallow trench 25 mm. long through skin and cellular tissue, and the patient was allowed to leave the bed. Futile attempts were made to hold the sides of this trench together with adhesive plaster, but after a few days, as there was a tendency to cicatrization down the sides of the gap, a deep suture of silkworm gut and a superficial one of catgut were introduced, and prompt union followed.

The history and progress of this case have been minutely detailed, as it is thought that the impressions and experience of a novice may be of interest and value. With the same thought the following observations are appended:

In a service of over twenty years twice has the writer stood idly by and watched a soldier die under similar conditions. In the presence of a successful operation it may be thought that he stands ready to say "Mea culpa," but such is far from being the case. Under less favorable conditions he believes that operation would have failed to save those lives, and would have only cast upon surgery the opprobrium that ever attends an unsuccessful operation. The more favorable conditions in the present case are worthy of consideration.

Firstly, a wise provision has set apart in this hospital a special operating room, with gas stoves, sterilizers, and other appurtenances conveniently at hand.

Secondly, last fall Maj. Walter Reed, of the Medical Department, kindly offered to give a private of my detachment a course in practical bacteriology. Private Musgrave (since appointed acting steward) was sent every afternoon to the Army Medical Museum for that purpose. Of course, bacteriology in itself would be of little importance to a hospital corps man, but I know of no better training to teach the minute precautions necessary to aseptic surgical work, and believe that an advanced step in military surgery will be taken when at least one man in every detachment shall have had such laboratory training.

It may be argued that, as this case was septic to begin with, aseptic precautions were of little moment. The question of dosage is an important factor in sepsis; and that a man is already charged with ptomaines is a most valid reason for carefully guarding him from further infection. It may well be believed that this patient owes his recovery to the securing of healing without suppuration in the most vital part of the wound—about the cæcum.

Thirdly, able assistants were found in Captains Gandy and Keefer. This operation is necessarily a slow one, and was found in this instance somewhat perplexing. Every step is exposed to possible fatal oversights. The element of time is an important factor in the prognosis. The patient lived through an operation lasting two hours and forty minutes; at the last end even ten minutes may make the difference between success and failure; and every delay in the course of the operation is carried over to be accounted for at the dangerous end. The importance of intelligent assistants, quick to see and ready to act, can not be overestimated. Alone, at a frontier post, the surgeon who attempts this operation will be liable to find himself in deep water, very like a lone fisherman in a squall, compelled to manage both rudder and sail; he may weather the gale, but if he does, he may well make his bow and thank offering to good fortune, for his chance for being swamped will have been much the greater.

The first criticism of this operation will be that it was postponed too long. It is to be feared that this will always be the case. In the absence of urgent symptoms, fever, vomiting, intestinal obstruction, etc., with a degree of pain that scarcely requires narcotics, who can say that this tenderness is not transient and harmless? Who will urge patients to undergo operation for a condition that is not evidently dangerous, and one that so often passes speedily away? There was no exudation into the abdominal wall; with a finger inside it was still soft and pliable. Outside there was nothing to guide directly to the seat of the trouble. This absence of

exudate in the wall of the abdomen is a useful indication that the trouble is entirely within the cavity; for any involvement of the parietes is quickly followed by widespread exudate. Here, deep within the abdomen, was a slow-forming abscess, painful and sore from distention. With no resistant backing, palpation could not demonstrate it. It caused no more general disturbance than would a boil of equal size. Like a boil, the escape of its contents gave ease. This transitory ease, followed by a sudden access of severe pain and inflammation, tells exactly what has happened and gives indisputable justification for operative interference. Except after repeated attacks, or in centers of population where the grouping of cases gives certain individuals a large experience of these conditions, an earlier operation can hardly be expected.

Nor is it to be presumed that this patient's condition would have been better had an earlier operation been performed. Suppose that the external incision had been made three days sooner and the adherent mass demonstrated. It would have been folly then to have torn the mass loose, to have broken down nature's protective adhesions. Clearly, the proper course then would have been to cut directly down upon the mass. With the cæcum so closely bound to the abdominal wall, there would be great danger of cutting into it—with a resulting fistula. If this were avoided, in dissecting to find the abscess, there would be danger of perforating the abscess wall—allowing the contents to escape into the peritoneal cavity—when the condition would be as it was actually found plus another opening through the abdominal wall.

If the abscess were fortunately opened without accident, it would be unwise to seek the sloughing appendix—to attempt to remove it with other dead tissues; and the healing of such an abscess would be tedious—with a strong probability of a fecal fistula.

In the present case, with the abscess already ruptured into the peritoneal cavity, the advisability of a second incision directly over the adherent mass was considered. It was clearly too late to leave dead tissues to be thrown off by the slow processes of nature, with an already existing opening into the peritoneum; and the difficulties and delays of the necessary dissection were deemed more dangerous than the method adopted.

Leaving the tip of the appendix is not advised by the authorities; but the reason already given seemed to justify the procedure. The silk ligature was applied with the hope of shutting in for a long time a possibly infected mucous cavity. It was also possible that the nutrition of the part of the appendix toward the cæcum—so nearly separated by sloughing—was maintained by a reversed circulation, and there might be a bleeding if it were left without ligation.

An instructive example of wandering attention may be mentioned in this connection. Before calling for the ligature, the operator satisfied himself that the sulcus was deep enough to allow the stump to be buried within it—that a single catgut stitch would bring the walls of the trench together over it, and render assurance doubly sure. When the freed portion of the appendix was straightened out, his attention was attracted by the more perplexing problem, what to do with the dead tissue on the end of the cæcum. The little silken knot was forgotten; and the sequence of the succeeding steps of the operation was so absorbing that it was not again thought of until the patient was in bed. No harm resulted, but a useful moral may be drawn: In an operation of successive steps, each step must be completed before proceeding to the next.

In slicing off the dead tissue the operator was very conscious of the danger of opening into the cæcum, either through the outlet of the appendix or by direct incision. In the tissues so stiffened by inflammatory deposits it would have been very difficult to close such an opening. But the danger of returning sloughing tissue to the abdomen was still greater.

It is to be regretted that the president of the Antivivisection Society was not present to see the operator attempt to cover the abraded surface by Lembert sutures. He would have admitted that certain things can only be learned by practice, and, considering the importance of the result, that the operator would be justified in making a few dogs suffer in the cause of humanity.

There was a strong probability that some septic material had been left behind on the surface from which the adherent mass had been torn, and, as it was deemed very important, if possible, to avoid further suppuration around the cæcum, this gut was moved away to the farther end of the external incision. The deep anatomy of the parts was not investigated, but the meso-colon must have been stretched so that the cæcum could have been planted almost anywhere. Had the conditions rendered it desirable to move the gut entirely away from the external wound, the operator would not have hesitated to perforate the abdominal wall with the retaining ligatures.

The injurious effects of hot water on the peritoneum were not forgotten. To promptly check the hemorrhage was of prime importance, and, with a free outlet, the water flowed in and out without diffusion among the intestines. Owing to

gaseous pressure within the intestines and blood pressure, the abdominal cavity is one with no vacant space. There may in this case have been a wall of protecting adhesions from the previous inflammation, but in any case, with a free outlet, the fluid pressure is that of a column of water of only a few inches in height, and a general diffusion of the fluid through the cavity is not to be expected; it could only be secured by blocking the outlet.

The large gauze drain is not approved by all authorities; but in this case it was introduced to hold other tissues away from the probably septic surface from which the abscess had been torn. To receive septic discharges into the folds of the gauze was to postpone infection. Even a few hours would be sufficient to form, or strengthen, a protective wall of lymph. It is believed that this was accomplished and that there was never any suppuration around the cæcum in its new location. Should there have been a recurrence of hemorrhage from the bleeding surface no new adhesions would have to be broken up to gain access to it.

The withholding of food from the stomach was an attempt to secure functional rest for the beginning of the large intestine. It may not have been necessary in this case, but in cementing weak places time is an important factor, and in a case that appears so precarious every precaution is deemed advisable.

Case of acute perforating appendicitis, by Capt. W. D. McCaw, Fort Ringgold, Tex.—Sergt. F. W. H., Company G, Twenty-third Infantry, a strong, well-built soldier of temperate habits, reported about 4 p. m. February 1, 1896, suffering from cramp colic, which had appeared within an hour. The patient had eaten a hearty dinner and was at work repairing the company billiard table when taken sick. I saw him immediately on his admission, and learned that on two previous occasions he had suffered from severe attacks of colic, two and four years ago; one attack while in the field during the Garza troubles. Each attack had lasted about three days and had been very severe.

I found the abdomen slightly tender to the touch all over, the patient suffering from "waves" of colic, not very severe, and referring his pain principally to the region of the spleen; tenderness, not particularly marked, at McBurney's point; no tumor of any kind; rigidity of abdominal muscles only during pain. No movement of the bowels had occurred for over twenty-four hours; pulse 80; temperature normal. I prescribed a dose of castor oil with turpentine stupes and gave a hypodermic of morphine. Patient passed a fairly good night, but required a second hypodermic.

Next day the patient still suffered pain, but not intense, referred mostly to right ileo-cæcal region; tenderness at McBurney's point on deep pressure; temperature 99°; pulse 80. Bowels had not moved; sulphate of magnesia was given. In the forenoon the bowels were moved twice, with relief of pain. At 4 p. m. patient was suffering again; exquisitely tender over ileo-cæcal region; no tympanites; no rigidity of abdominal walls; no anxious expression of countenance. I now became convinced that an operation was for the best interests of the patient, and explained his illness to him and what I proposed to do, telling him that notwithstanding his present fairly good condition, I was afraid that the opportunity would slip by and his sickness take a worse turn. He refused to undergo any operation, stating that he had recovered from the same kind of attack twice, and that he did not feel very badly. His temperature rose to 104⅘°; pulse 90; tongue slightly coated, moist. Morphine twice.

The patient passed a restless night, and on the morning of February 3 the pains were worse; great tenderness over ileo-cæcal region, but no tumor and no tympanites; temperature 101.4°; pulse 90. I again urged an operation, and explained fully the danger he was in, but could not prevail upon him to allow surgical interference. The case now rapidly changed for the worse. In the afternoon there was general tenderness, with tympanites and vomiting; temperature 102.8°; pulse strong, 100.

On February 4 peritonitis was general; tongue dry; vomiting of spinach-colored fluid; tympanites increasing. Stimulants and food were given per rectum. In the afternoon collapse; death at 2.50 a. m. February 5, eighty-two hours after admission.

Autopsy seven hours after death. Abdomen distended with chrome-yellow colored fluid, not purulent, with flakes of lymph, and deposits of lymph adherent everywhere over peritoneum. Many coils glued together by recent adhesions easily broken. Intestines empty except a few hardened masses in the pouches of the colon. Cæcum and appendix easily reached through a 3-inch incision parallel to Poupart's ligament; recent adhesions, but none old or well organized. The appendix was short and blunt, about 1½ inches long, enlarged and hardened; at its junction with the cæcum was a perforation large enough to admit the tip of the little finger. The opening had necrotic edges.

This case is, I think, unusually interesting from the mildness of the symptoms considering the severity of the lesion. It is one more example of a life that might have been saved by prompt operative interference, and it also shows that the most dangerous cases of appendicitis may delude the patient with false hopes because of the mildness of the onset, and the absence of great suffering. This patient never had intense pain; the suffering was not nearly as great as in a case of "colic."

The appendix could have been easily exposed, but it would have been impossible, I think, to obtain a stump, as the ulceration was in the angle of the appendix and cæcum; the appendix should have been removed, the edges of the ulcer pared, turned in, and the rent closed by Lembert sutures.

The first of the following fatal cases of appendicitis occurred at Fort McHenry, Md., during the temporary absence of the post surgeon, Maj. C. K. Winne, and when Dr. J. Mason Hundley, of Baltimore, Md., was in charge of the post hospital; the second case occurred in the service of Maj. J. C. Worthington, at Fort Thomas, Ky.:

J. B., white, age 25, a soldier from Fort McHenry, was admitted to Maryland University Hospital at 9.30 p. m. on August 16, 1895. Patient was unmarried; father and mother living, and in good health. He was attacked with cramps on Tuesday, August 13, 1895, which were diffused over the abdomen. On Thursday he walked from the barracks to the hospital at the fort, and while on the way was seized with a violent pain in the right side and inguinal region, which lasted until the next morning. On Friday, August 16, 1895, he was sent to the University Hospital by direction of Dr. Hundley, who was temporarily in charge at the fort. Patient said he had not eaten anything to cause the cramps; his bowels were irregular before the trouble came on; they then became constipated for a few days, and then he began to have cramps. The pain was localized in the right inguinal region, which was very tender on pressure. He said there was considerable swelling on the right side, but it had disappeared; the abdominal muscles over the cæcal region were rigid. He vomited five times on the night of the 16th instant. He had some abdominal attack lasting from June 21 to July 1, from which he recovered; this was attended with diarrhea and cramps; had no return of trouble until August 13, 1895. Urine, sp. gr., 1024; alkaline; no sugar, albumen nor bile salts; high color.

Notes by Dr. Randolph Winslow, attending surgeon at the Maryland University Hospital: B. was first seen by me about 11 a. m. on August 17, 1895. He was cheerful, free from any pain, pulse good and about 80 in frequency; temperature at 9 a. m., 99°. His abdomen was not distended, and in the usual situation of the appendix there was no pain on pressure, but in the region of the internal abdominal ring there was a localized area which was quite tender; little or no tumefaction could be detected. As he seemed materially better I did not feel justified in operating at that time, and I requested Dr. Frank Martin, an excellent surgeon and chief of clinic to the chair of surgery of the University of Maryland, to examine the man and give me his opinion in regard to the propriety of operating on him.

Dr. Martin coincided with me that an operation was not indicated at that time. On Sunday, the 18th instant, I again examined the man with a view of immediate operation, but his temperature at 6 a. m. was 98°, pulse 80, and his general condition excellent, and his local condition either unchanged or apparently better.

On the 19th his temperature at 12 m. was 98⅗°, pulse 76; no especial change, still some tenderness over inguinal region. On the 20th, 9 a. m., pulse 80, temperature 98⅘°; patient cheerful, free from pain except on pressure; there seemed to be more resistance and tenderness in the lower abdomen. Drs. F. Martin and I. R. Trimble examined him at 1 p. m. and we concluded that an abscess had probably formed, and I appointed 11 a. m. the next day for the operation. During the night B. says he had considerable pain on both sides of the abdomen; but the resident physician said he was sleeping quietly at midnight. On the 21st at 6 a. m. his temperature was 100⅕°, pulse 84. At 9 a. m. temperature was found to be 95⅘°, pulse 55. I was immediately notified and went to the hospital, and found him reacting from the collapse, skin warm and pulse thready and 130 per minute. He was at once etherized and was on the table by 10 a. m. An incision was made in the right semilunar line, or at least in that direction, and upon opening the peritoneum a stream of fetid pus gushed out; I do not know the quantity, probably a cupful. The abscess cavity seemed to be walled off from the peritoneal cavity, and my finger could not detect any communication between the two. The cæcum was lying exposed, grayish in color, with some areas of intense congestion. He was put to bed, with hot bottles and blankets. He soon regained consciousness, but did not improve; his pulse became more rapid, 140, and temperature rose to 103⅕°, and he died at 9 a. m. on the 22d, retaining his consciousness almost to the time of his death.

His body was at once removed by his father, and no autopsy was held.

Private O. W. W., band, Sixth Infantry, aged 21 years, native of Ohio, single, was admitted to hospital at 4.50 p. m. August 12, 1895, having suffered all day from "cramps" in his bowels. He had applied at the hospital at sick call for medicine the same morning and received Squibb's mixture, 4 c. c., which had given him some relief. Though he had said at sick call that he felt able to do duty provided he had something to relieve his cramps and had accordingly been marked "duty" on the

band's sick book, he became obviously worse at guard mounting, about 9.30 the same morning, so much so that the regimental adjutant then ordered the drum major to take Private W. to the hospital. This that noncommissioned officer neglected to do until about 4.50 p. m., when after being examined and prescribed for by Capt. A. B. Heyl, assistant surgeon, U. S. A., the man was admitted to hospital. Before dinner he had taken on his own account a dose of Epsom salts, immediately after which he had vomited. He had no other vomiting. He stated that he had had a loose passage like diarrhea on the night of the 11th that he attributed to having eaten green corn for dinner. The cramps had come on shortly after he had this passage. On admission to hospital he was given another teaspoonful of Squibb's mixture and put to bed, and an hour later, still complaining of pain in the abdomen, he was given 0.008 gram of morphine sulphate hypodermically. This gave relief, but he suffered during the night. He was given castor oil, 15 c. c., at 9 p. m. and 6 a. m., which acted freely in the morning.

He had applied once at the hospital for something for cramps in his bowels the latter part of July, 1895, and received a dose of Squibb's mixture. He states, also, that he had an attack of cramps in his bowels about six months ago that was quite similar to this one, but less severe, not causing him to go on sick report. August 13: Pains in abdomen continue; temperature 7 a. m., 102.4°; pulse 10 a. m., 120, full and bounding; tenderness over the whole abdomen, but marked at McBurney's point, where a soft fluctuating tumor as large as the larger end of a hen's egg can be felt. The patient was given turpentine stupes locally, with directions that he should have a hypodermic of morphine sulphate, 0.008, if the pains became worse. He was to have nothing in the way of nourishment, but a very little water to allay thirst. I at once made the diagnosis of appendicitis, with abscess and circumscribed peritonitis, with a chance for recovery by conservative treatment should the abscess remain unbroken.

At 10.20 a. m. the patient suddenly cried out that his bladder had burst and he felt something running down inside to his penis. At the same time he complained of great increase of pain in the right inguinal region. The hospital steward gave him, according to my previous direction, morphine sulphate, 0.016, hypodermically. I saw him at 11 a. m., and found him in marked collapse. The morphine had relieved the pain somewhat, but the right inguinal region was more painful to the touch than it had been, and no tumor could any longer be felt there. Believing that the abscess had burst into the peritoneal cavity and its contents escaped into the pelvis for the most part, I determined that immediate laparotomy was indicated. Captain Heyl saw the case and concurred in my opinion as to diagnosis and urgent necessity for immediate operation. Preparations for the operation were made at once, but it was not possible to obtain some needles and rubber dam from Cincinnati, and to properly prepare the room and sterilize the dressings in time to begin the operation, until 1.30 p. m. The patient, knowing the nature of the operation, unhesitatingly consented to it and showed impatience to have it done.

Operation commenced at 1.30 p. m. August 13. The pubes and abdomen were carefully shaved and washed with ether and 1:1000 bichloride solution. His stomach was washed out by the use of the lavage tube. He had morphine sulphate, 0.016, hypodermically, an hour before, and whisky, 30 c. c., half an hour before the operation. The patient was etherized by Captain Heyl. He was under the influence about two hours, and 250 c. c. of ether was used.

The usual aseptic precautions were taken. The incision recommended by McBurney was used, 12 cm. long from 3 cm. above and to the outer side of the anterior superior spine of the ilium to the middle of Poupart's ligament. The peritoneal sac was incised with the scalpel and laid open with a hernia knife and grooved director. Whitish pus escaped as soon as the peritoneum was laid open, about 2 c. c. On pressing aside the presenting bowels a considerable amount, probably 50 c. c., of white pus escaped, mixed with a clear amber-colored fluid and some flakes of curdy whitish material with a fecal odor. On exploring the region of the appendix with the finger several more pieces of this material were found, some of them quite firm and resembling slightly damp clay. About 2 grams of these enteroliths were removed, but lost in the process of the operation, with the exception of one piece resembling a date seed in size and shape that was preserved for the Army Medical Museum. The appendix was found with some difficulty behind the cæcum, curled on itself and tightly bound down by adhesions. It formed part of an illy defined sac wall with the aponeurosis of the muscles covering the posterior superior rim of the true pelvis and a small part of the edge of the mesentery, which was thickened and adherent to the front of the cæcum. A part of the abdominal peritoneum in front was thickened and appeared to have formed the front wall of the sac. There were no adhesions between coils of the intestines and no evidence of peritonitis outside of the limits of the sac in the immediate vicinity of the appendix. In loosening its adhesions the appendix, which was enlarged and intensely inflamed, was broken in two, and one or two minutes were consumed in ligating its mesenteric artery, which was done with juniper catgut. The lumen of the appendix was dry and empty and

nothing escaped from the broken end. The remainder of the appendix was then separated from its adhesions and a large gangrenous opening, involving at least a third of its circumference, was found at its base close against the cæcal wall. This opening was dry and the whole appendix was empty, indicating that its lumen had become occluded at its base. Three sutures of juniper gut were then passed through the slightly thickened wall of the cæcum below the base of the appendix so as to secure the opening. The appendix was then cut off with scissors, necessarily cutting through the gangrenous opening where nature had apparently commenced the process of amputation of the useless organ. The cut surface was then brushed with pure phenol and the sutures, with the exception of the middle one that cut through the sloughy intestinal wall, were tied. The use of these sutures appeared almost a needless precaution, as there was no leaking whatever from the stump of the appendix.

It was evident that the enteroliths that were discovered close to the ulcerated base of the appendix had escaped through the opening found and were occupying the cavity of the abscess that had broken at 10.20 a. m. on the morning of the day of the operation. The pelvic portion of the abdominal cavity was then thoroughly douched with warm 7:1000 sterilized solution of common salt, and a long glass nozzle attached to a fountain syringe was made to carry the solution down into the pelvis. Some 100 c. c. more of pus and amber-colored fluid were thus washed out, and the water then came away perfectly clear.

A line of juniper catgut sutures, including the peritoneum and skin and all intervening tissues, was then put in, also three silver-wire tension sutures, embracing all down to just above the peritoneum. A perforated glass drain tube with a wick of sterilized gauze covered with iodoform was then passed through the lower angle of the wound down to the pelvis. This glass tube was provided with a large sheet of rubber dam, through the center of which it passed. This had in it a large wad of absorbent cotton, over which it was folded, so as to retain any fluid that might drain out. The sutures were then tied. It was found necessary to add two superficial catgut sutures in two of the intervals between the deep sutures where the adjustment of the skin was not perfect.

The juniper catgut used for ligature and sutures in this operation was prepared by myself from violin strings, according to the method described in An American Text-Book of Gynecology, edited by J. M. Baldy, M. D., 1894, page 66. The line of suture was then sprinkled with iodoform and dressed with sterilized gauze covered with sterilized cotton and secured with a roller bandage. The patient at 4 p. m. was taken back to his bed in the ward, and within an hour had recovered consciousness and expressed himself as feeling fairly well. His temperature at 4.15 p. m. was 99°; pulse 120, rather weak. He was given about 30 c. c. of cold water by the mouth, which he retained. From 5 to 9 p. m. he was given bovinine 2 c. c. in a tablespoonful of water every hour, and was allowed a little cold water, hot tea, or cold Seltzer water to allay thirst. Not over 30 c. c. of fluid per hour was given. At 9 p. m. his temperature had risen to 100°, but shortly after fell to 99°, and remained below 100° all night. He had morphine sulphate 0.016 hypodermically at 9 p. m. He passed a fairly quiet night; slept very little. At 2 a. m. he vomited explosively a dark-brown fluid. He passed urine naturally at 8 p. m., and again during the night.

On August 14, 6.20 a. m., I found the patient comfortable, complaining of no pain—only some soreness in the region of the wound and weariness from lying so long on his back. His pulse was still 120 and stronger than at my last visit the night before. His temperature was 98.4°. He was allowed compressed meat juice, 60 c. c., to be alternated with milk 2 parts to limewater 1 part, 120 c. c. of the mixture. One or the other to be taken every two hours. At 8 a. m. he had another attack of expulsive vomiting. After this the milk and lime water was directed to be given every two hours and the beef juice omitted. A little ice water was allowed for thirst and at 11 a. m. he was given an enema of 120 c. c. of plain water for thirst; this he retained. At 12 m. his temperature was 98.7°, pulse 128. He complained of thirst and of weariness from lying so long on his back, but no pain. I removed the pad of gauze that was under the lower edge of the rubber dam covering the lower angle of the wound. It was partly saturated with slightly bloody serum. I replaced it by a clean wad of sterilized gauze sprinkled with iodoform. The dressing was not otherwise disturbed. At 4 p. m. his temperature was 100.1°, pulse 132, rather full. Complains a good deal of the discomfort from lying on his back and pain in his back, and is becoming restless. At 5 p. m. was given for restlessness morphine sulphate, 0.016 gram, hypodermically. After 8 p. m. he vomited the milk and lime water that he had taken. This was the second time that this had occurred during the afternoon, and it was determined to give no more nourishment by the mouth. He was therefore given expressed beef juice, 60 c. c., by rectal injection. This was retained and repeated with same result at 1.15 a. m. and 5 a. m. He was allowed ice water not to exceed 30 c. c. every hour. This he took through the night, and had no vomiting until 6 a. m., when he vomited expulsively. The vomit had the same dark-brown color as that

of the previous day, though he had had no beef juice or other dark-colored food by the mouth for nearly twenty four hours. He had morphine sulphate, 0.016 gram, at 9 p. m., hypodermically. Temperature, 8 p. m., 101.6°. He slept none during the night. At 9 p. m. I opened the rubber dam and removed the cotton which it contained and which was saturated with fluid, probably containing 100 c. c. that had drained out through the wick of gauze in the glass tube. The fluid was slightly pinkish and free from foul odor. The wick was removed from the tube and found wet throughout with similar fluid. A liter of 7:1000 salt solution, sterilized and at about the temperature of the body, was thrown into the bottom of the drain tube by means of a long glass nozzle on a fountain syringe. The first 50 c. c. or so of this came away slightly turbid, the remainder perfectly clear. A fresh piece of sterilized gauze, sprinkled with iodoform, was passed by a long probe to bottom of the glass drain tube and left with the upper end protruding into the rubber dam. The latter had a large wad of absorbent cotton, sterilized, folded into it, and was secured in place by a roller bandage without disturbing the dressing over the sutured wound. Temperature at midnight, 100.4°.

August 15, 6.30 a. m.: Pulse, 140; extremely weak and hard to count. Patient restless, but not complaining of pain. Temperature, 100.2°. Ordered digitalin, 0.0005 gram, at once, hypodermically. This brought up his pulse in half an hour to fairly strong and regular at 132. Was given morphine sulphate, 0.016, hypodermically, at 7.30 a. m. At 8 a. m. he complained of chilliness. Temperature, 99.2°. At 9 a. m. he was given a rectal injection of soap and water, 1 liter, which came away clear. At 9.30 a. m. his temperature had risen to 102.6°; pulse, 140, weak and hard to count. Gave digitalin, 0.005, hypodermically. At 11.30 a. m. removed the outer dressing and wick from tube and passed in 1 liter of salt solution by means of a long glass tube used as a nozzle to a fountain syringe. The fluid came away clear. Found that there had been a very slight exudation of fluid around the tube. For this reason it was thought best to remove the tube, which was done. Some reddish serum had escaped through the tube into the rubber dam. The skin about the line of sutures was somewhat puffy. A strip of sterilized gauze was inserted into the opening left by the drain tube. The whole wound was sprinkled with iodoform and dressed with sterilized gauze and absorbent cotton held in place by roller bandage.

At 12 m. he was given, hypodermically, digitalin, 0.0005. He continued to complain greatly of thirst and was given ice water, not to exceed 60 c. c. per hour, by the mouth. At 9 a. m. and 1 p. m. he had rectal injections of 120 c. c. of expressed fresh beef juice and 30 c. c. of Armstrong's beef peptonoids. At 2.20 p. m. he vomited a liter or more of dark fluid with a stercoraceous odor and suddenly expired.

Post-mortem examination seventeen hours after death: Cadaveric rigidity marked. Brownish-red froth escaping from mouth in considerable quantities. Body well nourished. Abdominal cavity only opened. Omentum normal. Intestines greatly distended from decomposition. Intestinal walls congested. Small intestines adherent by plastic lymph in right iliac region; but no general peritonitis. Wound closing and adherent to peritoneal coat of colon by thick bands of plastic lymph. Cæcum at point where appendix had been cut off showed no sign of leaking. Ligated artery in mesentery of appendix found secure. No sign of hemorrhage anywhere. The cæcum was bound down by bands of organized plastic lymph at the spot posteriorly where the appendix had been found doubled back and adherent, and a small collection of brown pus, about 5 c. c., was found here. No other pus was found in the cavity. It was decided that death was due to the peritonitis that had resulted from the spontaneous rupture of the abscess that had formed in the vicinity of the appendix after ulcerative appendicitis had progressed for some time, which ulceration was attended by occlusion of the lumen of the appendix at its cæcal orifice and perforation of its wall, permitting the escape of several enteroliths into the circumscribed part of the abdominal cavity, which had formed the abscess cavity; and that the progress of the peritonitis had been delayed nearly twenty-four hours by the operation.

The appendix and the most characteristic of the enteroliths were saved to be sent to the Army Medical Museum, Washington, D. C.

To these cases may be added two cases of cœliotomy, one by Surg. J. Van R. Hoff at Fort Columbus, N. Y., for peritoneal abscess, the other by Asst. Surg. W. L. Kneedler, at San Diego Barracks, Cal., for intestinal obstruction:

Surgeon Hoff's case.—Musician J. H., Thirteenth Infantry, was admitted to hospital at 4 p. m., March 25, 1896, suffering from a severe pain in the precordial region, which was somewhat relieved by morphine hypodermically, and sulphate of magnesia, followed by a simple enema which resulted in a small passage. The history of the case shows that H. was under treatment in this hospital for acute constipation from December 26, 1895, to January 3, 1896, at which time he complained of considerable abdominal

pain, which looked suspiciously like that from a commencing appendicitis. The patient was, of course, most carefully examined and watched, but the pain never localized itself in the right iliac region, and all symptoms disappeared in a few days after free catharsis. During the interval between his return to duty, January 3, 1896, and his readmission on March 25, 1896, he continued to suffer more or less from constipation, though he performed his duty without other discomfort. The day following admission, the pain somewhat modified in intensity, persisted, the sulphate of magnesia was continued in 4-gram doses hourly, till free catharsis occurred; flaxseed poultices were applied to the abdomen and milk diet directed. The pain localized itself more over the region of the gall-bladder and was not diffused; there was no contraction of the abdominal muscles, and nothing to markedly indicate that the appendix was in any wise involved, there being no special tenderness on pressure in that region, though some dullness on auscultatory percussion was elicited at a point above and to the right of the umbilicus. No symptom was emphasized, but the patient's facies indicated some serious, acute, morbid condition.

On the third day the area of pain became somewhat extended, and though more marked in the right hypochondriac region, it had gone down, and pressure over McBurney's point elicited decided complaint. The board-like feeling of the abdominal muscles was present, and there was some tympanites, though free catharsis had been maintained. The knees were drawn up and the picture of a commencing general peritonitis was more than an impression. The dullness had disappeared. On the morning of the fourth day no change for the better had occurred, all the symptoms of peritonitis were more marked, and evidences of appendicitis quite clear. The patient was prepared for operation on the previous night, in accordance with the requirements of aseptic surgery, it being believed that a cœliotomy was inevitable. After further asepticising, on the morning of March 29, an incision 3½ inches long, was made over the appendix. The long incision was made in the belief that we had a septic condition to deal with, and that free drainage would be necessary. On opening the peritoneum, pus gushed out in large quantities, coming apparently from a point back of the transverse colon, below the liver. The cæcum, nonadherent, was easily withdrawn through the incision, and found to be inflamed; beneath it lay the appendix, bound down by recent adhesions, especially at the free end, which was deeply imbedded in plastic lymph; the surrounding peritoneum was also much inflamed. The appendix was ligated and removed. It was not perforated, nor was it apparently diseased internally. The abdomen was thoroughly washed out with the normal salt solution; gauze drains were introduced in various directions among the intestines and the wound closed up, except one inch left open for drainage.

The patient rallied nicely from the anæsthetic and operation. The wound was dressed daily; the discharge was very free, and efficiently drained by the gauze draining into gauze. Some of the gauze drains were removed on the second day and the remainder on the third day without difficulty, and were substituted by strips of rubber tissue which seemed equally efficient. The wound was for a few days injected with peroxide of hydrogen solution and thoroughly irrigated with normal salt solution and the skin was washed with sublimate solution, this latter to, if possible, prevent infection of so much of the wound as had been closed up. This was only partly successful, for though the skin healed by first intention, pus burrowed beneath it into the muscular layers and threatened to open up the tract anew. Fortunately this was prevented by thorough irrigation and the injection of Peruvian balsam, and the sinuses of this and the original abscess as well were finally closed by injections of iodoformized oil. On the fourth day after the operation the patient showed symptoms of congestion of the lungs, which fortunately did not develop into the threatened pneumonia. The bowels were kept freely open by 4 c. c. doses of a saturated solution of sulphate of magnesia every hour until effective. One or two small doses of morphine (0.0065) were given hypodermically to relieve pain, which was not great. There was little flatulency, and it may be said that the patient made a "smooth" recovery.

The cause or exact location of the abscess I am unable to say, and bacteriological examination threw no light thereupon. I was more than content to get its contents outside the abdominal cavity. The patient is entirely well, the cicatrix seems strong and enduring, but, of course, there is always the possibility of a hernia following any cœliotomy in which drainage has to be maintained, i. e., in all septic cases.

Assistant Surgeon Kneedler's case.—Private R. A. E., First Infantry, presented himself at the post hospital August 19, 1895, complaining of a swelling of the penis, noticed for the first time the previous day. A diagnosis of balanitis was made. There was no specific history. After ten days treatment the swelling subsided. A hard nodule now appeared on the prepuce, and the left inguinal glands became enlarged. Syphilis was suspected, but no specific treatment was given. The man was about the ward until September 5, and there was nothing of special interest connected with his case. On that day he complained of considerable pain in the left iliac region. Examination revealed a globular swelling, deep seated, of considerable hardness, about the size of an orange, located at the spot of greatest tenderness. He

stated that several months ago he had fallen from his bicycle and hurt himself on the left side of his abdomen, low down, and that ever since this injury he had been much troubled with constipation.

On September 6 there was obstinate constipation, with symptoms of localized peritonitis. Next day the symptoms indicated some obstruction of the intestine, with an extension of the peritonitis. On the 8th, as there was no improvement of the symptoms, an abdominal section was made. Bands of lymph constricted the large intestine, just above the sigmoid flexure. A large firm growth, probably malignant, occupied the left side of the pelvis, involving the pelvic fascia, the inguinal glands, and the iliac vessels. After freeing the intestine from the constricting bands the abdomen was closed. The extent and location of the growth prevented any attempt at removal. Within a few hours after the operation there was a free operation from the bowels, and a fall in the temperature from 103⅘° to 99⅗°. The progress of the case was favorable.

September 15 the dressings were removed and the wound was found united in its whole length. There was no evidence of pus upon the dressings. The result of the operation evidenced the thoroughness of the antiseptic technique. September 21 there was a considerable rise in temperature. The dressings were removed and there was found to be suppuration of some of the inguinal glands that had become involved. The general condition of the patient was favorable. He gained in weight and spirits, but the growth in the pelvis did not diminish in size, and there were frequent rises in temperature. From October 22 to December 17 hypodermic injections of the toxic products of erysipelas were given. These injections were generally followed by a chill and a rise of about a degree in temperature. The condition of the patient remained fair, and there was no marked increase in the size of the growth.

At his own request, and on his representation that he had a family and property in the East, he was discharged the service on surgeon's certificate of disability.

From the special reports submitted by medical officers during the year, the following have been selected as presenting points of professional interest:

Gunshot fracture of the skull, Krag-Jörgensen rifle, by Surg. L. M. Maus, Fort Sam Houston, Tex.—I have the honor to report the death of Private F. C. W., Eleventh Infantry, from gunshot injury of the head. The case possesses interest only from the fact that the weapon used was the new army rifle, the Krag-Jörgensen. It is, I believe, the first authentic case of death from this cause in the Army. Believing that data upon the effects of the small caliber are much desired, I have carefully prepared the specimen and forwarded it to the Army Medical Museum.

The shooting occurred about 1 mile east of the post, in a secluded spot on the roadside leading to Salado, and was obviously selected for the purpose of suicide. Private W. was a man of morose disposition, given to religious discussions, with agnostic tendencies. His mind especially dwelt upon the possibilities of the future, and shortly before his death it is stated by his comrades that he said he intended to solve the question for himself. I think there can be no doubt as to suicide. I saw the injured man about forty-five minutes after the accident and found him lying, unconscious, on his back with the top of his head literally blown off. The face was blanched and the pulsation at the wrists had disappeared. He was still breathing, but the respirations were irregular and jerky in character. No powder marks were noticeable on his skin, though it is more than probable that the muzzle of the rifle was held less than a foot from his face. An enormous opening, exposing both the anterior lobes and the upper surface of the brain, existed, which was found to be 16 cm. long by 14 cm. wide. This large opening, caused partially by the absolute loss of bone tissue blown away and partially by the detachment of other fragments, which were adherent to the scalp at the junction of the right nasal with the frontal bone, passed through the left anterior lobe of the brain and made its exit through the frontal at its junction with the left parietal. So great was the shock that the frontal, both parietal, and left temporal bones were injured. The opening in the frontal, after all fragments were replaced, measured 6 by 6 cm. In addition, there were several fractures of this bone, one of which extended to about midway of the right coronal suture, and continued two-thirds through the right parietal. The left parietal sustained several fractures, one of which passed as far as the occipito-parietal suture. The squamous portion of the left temporal bone was also fractured in a crescentic-shaped manner. Both anterior lobes of the brain were more or less damaged, the left one especially being lacerated and disorganized for a distance of 7 or 8 cm. in the direction the missile had taken. An attempt was made to preserve the brain by means of Mueller's fluid, but owing to the intensely hot weather it was found impossible to do so.

Gunshot fracture of the skull, Krag-Jörgensen rifle, by Surg. Alfred C. Girard, Fort Sheridan, Ill.—I saw the man a few minutes after he was shot. His breathing was ster-

comous, he was of course unconscious, and death appeared to be only a question of minutes. A cursory examination revealed two bullet wounds. The entrance wound (he was running away when shot) was located in the upper occipital region of the skull and that of exit in the forehead a little to the right of the center (distance between rifle and victim, 90 feet). The man died in half an hour. Post-mortem was made the same night.

The wound of entrance into the skin presented a round opening, without appearance of scorching or blackening. The wound of exit in front was larger and more ragged. The integument was carefully dissected off and the bone of the top of the skull found extensively fractured, the parts of the bone being connected here and there by fascia.

On the calvarium being removed, the surface of the dura mater presented a state of intense congestion. To the right of the longitudinal fissure it was torn through for a distance of about 4 inches, about 1 inch from and parallel to it.

On removal of the covering the convolutions of the brain were made prominent by the engorged network of superficial veins. A furrow corresponding to the injury of the dura mater was plowed through the right hemisphere, in the region of the superior frontal convolution, about half an inch deep. The right lateral sinus appeared filled with blood serum; the left was normal. On section, the vessels of the brain were found engorged, but no other microscopic injury of a prominent nature was apparent.

After removal of the brain the cribriform plate exhibited comminuted fracture; one or two slight fissures in the petrous portion of the temporal bone.

The skull cap presented the following injuries: At the site of the entrance of the bullet, 1 inch above and to the right of the junction of the occipital bones, an oval perforation 1 by one-half inch, the edges shelving inward. From this opening there radiated the following fractures, viz:

1. Downward into the left lamboid suture, separating it, thence horizontally along the parietal and frontal bones to the left orbital cavity.
2. An oblique into the sagittal suture, opening it for 2 inches.
3. On parallel with the sagittal suture, bifurcating 1 inch from its origin into a wedge-shaped piece, which, again fractured, continued to the coronal suture, separating it.
4. The left fracture communicated with the horizontal left fracture, described under 1, parallel to the coronal suture and 1½ inches to the rear.
5. A fracture at an acute angle from the former to the right, communicating with the former, and with the lamboid 2 inches to the right of the superior angle of the occipital bone, and toward the front extending into the coronal suture.

The wound of exit 2 inches from the coronal suture and 1 inch to the right of the median line was pyriform, 1½ inches long at its greatest diameter, three-eighths inch wide, the edges more ragged. It communicated with the coronal suture by three fractures, with the orbital ridge by two, and thence with the horizontal breaks.

Death was evidently caused by the concussion, as no vital parts of the brain were injured and the hemorrhage was not considerable.

Now, as to the bullet, the so-called humane result of this small-caliber bullet, not much larger than a pencil, may be disposed of at once in the negative. The bullet was recovered, and showed but a slight indentation; the openings, considering the pulverization of bone in the immediate vicinity of the impact, were small. We had clearly what is called an explosive effect.

A few words of explanation on the modus operandi of such an injury are necessary to lead to a correct understanding. Theories, such as the effect of powder gases, heating of the bullet, etc., have generally been abandoned. There was no deformation of the bullet, or lateral impact, which might increase the striking surface.

I would exceed the limits which have to be given to an article of this nature if I attempted even to give in a condensed manner the experiments which have led to the present views on this enormously destructive effect accompanying an apparent slight bone defect. The conclusions arrived at have to be sufficient, and anyone taking a special interest in the matter will find a complete history of the experiments in the Bibliotheca Medica, edited by Kocher, Konig, and Mikuliez, names which guarantee the correctness and soundness of the accounts given. (Part 8, 2, 1895.)

Modern projectiles act in a twofold manner—first in the line of the impact, and second in a lateral direction. In both cases we observe besides the immediate effect, motion, which is communicated from the place of impact. If the result of impact leads to perforation, then the lateral effect is lessened in corresponding ratio. It depends upon the cohesion of the molecules, on the diameter of the projectile, and on its velocity. In common terms it may be stated that the greater the cohesion the more energy is wasted and the lesser the lateral effect; the greater the diameter the more force is lost in the impact; but the greater the velocity the more extended the lateral transmission of motion, as the molecules have not time to escape the lateral compression and communicate their motion until a plane of minor resistance is reached, when disruption follows. This is a so-called explosive effect, which more

properly should be called expansive. This is illustrated in our case by the penetration of a small bullet at a high velocity. The defect at the place of impact is small, but the lateral motion was such that the skull was raised from its base by the horizontal fractures, and as this did apparently not suffice to limit the motion, the upper fragments were torn from their fascial connection.

In addition to this direct expansive effect on the bone of the skull there is the hydrostatic result of rapid compression of the semifluid brain mass confined in it. The molecules of liquids are readily displaced and a greater effect will be produced in them by a relatively smaller velocity, and with high velocity it is enormous.

It must be understood that the small caliber has not introduced the explosive effect, but owing to the higher velocity and consequently greater impact with a lower diameter, it has extended the zone of explosive effect always observed in large caliber projectiles as long as they are moving under high velocity.

We may therefore give the following résumé of this case: A direct impact under the highest kind of velocity, without deformation of the bullet, small hole of entrance and exit of the bone, with extended stellate and circumferential fracture of the skull, partly due to direct impact, partly to lateral expansive motion, and partly to the hydrostatic effect of compression of the semifluid brain by the bullet, with displacement of the molecules in all directions and disruption at the place of least resistance.

The base of the skull was not affected by the hydrostatic pressure, because the bone was already tried to its utmost by the expansive effect of the direct impact, as shown by the longitudinal fracture and their branches.

Gunshot fracture of the skull, Krag-Jörgensen rifle, by Surg: A. C. Girard, Fort Douglas, Utah.—I was called about 3 p. m., February 16, to the quarters of Company F, Sixteenth Infantry, to see a man who had shot himself. I found private M. L. M. lying across his bed, his head leaning against the wall, dead. He had shot himself in a fit of depression, resulting from a debauch for which he had been placed under arrest. There was a history of an injury to the head while he was at Fort Niobrara, in 1892, received from a kick of a horse, since which time his disposition was altered. While formerly he was lively and enjoyed himself with the men, he became morose and depressed, secluded himself, and expressed suicidal impulses. He does not appear to have habitually drunk to excess, but only when he had these fits of depression. There is a slight external depression about 1 inch long, without evidence of internal injury, 1 inch from the coronal suture and 2½ inches from the rudimental frontal suture.

The weapon was the service rifle, .30 caliber. It lay on the floor. It had evidently been discharged by pushing the trigger with a stick. The enormous distension of the skull was striking; skin intact except a small circular opening in the right temple 2 inches back and 2 inches above the right orbit, and a similar one at the junction of the left temporal and lower third of the parietal region. The head felt like a bag of detached bones. Blood flowed from the nose and ears.

Post-mortem eighteen hours after death; head only examined. Small circular opening about one-third of an inch with slightly scorched edges, as described, above the entrance opening. Similar opening as described, above wound of exit. On the removal of the calvarium the dome of the skull was found broken into eight large pieces, all separated from each other, with a number of small ones at the places of entrance and exit of the bullet. The entrance wound was comminuted to a longitudinal distance of 2 inches and perpendicularly 1½ inches. The actual place of entrance could not be distinguished among the débris. The place of exit was a distinct, small round hole one-fourth by five-sixteenths of an inch at the junction of the squamous portion of the temporal bone and the inferior border of the parietal bone, about 2 inches from the posterior inferior angle. (The position of the body and of the rifle and the course of the ball after leaving the head, passing through a lathed partition 5 feet above and 7 feet to the left of the patient and imbedding itself in a stone wall 9 feet from the floor in the next room, undoubtedly make the right side that of entrance and the left side that of exit.)

The first fracture was from behind right external angular process, starting from the comminuted space across the right frontal eminence to center of frontal bone, meeting there the second fracture, starting from similar point on the left side, thence continuing into central frontal suture, a continuation forward for one-half inch of the saggital suture. This suture was separated to the junction of the coronal suture, thence the coronal suture 1 inch to the right, thence third fracture, over a section of the parietal bone down over the squama to the entrance wound. The right side of the coronal suture was separated down to the temporal bone. In its center the fourth fracture, dividing the parietal bone into two longitudinal halves, terminating in the lambdoid suture, and intersected about the middle by the fifth fracture, extending downward and forward into the wound of exit and intersected in its lower third by the sixth fracture, three-fourths of an inch above and nearly parallel with the squamous suture, continuing upward into the coronal suture and forward, meeting the

second fracture three-fourths of an inch behind the left angular process. The seventh fracture was three-fourths of an inch above edge of right squama and third fracture, about bisecting longitudinally the right parietal bone and ending in right lambdoid suture. The eighth fracture extended from the lower end of the first fracture back of the angular process across the inferior fossa, the body of the sphenoid bone down to the sella turcica. The ninth fracture was similar to the eighth on the left side. The tenth fracture extended from the wound of entrance across the central portion of the petrous bone, thence into the lower portion of the posterior fossa, encircling the foramen magnum and meeting the eleventh fracture, which took a similar course to the tenth on the left side.

The surface of the brain was hyperemic. Soldier did not die for probably half an hour after receipt of injury. The substance of the brain was apparently normal, except the anterior lobes, which were pulpified.

The remarkable points of this case are:

1. The evidence of expansive action, which was not due to lateral impact, but to hydrostatic action resulting from the enormous velocity.

2. The absence of serious injury to the bone as far as comminution is concerned, owing to the slight resistance offered by the temporal bone.

3. The exceedingly small wound of exit in the bone and skin, contrary to most similar observations.

In the case reported from Fort Sheridan the bullet struck one of the strongest parts of the skull, hence explosive action in that case from resistance to lateral impact; but as the bullet displaced but a smaller portion of the contents of the skull the hydrostatic action was less marked than in this case.

Rotation or wabbling of the bullet as a cause of explosive action must be negatived, judging from the clean cut of the wound of exit in the bone. Powder gases might have caused the disruption of the skull, but would have followed the line of the bullet and caused a larger destruction at the exit. There was no sign of scorching of the substance of the brain, and only a small rim of blanched tissue around the edge of the entrance skin wound. The destruction of the brain would have been more general from the action of the gases, it being slower than hydrostatic effect.

This case is an additional proof of the correctness of the theory that the degree of moisture of the tissues has much to do with the explosive action intensified by the enormous velocity of the small-caliber rifle bullet.

Gunshot wound of the neck, followed by aneurism; deligation of left common carotid, by Asst. Surg. E. C. Carter, Fort Harrison, Mont.—J. C., colored, private, Troop D, Tenth Cavalry, aged 23 years and 2 months, was shot by a comrade with a revolver, caliber .38, about 6.30 p. m. June 13, 1895. The ball entered the back of the neck 1½ inches to the left of the median line and 1½ inches above the seventh cervical vertebra, and ranged horizontally forward. The aperture of exit was one-half inch to the left of the median line and one-half inch below the mental tubercle. The ball passed between the great vessels of the neck and the vertebral column, wounding some of the former. There was a severe shock with irregular action of the heart, at times slow, at times rapid and tumultuous, due probably to injury of the pneumogastric nerve. There was considerable hemorrhage, perhaps a pint or more, from the aperture of entrance. This was easily checked by pressure. A tumor 3 by 4 inches formed under the left angle of the inferior maxilla. When shot, the man fell on his hands and knees and asked, "Who shot me?" and immediately became unconscious. He remained unconscious and in convulsions for some hours. Next morning his condition was more satisfactory. The wound healed rapidly, superficially. The size of the swelling under the jaw diminished gradually, but a small pulsating tumor, about the size of a pigeon's egg, remained. Surgical interference was contemplated, but after consultation with Dr. C. F. Kieffer, U. S. A., who gave me valuable aid throughout the case, it was decided to wait, keeping the patient under observation. About July 10 he was considered to be in sufficiently good condition to make a railway journey of some hundred miles to appear before a United States court. After his return the symptoms gradually became graver. He was losing flesh, becoming weaker; he suffered pain in the left side of his head and neck; hearing of the left ear was about one-half and vision of the left eye two-thirds; ptosis of left eyelid developed; on protrusion the tongue was deflected to the left side. The pulsating tumor was increasing in size, but apparently was working away from the carotid artery and jugular vein. On July 30 it was decided to operate. The patient was carefully prepared. Ether was given, and under strict antisepsis the sheath of the left carotid was exposed. The track of the ball was visible, passing beneath and very close to the carotid about its bifurcation. The lingual artery seemed to have been injured at its origin. Pressure on the common carotid caused the pulsation of the aneurism to cease. The sheath of the common carotid was exposed and two strong silk ligatures firmly tied round the artery. About 6 ounces of blood were lost owing to the cutting of some veins of the thyroid plexus. The action of the heart became quite weak; a hypodermic of atropin was given, after

which he rallied well. The wound healed fairly rapidly. The ligatures did not come away until October. The man has been returned to duty, and except for a slight degree of ptosis seems to be as well as ever. Date of report, January 27, 1896.

Trephining for inveterate headache, following injury, by Asst. Surg. A. E. Bradley, Fort Custer, Mont.—Private G., Tenth Cavalry, stationed at Fort Custer, Mont., was, about May 15, 1895, thrown from a horse, receiving a wound in the right parieto-frontal region. The scalp wound was about an inch in length, and so far as could be ascertained no other injury was sustained. The wound was dressed, and he was not excused from duty. He was first seen by the writer May 21, being brought to the hospital on a litter, having had what was evidently an epileptoid seizure. When consciousness was restored he complained of intense headache. He had a seizure the following day, and another May 31. Headache was persistent during this period, and was not at all benefited by medication. On June 6 he was sent to quarters and to light duty. He complained constantly of the pain in the head, begging relief. The scalp wound was then well healed and the cicatrix but little adherent; nothing abnormal could be discerned by palpation.

With strict observance of modern surgical methods he was trephined July 9. A pear-shaped flap was raised and with a three-fourths-inch trephine two buttons of bone were removed at the site of injury, the intervening bone spurs were chiseled out, and an inch incision made in the dura. So far as the opening permitted, nothing abnormal could be perceived. The dura was closed with catgut and the scalp incision with silk, without replacing the bone buttons. A slight seizure followed the operation. For the next few days he was free from pain and had but little headache. Convalescence was uninterrupted and normal in every respect. He passed from the writer's observation July 23. At that time he claimed to have headache, but not of the former intensity; he had had no more seizures. He was discharged for disability on account of epilepsy and headache in March, 1896. Were the writer to operate again, he would remove a larger section of bone. The section removed in this case was but 1½ inches by three-fourths inch, and inadequate for proper exploration and inspection.

Luxation or fracture of the cervical vertebræ, by John H. Lacy, M. D., Solomonsville, Ariz.—On March 31, 1896, Private G., Seventh Cavalry, and several members of his troop went to the Gila River for the purpose of bathing. He undressed, and, without ascertaining the depth of the water, plunged head first into the stream from an elevation of some 3 feet. The water proved to be only a few inches deep, so that, weighing 150 pounds or more, he struck the sandy bottom with great violence, falling on the back of his head and forcibly flexing the head on the chest. He lay perfectly still until his companions reached him, finding him conscious, yet entirely helpless. He was brought at once to camp and placed on a cot, where I saw him three hours later. Upon examination, I found him conscious and in great pain, but I could not make out any fracture or dislocation. He was able to give me a full account of the accident. His pulse was 64; temperature normal; pupils slightly dilated. Extension of the head gave him some relief, but any lateral motion was impossible on account of intense pain. The motor and sensory nerves of the lower extremities and of the body up to the lower border of the sternum were completely paralyzed. The hands and forearms were in the same condition. There was slight sensibility about the upper portion of the chest, but the only movement he was able to make was a slight shrug of the shoulders. The pain was referred only to the upper cervical region. At this time, and for several hours, there was persistent priapism, which afterwards became intermittent. The urine was removed by soft rubber catheter and bowels moved by enemata at proper intervals until his death. Pain was relieved by hypodermatic use of morphine as was necessary. Next day the condition of the patient remained unchanged, with the exception of a slight rise of temperature in the afternoon. Ice was applied to the nape of the neck and continued throughout the treatment. On the morning of April 2 I found the temperature 104° F. I then wired Fort Grant for consultation. Owing to unavoidable delay, the surgeon from Grant did not arrive until next day, shortly after the patient had expired. During the 2d the temperature continued to rise, respiration became more labored, and at 2 a. m. of the 3d the patient became unconscious, dying at 9 a. m. His temperature thirty minutes before death reached the unusual height of 109°. No autopsy was made, so that the exact nature of the injury could not be ascertained. I feel warranted in asserting that there was direct pressure on the spinal cord, either from partial luxation, fracture, or from the extravasation of blood.

Fracture of both bones of both legs, with displacement of the astragalus, by Asst. Surg. G. D. De Shon, Fort Douglas, Utah.—On July 16, 1895, Private R. F. T., Company E, Sixteenth Infantry, a man 31 years of age, 5 feet 10 inches high, and weighing 186 pounds, while putting up a telephone line at this post, slipped from the ridge pole of the Amusement Hall to the eaves, a distance of 25 feet, and fell from the eaves to the ground, a distance of 16 feet, striking squarely on both heels and then falling full length upon his right side. The ground on which he fell was a sandy loam in its virgin state, not tramped down. Being unable to rise, he noticed that each foot was

turned outward just above the ankle joint so sharply as to make almost a right angle with the long axis of the leg. He was brought at once to the post hospital and found to have sustained the following injuries:

Right leg: Compound fracture of tibia 2¾ inches above tip of malleolus, the lower extremity of the upper fragment protruding. Simple fracture of fibula at same level. Both fractures oblique. Left leg: T-shaped fracture of tibia 3¾ inches above and extending down through tip of malleolus. Simple transverse fracture of fibula at same level. Simple oblique fracture of fibula 1½ inches above tip of malleolus. The sharp extremity of upper fragment in this last fracture rested just beneath the skin and was with difficulty prevented from pushing through. There was a dislocation of the ankle joint, the astragalus being displaced, upward, forward, and outward. Capillary hemorrhage from the wound in the right leg was so profuse that a counter opening was made along the inner border of the tendo Achillis and a fenestrated rubber drainage tube passed through close to the bone. Antiseptic dressings were applied, the fractures and dislocation reduced, and the legs placed in fracture boxes.

On the sixth day plaster of paris casts were applied from the base of the toes to the junction of the lower and middle thirds of the thigh. The greatest difficulty was experienced in keeping the astragalus in position, constant pressure downward, backward, and inward being maintained by an assistant during the application and hardening of the cast. A large fenestrum was made in the right cast opposite the wound, which was dressed daily. On the thirteenth day the tube was replaced by a gauze drain, which was gradually diminished in size until the thirty-seventh day, when it was dispensed with entirely. During the first fortnight there was much serous oozing, saturating the dressings. Slight suppuration followed, but was held in check by irrigations of peroxide of hydrogen and corrosive sublimate, the amount of pus for twenty-four hours at no time exceeding one-half dram. To prevent any possibility of burrowing and the formation of sinuses, the drain was continued for several days after the disappearance of suppuration. On its removal the wound healed promptly and firmly. On the thirty-fourth day from the accident, or the twenty-eighth from the application of the fixed dressing, the cast was removed from the left leg. The astragalus was found to be in place and all fractures united except the lower fracture of the fibula. Passive motion was employed and the leg replaced in the cast. This was repeated on the third, fifth, and seventh days, and thereafter daily. The right cast was not removed until the thirty-fifth day after its application or the forty-first day of the injury, this delay being due to the danger of reopening the wound by muscular movement. The fractures were found to be solidly united, and passive motion was employed, as already described, for the left leg. The left cast was totally dispensed with on the forty-eighth day of the injury, the right cast one week later.

During the first forty-one days the patient remained constantly on the fracture bed. After this he used the roller chair during the day until the fifty-first day, when he was given crutches. His improvement has since been rapid. He now, three months after the injury, walks very well with the aid of a cane and promises a complete recovery and return to duty at no distant date. Two weeks ago it was discovered that the lower fracture of the left fibula had become firmly united. On the first removal of the fixed dressing superficial ulceration and much tenderness had been noted in this region, and it had been thought that excision of the ununited fragment might be indicated at a later date. The only deformity now existing is a slight bowing of the left leg at the site of the upper fracture. This, however, is but an intensification of a previous bend at the same point, caused, the patient states, by a heavy weight falling on top of the bent knee and being transmitted down the leg when the patient was 5 years old, not an improbable cause in view of the relation of the epiphysis to the diaphysis at this point at the age mentioned. The temperature from the start has been greater than can be accounted for by the limited amount of suppuration. Repeated and careful physical examination (including urinalysis) has failed to reveal any constitutional disorder. The patient having suffered from some form of malarial fever seven or eight years ago, quinine was tried in large doses for a week without producing more than a slight temporary variation of temperature. From the date of admission to hospital to the present time the general health of this patient has been excellent. His appetite has been good and his secretions and excretions normal, even during his highest temperature. He has at all times presented the appearance of an exceptionally robust, stalwart man. No literature is at hand on the subject of temperature in fractures, and it is not here known what effect on body heat may be produced by bone breakage. This case is deemed worthy of report as illustrating, first, multiplicity of fractures within a limited area and involving a major joint; second, inadvisability of too early excision of small ununited fragments in the vicinity of the joint; third, continued high temperature in case of fracture without any indication of the same in the general condition of the patient.

Bimalleolar fracture, by Asst. Surg. N. S. Jarvis, Willets Point, N. Y.—Corporal D., A, Battalion of Engineers, aged 32, was admitted April 22, 1895. While playing hand ball, a favorite game with the enlisted men at this station, he sustained the injury about to be described. He is an unusually heavy, large-muscled man, and in the act of jumping to strike at a ball in the air, descended with great force upon a stone about the size of a hen's egg, striking upon the inner edge of his right sole and causing eversion of the foot. There was an oblique fracture of the external malleolus one-half inch above the tip, running backward and upward; a fracture of the internal malleolus about the same distance from the tip, running downward and backward; there was also some backward dislocation of the foot with marked swelling, indicating probable laceration of the lateral ligaments and tendons. The foot was placed in a fracture box and lotions of lead and opium applied until the swelling and ecchymosis had disappeared. A light plaster splint was then applied, the toes being drawn well forward so as to overcome the backward displacement; and in view of the greater separation of the fragments of the inner malleolus, the sole was slightly inverted. Firm union ensued in six weeks, but there was an unusual stiffness of the joint, which, under massage and gentle active motion, gradually yielded and the man was returned to duty July 22. The literature upon the subject of fractures which I have been able to peruse gives very meager reference to this injury. Forcible eversion of the foot usually results in fracture of the internal malleolus, and the force of the injury then is concentrated upon the fibula; when the external lateral ligament resists the downward weight of the body, the astragalus wedging itself outward against the external malleolus thus acts as a counter force to the weight of the body. The resultant of these two forces is exerted on the lower end of the fibula at a point about 3 inches above the tip. This injury, one of the most frequent forms of fracture, is commonly known as "Pott's fracture." In order that this fracture may take place it is necessary that the tibio-fibular ligaments resist the strain, thus acting as the fulcrum of a lever. Where the ligaments yield an unusual type of fracture is the result.

Sir Arthur Cooper describes a fracture which frequently involved the two malleoli and sometimes the astragalus, an oblique fracture of the internal malleolus and of the lower end of the fibula, or laceration of the external lateral ligament. Cooper spoke of this injury as a "dislocation of the tibia outward." This injury was probably due to great indirect violence and lateral bodily displacement of the foot. Hamilton, in a collection of 37 cases of fracture of the fibula, observed 3 only in which the external malleolus was broken off and 8 times the internal malleolus. Maisonneuve claimed to have demonstrated by experiments on the cadaver that fracture of the fibula at its lower extremity is not by forced abduction, but by violent outward motion. Erichsen states that fracture of the malleoli occasionally takes place, being generally caused by catching the heel in running down stairs. He states that there is marked backward displacement of the foot. In this case there was some displacement, but it could not be considered conspicuous. Agnew, Downes, and Bryant make no reference to this fracture. It may therefore be considered a phenomenal accident, and it is probable that its cause was forcible rotation outward of the foot, as suggested by Cooper and Maisonneuve.

Ichthyol in the treatment of carbuncle, by Asst. Surg. Robert B. Benham, Fort Bayard, N. Mex.—This case first came to my notice on the evening of the third day of its inception, and up to this time had been given the usual treatment of poulticing, free incision, irrigations with peroxid of hydrogen locally, with one-tenth grain of calcium sulphite each hour internally. I found a hard, very much elevated, and highly inflamed surface, involving a space of about 7 inches in diameter on the back of the neck, which extended well up into the scalp and had every appearance of becoming more than usually destructive by sloughing, the patient at this time complaining of considerable pain and lassitude. Believing this to be a good opportunity to show the efficacy of ichthyol in the treatment of specific local inflammations of the subcutaneous tissue, I directed the shaving of the scalp, well beyond the line of demarcation, and the application over the whole surface of a 4 per cent ichthyol ointment spread on lint. The following morning I found the result to be all that I could have wished, the hardness having almost entirely disappeared and the whole of the inflamed surface being apparently under control, showing the ichthyol to have a true abortive power. Another incision was now made at a point about 1 inch to the right of the median line, giving irrigating connection with the former incision, which had been made about 2 inches to the left of the median line. Morning and evening irrigations with the peroxid of hydrogen and renewals of the ichthyol ointment were made until complete recovery, which was rapid, the sloughing being wholly confined to the surface in the immediate neighborhood of the first incision and much less than is usual in a carbuncle of this character.

I would like to add that in four cases which I saw at Fort Wingate recently, and in which the inflammatory action was more of an erysipelatous character, ichthyol had this same abortive action.

Severe dermatitis caused by the tops of the garden parsnip, by Asst. Surg. Charles F. Mason, West Point, N. Y.—During the month of July, 1895, four cases of severe dermatitis of the arms and forearms were admitted for treatment. All gave the same history, which was as follows: They had been perfectly well until they had been detailed to thin out parsnips in the company garden. After working four or five hours with bare hands and sleeves rolled up, each began to have smarting and itching in the forearms, followed at once by an eruption of papules, quickly developing into vesicles; there was no exposure to *Rhus venenata* or any other known poisonous plant, and all attributed the trouble to the parsnips. The eruption consisted of vesicles from the size of a split pea upward, often merging into bullæ as large as the palm of the hand, and in one case the posterior aspects of both forearms were one large blister. The bullæ rested on an inflamed base and were very painful. All did well under antiseptic treatment, but were rather slow and behaved much as burns of a similar degree. I went to the garden myself, and after investigation found only the parsnips intermixed with a few nonirritant weeds. The sergeant in charge told me that every person who had worked in the parsnips except one had been more or less affected, and that only those who had so worked became affected. I then rubbed some of the parsnip leaves and stems upon my hands, causing immediate redness, followed the next day by the characteristic vesicles which were painful and itchy. I can not find in medical or other literature any report of similar cases, and so deem them of sufficient interest to be placed on record.

Result of fly bite, by Asst. Surg. E. F. Gardner, Fort Grant, Ariz.—A man applied for treatment on the afternoon of August 23, with a considerable swelling of the back of the right hand. It seemed to originate near a spot covered with a whitish crust which had followed slight injury received about a week previously. There was a trifling degree of redness in the immediate vicinity of this injury, but no heat nor pain and a very little tenderness on pressure. He stated that the slight injury had given him no trouble until the evening before I saw him, when, while playing billiards, he felt something on his hand near the spot, followed by some itching, and in an hour or so the back of the hand began to swell. He saw no fly or other insect on his hand at the time mentioned, and thought nothing of the matter. As before stated, there were no symptoms except the swelling when I first saw him; but as he was working in the post bakery I thought it best to put him in the hospital, ordering a large, moist antiseptic dressing to cover the whole hand and lower part of the wrist. Next day the swelling extended up the forearm about 2 inches above the dressing. The skin of the back of the hand and arm was perfectly natural in color; there was no pain, no sensation of heat in the part, no elevation of temperature, no tenderness on pressure except a very little at the place of injury on the back of the hand, no pitting on pressure, absolutely no symptom except the swelling, which was well marked. The hand and forearm to a point a little above the swelling were painted with a strong solution of quinine in tr. ferri chlor. and the antiseptic dressing renewed and made to cover the forearm well above the swelling. The next day the swelling had extended a little above the dressing, as before, but there was no other symptom whatever. So it continued from day to day, increasing until it nearly reached the shoulder, the only discomfort being that if the arm was allowed to hang at the side there was some pain in the vicinity of the ulnar nerve near the condyle of the humerus. but there was no local pain in the back of the hand and no change in the color of the hand or arm, the iron having been applied only a little above the middle of the forearm, and by this time not interfering with observation as to the color of the skin. The swelling subsided gradually from above downward, and on September 3 he was returned to duty cured. There was no evidence of lymphangitis, but the epitrochlear and axillary glands were slightly enlarged as compared with those of the other side, and remained so at the date of return to duty, but at no time was there any pain or tenderness in them. It will be seen, therefore, that in this case there were no constitutional symptoms of any kind and no local ones except the progressive swelling starting from near the local injury. This was sufficient in degree to have caused anxiety if it had been accompanied by other symptoms. In fact, it seemed to me to be a question of where it would stop, as treatment appeared to have no effect on it.

The diagnosis of a case like this from all forms of suppurative disease need not be considered, nor is there any difficulty in distinguishing it from erysipelas or from malignant cellulitis, and cellulitis simplex, so called, is accompanied to a minor degree by the ordinary symptoms of inflammation. Common stings or bites of insects sometimes produce diffuse swelling, but such swelling reaches its height in a few hours and is not regularly progressive for five or six days, as in this case. I have seen such progressive swelling follow the bite of a rattlesnake, but it reached its height in two days. It was not greater in degree than in the present case, and of course there was ecchymosis and purple discoloration of the skin of the entire limb. Neither does it resemble the symptoms produced by rhus and similar shrubs, the heat, redness, itching, etc., being entirely absent. At about the same time there

was a case of rhus poisoning of the arm in the hospital, and the swelling was the only symptom common to the two affections. As to the cause, it may be stated that in one or two of the other cases which have occurred here the patient has felt a slight sensation on the part, and on looking has found a fly somewhat larger than the common fly, lighter in color, and, as they described it, "with longer suckers," which has been brushed away, leaving no mark. But an hour or two later the swelling has begun at this spot and extended progressively, as above described. This is possibly what occurred in this case, the slight local injury of a week previous being accidental or only a means by which the insect was attracted. That such an amount of swelling, progressing daily for five or six days, could be caused by one inoculation of any toxin seems improbable, at least in such amount as would be deposited by simple contact or even the bite of a fly. If any known micro-organism produces such a result I have seen no account of it. It resembles more nearly, perhaps, the work of the streptococcus, but it seems too innocent for that somewhat virulent organism. Possibly the climate of Arizona does not agree with the streptococcus and it exists here only in an attenuated condition.

Treatment seems of little avail. Nothing stops the progress of the swelling. Antiseptic dressings and applications of iron, iodine, silver nitrate, lead washes, ointments, dry powders, bismuth, zinc, etc., all seem useless, and the simple wrapping of the arm in dry cotton seems as effective as anything. Fortunately, the affection is an innocent one and is followed by no untoward effects.

My apology for reporting so innocent a case is that it is an unusual one, and that in these days of bacteriology any case, even the simplest, may be of importance as involving a question of whether or not it is due to the action of bacteria, or, if to such action, whether it may not be due to some usually virulent organism in a state of attenuation, or as marking a connecting link between benign and malignant bacteria.

Hydrophobia from the bite of a cat, by Dr. William Morrow, Dallas, Tex.—Some three months ago Sergt. M. M. W., Company B, Twenty-third Infantry, on duty at special regimental recruiting station, Dallas, Tex., was bitten on the right hand by a cat. He paid but little attention to the wound, merely having a druggist apply some simple dressing to prevent soreness. On the morning of November 2 he came to me for consultation, presenting the following symptoms: The day before he had felt keen, darting pains in the right shoulder, followed at night by nausea and persistent vomiting, sleeplessness, and difficulty in swallowing water. He was constipated; tongue heavily coated and dry; urine scanty and high-colored; temperature, pulse, and respiration normal. However, he seemed nervous and anxious about his condition. I saw him several times during the day and night, and his symptoms remained about the same, except the vomiting, which was much better. He came into my office late at night and asked me to give him something for his restlessness as he could not sleep at all. I prescribed chloral, bromide, and morphine. They, however, did not have the desired effect, as he was awake all night. The following day, November 3, he rapidly grew worse. The temperature rose to 101.4°. There was complete inability to swallow water, although he could take small sups of beef tea, in which some of his medicines were administered. He became wild and maniacal and had to be restrained by force. The tongue and mouth were parched and dry. There were frequent attacks of spasmodic respiration, much resembling asthma. During these attacks the shoulders were elevated, the eyes wild and glaring. He could not bear for the windows to be raised, declaring that the fresh air would kill him. There was a sense of great and impending danger; once he got away from his attendants and rushed wildly from the room, saying that he saw his grave. His thirst was intense, but the sight of water would throw him into a spasm. It was indeed a melancholy sight to see the poor fellow try to take just a little water to quench his burning thirst. At 1 a. m., November 4, I succeeded in getting him to sleep; at 3 o'clock he suddenly awoke and sprang from the window, smashing the glass and cutting an ugly gash in the left temple, which bled profusely; also a deep gash in the right arm. The symptoms all increased in severity; at 3 p. m. the axillary temperature was 107.4° F., and at 3.40 p. m. he quietly passed away.

As soon as the diagnosis was made I endeavored to get some curare, but none could be obtained, so I used morphine, atropine, and hyocine, which would quiet him when fully under their influence. I was fortunate in having associated with me in this case Dr. M. A. Kingsley, a physician of experience and ability.

Report on the scorpion of Durango, Mexico, by Surg. L. M. Maus, Fort Sam Houston, Tex.—During a recent visit to Durango, Mexico, my attention was drawn to the frequency of death as a result of the scorpion's sting in that city. Under 10 years of age the mortality is very great (if prompt measures are not taken at once), and occasionally among adults. The sting of this variety of scorpion, found in the United States and other parts of Mexico, is considered comparatively harmless, and so far no satisfactory reason has been advanced to explain the malignancy of the Durango scorpion, which apparently differs in nowise from that found elsewhere of a harmless character. The scorpion of Durango is a variety of the *Ischnurus Mexicanus* of Villada, and is a native of hot countries or hot sections of the temperate zone; it corresponds in

size to that found in the southern United States, is of a yellowish color, and is armed with a curved canaliculated sting at the end of the tail, which it carries over its back while in motion. It is provided with a poison sac at the junction of the last joint of the tail and the sting. The operation of stinging is performed by a whipping process of the tail, during which movement the poison is injected into the tissues, and the results of the case depend more or less upon the thoroughness of the operation. While Durango is especially noted as the home of this poisonous animal, it appears that it is also found in other parts of that State, and even in Tepic and Michoacan. Apart from these localities it does not seem to propagate, or if so, loses its venomous qualities. For many years, by means of the interchange of commerce, this scorpion has been transported in bales of goods, blankets, serapes, etc., to the various towns throughout the Republic, inland as well as on the coast, and in no instance has it been known to propagate itself in these new localities; or if it lived at all and reproduced itself the progeny became harmless. No plausible theory has ever been advanced for this curious fact. In a conversation with a physician in charge of the Belavenia Mining Works, not over 50 miles from Durango, I was informed that the sting of the scorpion was regarded as harmless even to children, and was of common occurrence there.

This dangerous little pest prevails at all seasons of the year, and its sting is equally venomous at all times, though it abounds in greatest numbers during the early summer and diminishes after the summer rains, which usually begin the last week in June. After and during the rains the temperature is considerably reduced and the weather is not especially favorable for them. During the scorpion season the city council offers a reward at the rate of 75 centavos per hundred, giving a small advance for females. The capture of these animals is usually carried on by the street gamins, the hereditary foe of the scorpion, who may be seen in great numbers at dusk every evening searching the streets, plazas, corrals, walls of buildings, etc., armed with a torch of pine, long pole, and a can suspended to the shoulders. Once brought to the ground, the animal is covered with a handful of earth, his sting dexterously pinched off with the thumb nail (grown long for the occasion), and placed in the can, for they must be delivered alive to receive the reward. After delivery to the city authorities they are killed. The records of the municipal government for the past decade show that between 50,000 and 60,000 are delivered annually for reward, and it is presumed that from 30 to 40 more are killed by each household without being reported to the city authorities, thus making a grand total killed each year of from 200,000 to 250,000 in Durango alone. During the scorpion season no one can consider himself safe, and due care must be exercised at all times. At this time they are liable to be found between the sheets on retiring, in one's wearing apparel on dressing, or the hand may be unwittingly placed on one quietly resting on the back of a chair or other piece of furniture. No warning is given of their presence save a slight whistling sound.

At the moment one is stung a peculiar characteristic pain is felt, and a small, reddish spot, which is difficult to see, remains. Very shortly after the sting a series of phenomena appear, dependent upon whether the person stung is susceptible to the poison or not. It appears that certain individuals are immune to the poison, and a few of this class permit themselves to be stung a number of times, in the presence of an admiring audience, for a certain money consideration. This class, except the slight pain and reddish spot above referred to, suffer no symptoms.

In the susceptible class shortly after the sting, a very few moments, formication begins near the site of injury and extends to the throat, nose, and face. So intense becomes the sensation that the patient is compelled to violently rub the affected parts for relief. Violent sneezing and blowing the nose, with copious expectoration of mucus and saliva, follow.

The saliva drivels away from the corners of the mouth. Muscular disorders now supervene. First, irregular contractions of the muscles of the legs and arms occur, followed by those of other parts of the body. The jaws become rigidly set, as in tetanus, and on account of the severity of the convulsion control over the patient's movements is lost. The muscular spasms appear and intermit after the manner of the tetanic convulsion. If these convulsions increase in severity as the case progresses, it usually proves fatal; while, on the other hand, if they diminish in intensity recovery generally occurs. During this convulsive period organic congestion takes place; the lungs become congested and filled with bronchial secretion, the circulation rapid and irregular, and the respiration jerky in character. The temperature rises to 103° or 104°, and the body becomes covered with profuse perspiration. The eyes are congested, and the patient suffers from temporary nystagmus. Profuse vomiting occurs, blood very frequently appearing among the ejected matters. In this terrible condition the patient usually succumbs to the poison, either through asphyxia or congestion of the lungs.

The above symptoms are developed in a varying time after the sting, from a few moments to one and a half hours. Young children frequently die from this cause in less than one hour after being stung. Dr. Santa Maria, who has practiced medicine

in Durango over forty years, remembers one case, a girl of 15 years, who died in less than one hour.

Except a sense of weariness, there remain no effects of the sting a few hours after it has occurred in cases which recover. It appears that no autopsies have been made on those dying from the effect of the sting, and consequently nothing is definitely known of the lesions which occur. Deaths from this cause usually occur at home and never in the hospitals, and it appears almost impossible to obtain the permission of the parents for an autopsy.

Considerable difficulty at times is experienced in making a diagnosis as to whether the person has been stung or not. This is especially the case when the accident occurs at night or during sleep. Great alarm is caused when a child suddenly starts from a profound slumber with a scream. The sting may be mistaken for the bite of a chinch or flea, which resembles the spot left by the scorpion very closely. Then again the natives object very seriously to the exposure of the body after being stung, believing that exposure to the air stops perspiration and thus augments the gravity of the case. For these reasons, frequently much valuable time is lost and the patient's life sacrificed for the want of prompt local treatment. Not infrequently the diagnosis is postponed until the alternating clonic and tonic spasms appear.

Local treatment is imperatively demanded as quickly as possible after the sting. A tourniquet should be placed around the limb between the site of injury and the heart. The spot should be burned or scarified and the poison drawn out by means of suction or pressure. The lighted end of a cigar is commonly used for this purpose, and appears to answer very well. The burn should be well into the skin and cover enough territory to insure a complete destruction of the poison. The physicians of Durango prefer the burning process to the scarifying, claiming that the latter requires more or less skill, and is therefore less easily performed correctly and satisfactorily.

In addition to the local treatment, hot baths, ammoniacal and alcoholic stimulants, pilocarpin, opium, and other sedatives are used. Chloral, with the bromide of potassium, is largely used to allay the muscular spasm.

Dr. Santa Maria uses chloroform inhalations with considerable success. He has used this remedy since 1857, and claims that he has treated many hundred cases successfully, many of whom were infants and young children.

His method is as follows: As soon as the muscular disorders begin, he starts the chloroform inhalations, and continues them from time to time, holding continually under control the spasmodic tendency. In many cases he administers the remedy for one, two, or three hours, but never resorts to complete anæsthesia. Sometimes a half dozen whiffs suffice, when the patient drops off into a quiet sleep. Should the convulsions return, he again begins the chloroform. He has used as much as 200 c. c. in one case before he could safely leave the patient. Although he does not regard the chloroform treatment as a sine qua non for the scorpion sting, still he claims good results in those cases which succumb to the poison, since under its beneficent effects the patient enjoys peace and comfort, and through its use both he and the surrounding friends are spared that terrible scene soon to terminate in death. Hypodermic injections of the chlorides of gold and lime around the site of sting have also been recommended, but have never been given a fair trial. Owing to the rapidity of absorption of the poison, this method is regarded as hardly practicable, since it would generally be too late before the physician arrived prepared to administer the injections. The suggestion of this treatment resulted from an article published by Dr. Calmette, in the Annals of the Pasteur Institute, in 1891, relative to the use of these injections in persons bitten by the cobra de capello. It appears that the poisonous effects in the human system from the bite of the cobra are almost identical with those produced by the sting of the scorpion.

For the principal facts embodied in this very imperfect report I am under obligations to Drs. Santa Maria and Hurera, two very able practitioners of Durango, who have had a wide experience in the treatment of persons stung by the scorpion.

Report by Maj. C. E. Munn concerning conditions, sanitary and medical, in Honolulu and the Hawaiian islands.—In compliance with paragraph 56, Army Regulations, I have the honor to submit the following report of observations made during a recent brief leave of absence which allowed me to visit the Hawaiian Republic. During the three weeks of my stay on the islands I was the recipient of much kindly attention from Government officials, both military and civil, and was invited to visit places of professional interest and listen to histories of progress, such as would naturally benefit me, as a citizen and medical officer of the Army. In general, the standard of medical education on the islands is high. Among the able men practicing in Honolulu I found one Dr. John S. McGrew, who had been a medical director of one of our Western armies and wore the button of the Loyal Legion. The younger practitioners that I met seemed intelligent and honestly striving for scientific advancement, but as yet there has been no medical society organized among them. Except in official positions, the English-speaking practitioners have little experience in Asiatic communities, the Japanese and Chinese in the towns preferring their own

countrymen to treat them when sick or injured; but most of the sugar and coffee plantations employing cooly labor have salaried medical men resident for their care. Sometimes a salaried Government official, as the port physician at Hilo, has also medical charge of extensive plantations in what is termed his district. The native Hawaiians in the remote districts still confide in the mysteries of native medicine men, and I have heard much of the obstacles encountered by the Government in its care of this interesting, fast disappearing race. A noble building in Honolulu provides 100 beds for them. It is called "Queen's Hospital," situated in a beautiful park near the center of the city. The wards were clean and comfortable, and the patients seemed to be carefully treated, fed, and nursed. I was informed by Dr. C. B. Wood, the resident surgeon, that septic cases rarely developed in the building, though he was constantly making important operations in the plainly furnished operating room. One convalescent patient showed me his appendix vermiformis in a bottle. Eye cases, including sections for cataract, are frequent. This hospital receives all casualties from strangers and seamen, and has a number of rooms for paying patients, though it may be classed as a Government charity. One ward receives such cases of registered prostitutes as may be sent for treatment by the officer charged with their weekly examination; other beds are filled by cases from the military barracks, those who may be ordered to hospital at the daily surgeon's call, for as yet there is no separate hospital at the military post.

Not attempting to properly describe this building and its management, I can say that it would be creditable to any city, and considering the class of its patients, the peculiar types of disease, typhoid, remittent, and other fevers, the success of the physician seems wonderful. The climate aids, of course, for all convalescents and many sick are kept on the broad verandas most of the time. It was curious to see the convalescents and suitable cases eating poi, a fermented paste made from taro-esculenta, at mealtime with their fingers, if accustomed. I saw two cases of beriberi in these wards, both Japanese, but learned nothing new of treatment. The prognosis in most cases was hopeless. I was told the disease is rather frequently imported from Japan. The cases of fever seen were interesting from the fact that most of them are continued, do not yield to quinine, are not distinctly remittent, and do not present the typhoid curve. Dr. Wood says it is not enteric nor malarial fever, but I believe from a study of several records that it is typhoid, modified by race and climate. I observed it was best treated by mineral acids, salol, and other drugs deemed intestinal antiseptics.

Leprosy for many years has been the most important problem for the Government physicians. I was permitted to visit the experimental hospital in the suburbs of Honolulu. There were 15 cases presented for my examination, representing the younger and less hopeless types. These are now divided in groups of three or five, each group treated by a physician who is a member of a board of five. Each member treats his assigned cases substantially as he pleases, and from week to week notes the results of the use of his prescriptions. A photograph apparatus and bacteriological laboratory are adjuncts to the service.

The bacteriologist was absent at the time of my visit pursuing a course of study in Baltimore. Dr. Myer, one of the board, informed me that several of his cases had much improved by the use of cantharidate of soda, full diet, and warm baths, morning and night. They also prescribe creosote largely. There are now about 1,200 lepers segregated at the leper settlement at Molokai regarded incurable. By far the larger number are native Hawaiians. It was curious to note that possibly the Asiatics did not bring the disease to the islands, for it was known in the earliest history of the native population long before the arrival of the Chinese. It may be mentioned here that the population of the islands, now about 100,000, includes some 25,000 Japanese and 23,000 Chinese.

I have visited the Government dispensary, where large numbers are skillfully treated by officers appointed and paid by regular appropriation; the city prison, with its hospital, models of good order and neatness, and the hospital for the insane. At this last nearly all the patients, about 60, were in the yard, a beautiful park-like inclosure, where they are kept most of the time. The buildings were small wooden pavilions, neat and orderly inside and out. The locality from whence the cholera infection spread in August and September, 1895, was especially interesting, as it was easy to observe how favorable to the dissemination of the germ were the conditions. In this epidemic there were about 80 cases and 60 deaths. Very much has been done to improve this district under the direction of the board of health, and important work is in progress. I attended a meeting of the board of health and was surprised to notice the scope and importance of their action. They seem to order and supervise with authority all kinds of sanitary improvement. Not only supervision of abattoirs and fish markets, waterworks, and quarantine, but the planting of trees by the thousands at Molokai. Their action, sustained by the Government, confined the cholera cases to Honolulu, preventing its spread to the other islands, and in a wonderfully short time destroying every focus of infection. The work of this board is deserving of the highest praise.

The military establishment of the country now consists of two companies of regular infantry, paid and officered as a permanent force, and at least one regiment of uniformed and fairly well-drilled national guards; there is also a reserve force known as a citizen guard, but I did not ascertain the number. The whole force is under the immediate command of Col. R. H. McLean, formerly one of our naval officers. I witnessed a review of about 600 of these troops and was pleased at their soldierly bearing, appropriate and neat uniform, and fine marching. Frequent drills and untiring instruction both by day and in the evening are rapidly molding this force into formidable shape for national defense. The medical department is as yet but partly organized. One officer with the rank of captain holds a daily surgeon's call at the barracks, but there is no hospital corps, and cases needing attention in bed are sent to the "Queen's Hospital." The barracks were models of perfect sanitary condition, and the ration, well cooked and served, exceeds ours in quality and variety. The general health of these well-cared-for men was excellent.

I will close this report, perhaps already too much extended, by briefly remarking on the general sanitary fitness of Honolulu as a military station. Important improvements in water supply now in progress and the sewerage system contemplated in the immediate future will make the city a most desirable residence, even a health resort, for any nationality. The trade winds and porous soil, black sand over coral rock, have thus far prevented the common effects of cesspool poisoning, though it is to be feared immense areas of the city are more or less saturated. Honolulu with its beautiful streets, shaded lawns, and gentle slopes can be made an earthly paradise, and its surrounding elevations offer most healthful sites for post life and quarters for large bodies of troops. The temperature is mild and equable, tempered by the trade winds—not too hot or cold. The rainfall is abundant and droughts are rare. Sea bathing is enjoyed in the suburbs of the city to a degree, as I believe, seen nowhere else on earth.

SANITARY CONDITION OF THE ARMY.

QUARTERS.

In four instances during the course of the year attention was specially invited by medical officers to the insanitary and generally worthless condition of the barrack buildings at their posts. The barracks at Fort Preble, Me., were characterized as very old and not worth repairing. At Fort Custer, Mont., the barracks, with one exception, are old and dilapidated, all the floors uneven, worn through in places, and so near the ground that the subfloor space can not be cleaned nor inspected, except by taking up the floor. The antique and dilapidated condition of the buildings at Whipple Barracks, Ariz., has been reported on various occasions. They are overcrowded and poorly ventilated. Estimates for additions to relieve the overcrowding have been disapproved. In July and August, 1895, the improvement of this post was again discussed and urged by the chief surgeon in the hope that early and favorable action would be taken by the War Department. As previously reported, the barracks at St. Francis Barracks, Fla., are old and in bad repair, while the dormitories are so crowded that the bunks nearly touch each other.

The conditions affecting the casemates at Fort Adams, R. I., and Fort Trumbull, Conn. (mentioned in my last annual report), the damp walls, insufficient ventilation and sunlight have again been reported. Tonsillitis and bronchitis, ascribed by the surgeon to dampness and defective ventilation, occurred in the family of the officer occupying casemate quarters No. 5 at Fort Trumbull. The subject was investigated fully, with the result that these quarters will not hereafter be considered assignable as officers' quarters.

Defective heating of the squad rooms of the barracks at Fort Walla Walla, Wash., was reported in February, 1896, as due in part to an inferior quality of coal and to a greater extent to an insufficiency of stoves and the difficulty of getting parts for the repair of stoves in use. In consequence of this the men kept the ventilators closed, as there was no approach to comfort during cold weather with them open.

Defective heating was reported at Fort Brady, Mich., as the indirect cause of the occurrence of tonsillitis among the troops. The cases came only from the companies occupying the end quarters of the barracks, which, from their situation, are more exposed to draughts and more difficult to heat than the interior quarters. To avoid these draughts the men were accustomed to close the ventilators. Special attention having been given to the heating and ventilation, the disease disappeared.

In January, 1895, Maj. H. McElderry, surgeon, was led to make an investigation into the efficiency of the ventilation in the dormitories at Fort Robinson, Nebr., on account of the occurrence of a large number of cases of tonsillitis among the men. In consequence of this inquiry he recommended a system of winter ventilation such as is described in Circular 10, S. G. O., series 1877, consisting of air ducts leading from both sides of the building under the floor and opening underneath a jacketed stove, with exit apertures in the ceiling near the side and end walls, leading into a cylinder of galvanized iron, tin, or earthenware 18 inches in diameter surrounding the stovepipe from the ceiling, where it rests on an earthenware collar, to 3 feet above the roof, the top of the cylinder capped and the stovepipe projecting a foot or two above the cap of the cylinder. In November, 1895, report was made that the inlet ducts had been constructed and openings made under the stoves, but that the jackets for the stoves, the foul-air exits, and the cylinders for the stovepipe were not yet in place. In January, February, March, and April the surgeon renewed his recommendations for the completion of the scheme of winter ventilation of the dormitories, but no action seems to have been taken. A similar system of winter ventilation was recommended by the same medical officer with better success at Fort Niobrara, Nebr., in January, 1896.

At Fort Douglas, Utah, in December, 1895, Maj. A. C. Girard, surgeon, recommended air boxes beneath the floor, opening underneath the stove, with the latter jacketed to a height of only 14 to 18 inches, sufficient to give an upward direction to the entering air, and not enough to interfere with direct radiation. Instead, however, of placing the exits in the ceiling, which he regarded as permitting too great a loss of heat, he recommended that the stovepipe joint nearest the chimney be replaced by a T, having a pipe running from it perpendicularly to within 12 inches of the floor. In May, 1896, he reported that the ventilating flues introduced experimentally into the quarters of one of the companies had proved satisfactory, and that no case of disease attributable to defective ventilation had occurred in that company since the introduction of the flues in January, while a number of severe cases had occurred in the other companies. He therefore recommended that fresh-air boxes and exit flues be introduced into all the dormitories, so as to be available during the coming winter. The commanding officer approved this recommendation, and the quartermaster was directed to carry it into effect. In the pavilion hospitals of the war of the rebellion this system of fresh-air ducts beneath the stove and exit shafts around the stovepipe gave satisfactory results. It is to be observed, however, that complaint of insufficiently warmed air flooding the floor of the ward and chilling the feet of those not confined to bed came occasionally from wards in which the ventilating shaft was run upward from near the floor, with the stovepipe entering it at a height of 8 feet. A strong and steady air movement toward the lower end of the shaft was established, and in cold weather this was uncomfortable.

The surgeon at Vancouver Barracks, Wash., reported the need of some provision for artificial ventilation in the barracks of that post.

Overcrowding in the quarters occupied by laundresses and married soldiers was noted specially at only one post, Fort Assinniboine, Mont., where the commanding officer used every effort to remedy the evil.

FORT ASSINNIBOINE, MONT.—*Capt. P. R. Egan, October, 1895.*—The quarters occupied by the laundresses or camp followers are all filled to the limits of health, while in some instances that limit has been very much overstretched. In the building known as the "Scouts' Quarters," a sergeant, his wife, eight small children, and one grandchild and son-in-law occupy two rooms. Eight persons sleep in one of these rooms, which is 18 by 15 by 9 feet; the other room, which is the same size, is used as a kitchen, dining, and wash room, besides being used as a dormitory for three persons. In quarters No. 48, one room, 12 by 15 by 9 feet, is occupied by two families, one consisting of husband, wife, and three children, and the other of husband, wife, and one child. In a shed made by boarding up a porch they wash for 20 men and do their cooking; in cold weather this porch can no longer be used for these purposes. In quarters No. 47, a sergeant, his wife, and two children occupy a room of the same size, in which they have to live, cook, and wash. In this climate, where for six months in the year the admission of unheated fresh air is almost an impossibility, it is to be wondered at if such crowding does not lead to serious disease. It is believed that it would be more humane to the families themselves, and a decided saving to the Government, if colored regiments could be prevented from having such an excess of camp followers.

At Fort Niobrara, Nebr., Capt. George McCreary reported the squad rooms of five companies as furnishing only from 400 to 500 cubic feet of space per man of the average occupancy. He claimed that one result of this crowding was at once perceptible by a strong, disagreeable odor to anyone entering the dormitories in the early morning, and that the number of headaches attributable to this cause was large. He recommended that action to provide increased space be taken immediately, that the condition of the men in this respect might be improved before the approach of cold weather, when the windows cease to be available for ventilation. On the approval of the post commander estimates for the additions were forwarded by the quartermaster.

The marked improvements that have been made during the past few years in the sanitary condition of our military posts is specially manifest in the fact that during the past year no report was received concerning the crowded condition of prison rooms or guardhouses, nor concerning the want of ventilation or repair of the buildings occupied for prison purposes. Formerly unfavorable criticism on the quarters provided for men under guard was as common as it is now infrequent.

DRAINAGE AND SEWERAGE.

Inefficient surface drainage at a military post appears from the sanitary reports to be a rarity, as the only post at which such a condition has been mentioned during the year is Fort Niagara, N. Y., where the surface water on the parade ground, according to the reports, covered the board walk after each rainfall for a distance of 6 yards. Inefficient subsoil drainage was noted at Fort Adams, R. I., where the underground gullies are constantly filled from springs, and at Fort Wadsworth, N. Y., where there is a large marshy spot just behind the casemates occupied by the guard and Battery D, First Artillery. The surgeon attributes the large sick rates of this battery to the dampness of soil and recommends improved drainage or, better, that a barrack building be constructed for the men in some other part of the reservation. To a high level of the subsoil water at certain seasons at Fort Wingate, N. Mex., is attributed a prevalence of tonsillitis, diarrheal, catarrhal, and rheumatic diseases, which is unusual in the dry, bracing, and healthful climate of New Mexico. This post was destroyed by

fire July 2, 1896. In rebuilding it a site to the west of the old parade ground should be selected as being dry and well drained by a ravine on either side.

A protest was entered by Capt. Henry I. Raymond, assistant surgeon at Fort Niagara, N. Y., against the disposal of liquid wastes on the ground in the immediate vicinity of buildings. There is no provision for carrying off these wastes from the old French barracks and castle, now occupied by the families of nine enlisted men, and the result is that the saturated ground exhales noxious effluvia. Typhoid fever has occurred in the old barracks and malarial manifestations have been frequent, while unavoidable exclusion of direct sunlight, dampness of the walls, and the avoidable evils of bad drainage and poor policing have brought about a deteriorated condition of system in several of the indwellers of these old buildings.

The condition of the drainage system of Fort Sill, Okla., has been described in several annual reports from this office. According to the present post surgeon the system is now hopelessly beyond repair. Complaints of the stench caused by clogging and overflow are of constant occurrence. At Fort Assinniboine, Mont., a system of subsoil disposal of lavatory and kitchen waste has been put in operation at the barracks. An iron pipe carries the waste water 3 feet beyond the wall of the building. From this point a drain extends for a distance of 30 yards and ends in a cavity about 2 feet deeper than the drain. The floor of the drain is formed by the sand and gravel of the soil—its roof, with that of its terminal expansion, consists of wooden slabs 6 to 8 feet below the surface. As soon as the water leaves the iron pipe it begins to sink into the porous soil. Of course, on account of the warmth of the building, foul-ground air will be draughted into the kitchen through this pipe, as it is probably untrapped. This leaching drain is intended only as a temporary expedient until a proper system of sewerage can be introduced, and as being an improvement on the former method of diffusing the waste water over the surface in mud holes to the inconvenience of travel.

The earth pits at Fort Washakie, Wyo., have been frequently condemned in the reports from this office. It is understood that dry-earth boxes will be introduced as soon as the sawmill at the post is in working condition. It is impossible to keep wooden boxes free from taint when used for this purpose. Pails or troughs of galvanized iron, mounted on low wheels for convenience in removal, are much more cleanly, durable, and economical.

Concerning the efficiency of the dry-earth system there is ample testimony from the experience of many military posts. Where complaint is made there is found on investigation to be some want of the necessary care in carrying out the details of the method. As an instance in point, it was reported of one post during the year that "in only one closet was any dry earth found, and in that no evidence of its systematic use." The action taken by the post commander on this report was to call the attention of company commanders to this negligence, and on his next inspection the surgeon found the dry-earth closets in satisfactory condition.

At the large and important post of Fort Meade, S. Dak., privy pits are still in use. Capt. W. R. R. Fisher, assistant surgeon, in his report for February, 1896, made an earnest appeal for a better method of disposal of excreta, and his views were approved by his superiors at post and department headquarters. A suitable sewerage system will no doubt be considered in connection with the reconstruction of this post.

The privy pits at Fort Keogh, Mont., also should be filled up and replaced by the dry-earth system until sewers are built.

A sewerage system for Fort Clark, Tex., was discussed in a recent sanitary report. The practicability of establishing such a system was considered doubtful. Owing to the contour of the post, the only outlet is into the Las Moras Creek, which would thus be polluted for those living below the post and depending on the creek for their water supply. Besides, on account of the rocky character of the ground, all excavations would have to be blasted, some of the trenches to a depth of 18 feet, the expense of which would be very great.

Obstructions of sewers were reported from several posts. At Fort Huachuca, Ariz., the roots of trees penetrated the joints of the sewer pipe and blocked the sewers, which had to be dug up at several points. Another obstruction at this post was due to a sag in the line of pipe, in which sediment collected. The insufficiency of the fall at Fort Ringgold, Tex., specially mentioned in the last annual report from this office, was the cause of the blocking of pipes at that post. At Fort Barrancas, Fla., the mouth of the sewer became so frequently obstructed that an expenditure was recently authorized for material and labor to change the sewer line and obviate this difficulty.

At Fort Douglas, Utah, the surgeon, Maj. A. C. Girard, reported that the faulty method of surface disposal of the sewage of the post created a nuisance, which, owing to its proximity to residences near the reservation, would eventually involve the United States in damage suits, and recommended the utilization of the sewage on the post garden by means of surface or subsoil irrigation as advocated by George E. Waring, jr., C. E., and as adopted at Sherborn and Lenox, Mass.; the insane asylum near London, Canada; Eastern Insane Asylum of Pennsylvania, and the Maryland Hospital for the Insane. The post commander approved of this recommendation as being the simplest, least expensive, and most effective and expeditious way of establishing a sewerage system at the post. The objections to connecting with the sewerage system of Salt Lake City are, primarily, the expense, as the shortest distance from the post to the city limits is 1 mile, and, secondly, the difference in level (700 feet) between the post and city, which it is claimed would increase dangerously the pressure of the sewer air in the drains and on the traps of the post. In considering expense it must be remembered that when the construction for subsoil irrigation has been completed a certain amount of expense with constant work and supervision is necessary to carry on the process of disposal of the liquid on the soil and of the solids that accumulate in the tank; but the expense attending connection with the system of the city ends when the connecting sewer has been built. The difference in level constitutes no practical objection to the latter method, as internal pressure can be relieved by free communication with the external air and properly arranged traps in the drains and fixtures. In the one case the sewage has to be disposed of on the reservation, requiring continuous attention to prevent a nuisance; in the other it is removed to a distance by water carriage almost automatically. I am therefore inclined, from the sanitary standpoint, to recommend connection with the city sewerage system rather than subsoil irrigation, which should be resorted to only when efficient removal can not otherwise be had.

The faults of the sewerage system at Fort Bayard, N. Mex., have been brought to notice by the surgeon, Capt. William O. Owen, jr., who in each monthly sanitary report for the past two or three years has urged the construction of a well-considered system. At present dry conservancy is used for excreta, and the sewers carry off only waste water; but they are poorly trapped, unventilated, leaky, and otherwise faulty in construction and repair.

Concerning the primitive and imperfect sewerage system at Whipple Barracks, Ariz., the commanding officer states that it can not be remedied without an entire replacement on new and modern principles, not justified by all other conditions or the probable life of the post.

WATER SUPPLIES.

An insufficient water supply was reported from a few posts. Doubtful or bad quality of water was reported from others, and filtration suggested for their purification.

The supply at Fort Canby was reported deficient in August, 1895. The quantity required daily exceeded the supply, and the bath houses had to be closed. The scarcity was due to the rainfall having been unusually light during the year, 20 inches less than the average. The supply consists mainly of surface water impounded in ravines and piped to a cistern, from which it is pumped to a distributing reservoir. Plans submitted three years ago for utilizing the rainfall on the buildings of the post were not favorably considered. Subsequent to the beginning of the fall rains the supply was ample; but in connection with probable deficiency during the dry season, the post surgeon invited attention to the availability of a spring near the new light-house on North Head, which, during the scarcity of August, discharged enough to fill a 2-inch pipe.

In my report for the year ending June 30, 1894, I stated that the insufficiency of the water supply at Fort Warren, Boston Harbor, had been remedied by connecting with the mains of the Boston City supply through the medium of the supply pipe for Gallups Island. It appears, however, that this connection has not proved the efficient remedy that it was expected to be. The pipe is laid along the shore of Gallups Island at about tide level for 1,925 feet and thence under water by a pipe of special manufacture for 1,440 feet to the shore of Georges Island, on which Fort Warren is built, where it becomes an ordinary underground distributing pipe, leading to the fortification and the cottages on the beach. Very shortly after the pipe was laid, December 12, 1893, the water was turned off because of a leak occasioned by the anchor of a schooner. Since then leaks in the pipe have been of frequent occurrence from such causes and from freezing of the pipe at the tide line on Gallups Island. Fishermen often seek shelter in stress of weather under the lee of Georges Island and damage the pipe with their anchors. Divers report that the line of pipe has quite a zigzag course, owing to this and to the strong tidal currents in the harbor. The water was turned off December 31, 1894, because of a break supposed to be between Long Island and Gallups. This was reported to the city, which is responsible for this part of the pipe, and it was learned that an inspection would be made and the injury repaired as soon as the weather permitted. Not until September 15, 1895, however, was the water again turned on. The city found numerous repairs necessary, and to avoid future breaks a trench was dredged along the bottom of the bay for the protection of the pipe. Breaks also occurred from freezing in several places on Gallups Island, where the pipe had but a light covering of sand. Since December 31, 1894, water in the wells and cisterns of the post has been used, and when this supply became exhausted water was purchased and brought from Boston in a water boat at considerable expense; and, in fact, the same condition of affairs continues to the present time, for the sanitary report for April, 1896, states that the water for the supply of the post is brought from Boston in the steamer

Resolute daily and pumped into the distributing tank. This is supplemented by filling the tank once or twice a week from the wells and cisterns. Salt water is pumped daily for use in the latrines and for the periodic flushing of the sewers. Capt. Paul Clendenin made a special report on the condition of the water supply at this post in January last, a copy of which was furnished for the consideration of a board of officers, of which he was appointed a member, convened February 18, to determine and recommend a permanent system of water supply.

At Columbus Barracks a deficiency of water was reported during the past summer, especially noticeable toward evening. An analysis of this water by Prof. Curtis C. Howard, of the Starling Medical College, has been placed on record in parts per 100,000, as follows: Total solids, 59.7; mineral matter, 40.3; organic and volatile, 19.4; iron, 0.69; hardness, 36.9; temporary, 20.7; free ammonia, 0.035; albuminoid ammonia, 0.006; nitrites, none; nitrates, 0.034; chlorin, 0.14; oxygen required, 0.08. The large quantity of free ammonia is regarded as due to the reduction of nitrates, and not to any recent decomposition of nitrogenous organic matters. The water is much harder than is desirable, and the presence of the iron is objectionable, as it exists in quantity perceptible to the taste and gives a reddish stain to all containing vessels. The organic purity of the water is, however, beyond question.

A temporary deficiency of water occurred at Fort Monroe in December last on account of the prevailing dry weather. The cisterns of some of the officers' quarters were empty, and water had to be carried from a distance for bathing and flushing closets. The use of salt water for the closets and urinals, suggested by the surgeon, was not approved, as it involved an expense for a new water system, which would be unnecessary if the supply from two wells recently recommended should prove as large as anticipated. Water was struck in the artesian boring at Chamberlin's Hotel at a depth of 945 feet. It flowed freely, but was saline and unfit for drinking purposes.

A scarcity, also temporary in character, was experienced at Fort Grant during the past year. Until two years ago a water famine was anticipated at this post every summer, but the line of pipe having been extended at that time up the canyon to a point where there seemed to be a liberal and permanent supply, it was supposed that the water question had been settled. Toward the middle of September, 1895, the supply was so short that it was difficult to get enough from the mains for ordinary household purposes. Maj. E. F. Gardner surgeon, reported as follows:

> Fortunately the heavy rains of the latter part of the month relieved the situation, and there is now sufficient. The water supplied to the post is simply upland surface water, and the amount is entirely dependent on the local rainfall. After the supply from melted snow in the mountains is exhausted in the spring, if there is no summer rain, there is no water, as may be seen from the fact that although 4 inches of rain fell during the month of August—and this is an unusual fall for this place—there was a shortage of water before the middle of September. As in the case of all such supplies there is much wastage, for after the reservoirs are filled the remainder runs off and is lost, so far as the post supply is concerned. At present there is plenty of water, but in two or three weeks from now there may be a shortage again. The water question is one that will require consideration, unless there is a change of climate in this locality.

This report led to a full consideration of the conditions at Fort Grant, and plans and estimates were made out for machinery, pumps, etc., for increasing the supply, but these were not approved on account of the large amounts expended so recently in extending the present system. The sanitary reports from September to the present time show the supply to have been amply sufficient for the needs of the garrison.

The water supplied to the garrison of the Presidio of San Francisco, Cal., is pumped from wells sunk in the southern part of the reservation. The quantity furnished is insufficient, particularly in the dry season, but the Quartermaster's Department is taking steps to increase the number of wells and to add to the storage capacity.

Maj. J. B. Girard, surgeon, December, 1895.—The water furnished to this garrison is obtained from wells sunk on the southern side of the reservation and pumped into a reservoir located on a point close by and moderately elevated above the post buildings. The capacity of the reservoir according to the best obtainable calculations is 440,640 gallons, and the endeavor of the pumping engineer is to keep it constantly filled up. Were he successful in attaining that object it is evident that the garrison could always depend on an abundant supply of water for all purposes. Unfortunately, instead of such being the case, it is found that so long as the escape pipe is open, the level of the water in the reservoir, in spite of the pumping, tends to get lower; and in order to preserve the balance, and to prevent the final emptying of the reservoir, said escape pipe is closed during a certain number of hours at night, and reopened in the morning. Observations accurately taken during the past few weeks at times when the reservoir was closed show that the pumps, working unremittingly, will deliver an average of about 4,165 gallons of water per hour, or 99,960 gallons per day. If, as stated before, the contents of the reservoir tend to escape faster than they are pumped in, the inference is that the garrison requires more water than is furnished, or that the quantity named above is not actually delivered. If, in addition, the fact is duly considered that the water supply now obtained from the wells is used exclusively by the human population of the post for drinking, washing, and the flushing of closets and sewers, and that there are in the garrison over 500 public animals entitled to good water and who do not get it; that, furthermore, a great deal of water is needed for the irrigation of gardens, lawns, and ornamental shrubbery as well as for the sprinkling of roadways during the dry season; that, finally, the danger of fires in a post made up mostly of wooden buildings makes it absolutely necessary that there should always be an abundant reserve supply of water on hand for their suppression, the conclusion seems unavoidable that the water supply as delivered at present is insufficient.

Lieut. Col. A. S. Kimball, chief quartermaster.—The reservoir holds about 460,000 gallons. The water has been shut off from the post from 12 o'clock midnight to 4 a. m. each night during the past few weeks for the purpose of accurately testing the inflow to the reservoir, not for the purpose of preventing the emptying of the reservoir. The tests made show that about 100,000 gallons of water daily have been delivered into the reservoir, sometimes as much as 115,000 gallons; also that the daily consumption of water at the post at this season of the year is about 90,000 gallons. It has therefore been practicable recently to shut down the pumps occasionally, the supply of water pumped being larger than the demand. During the warm, dry season the quantity of water consumed at the post is believed to have been double what it is now, and it was then difficult to maintain the supply.

On November 18 the reservoir came near being emptied, notwithstanding the fact that the pumps at that time were kept running constantly. One hundred gallons per diem for each person at the post should be a sufficient quantity. For the whole post the amount at that rate would be about 90,000 gallons per day, and this can be supplied by the present plant pumping twenty hours daily. The animals at the post are supplied from a flowing well northeast of the existing stables. The water from this well is conveyed by means of a wooden flume to troughs near the stables, is of good quality and sufficient in quantity for all the animals. When new stables are constructed, on the site filled for the purpose on a lower level than the existing stables, it is proposed to pipe water from the well referred to to each stable, and it will not be necessary to connect the stables and corral with the post water mains. Tests are now being made by measurements taken through a weir to determine the capacity of each of the existing wells at the pumping works, not only to the suction limit of the main pump, but also to the full depth of the wells, in order that when the necessary data are obtained recommendations may be made for such additional improvements as may be necessary to furnish with eight hours' pumping per diem a sufficient supply of water for the needs of the post. * * * There is no question but that a sufficient supply of good potable water is contained in the water-bearing strata below the surface of the ground in the immediate vicinity of the present plant. The existing wells have now supplied the needs of the Presidio for upward of a year, and the recent tests, showing a capacity of 100,000 to 150,000 gallons per diem, have been made after the end of the long dry season, before sufficient rains have fallen to have any tendency to increase the efficiency of the wells and when the wells are consequently furnishing the minimum supply. Either one of the pumps at the new works is capable of delivering 40,000 gallons per hour into the reservoir, if suf-

ficient water were available to run it at its full capacity. The problem to be solved is to obtain sufficient water by sinking additional wells where the underground supply is found to be most abundant, and to raise this water to the suction limit of the pumps by deep-well pumps or other means, so that one of the main pumps may be run more nearly to its full capacity and supply the wants of the Presidio by pumping not to exceed eight hours per diem.

To this end tests and experiments are being made on which to base recommendations for the necessary improvements, and no effort will be spared by me to accomplish this result. As regards the suitability of the water from the flowing well in the marsh northeast of existing stables at the Presidio for use of animals, I inclose copy of report of analysis made March 13, 1894, by Thomas Price & Son, analytical chemists of this city. This water is classed by these chemists as suitable for domestic purposes as well as for the use of animals.

The question of the potability of this water I regard as important, as it is proposed to recommend the expenditure of a considerable sum for sinking a new and well-constructed well in the same vicinity and for piping the water to the new stables when they are erected. The water furnished for domestic purposes at the Presidio from the wells at the new pumping works near Mountain Lake is clear, colorless, odorless, well aerated, and perfectly safe for domestic use, and is classed by Professor Price as among the best water to be obtained anywhere.

Thomas Price & Son, chemists, San Francisco, Cal.—The total residue per United States gallon amounts to 26.36 grains, of which 2.04 grains are chlorine, equivalent to 3.35 grains common salt. The free ammonia present amounts to 0.04 part per million, and the albuminoid ammonia to 0.06 part per million.

Brig. Gen. James W. Forsyth, commanding department.—When the system herein referred to for supplying water to the Presidio garrison was adopted, it was hoped that the wells provided would furnish an ample supply of water for all the needs of the situation. It was soon demonstrated that during the dry season there were not sufficient wells, and others were added. These, however, were still not sufficient to supply all the water that was desirable during the continuance of dry weather, but since the rainy season has begun it is believed that an ample supply of water has been furnished. More wells and a larger reservoir are features of improvements for which the necessary steps are now being taken to add to the water system at the Presidio. When these improvements are completed, it is believed that the water supply will then be ample for the garrison as at present constituted. At any rate, the probabilities are sufficiently promising to justify a thorough trial of that method of meeting the necessities of the situation before resort to connection with the city water system. Proper efforts are therefore being made to perfect the water supply, and it is believed that these efforts will finally meet with success.

The quality of the reserve supply of water stored in the cement-lined brick cisterns of Alcatraz Island was made the subject of criticism by Capt. H. E. McVay. The daily supply is brought from San Francisco by steamer and is pumped into tanks on the citadel for distribution. This water is contaminated by drainage from certain hog ranches, market gardens, and small unsewered settlements. Its average free ammonia is about 0.014 and its albuminoid 0.016 parts per 100,000. When from any cause the daily supply is not received, reserve water from the cisterns is pumped by wind power into the tanks. These cisterns, which are in excellent repair, have a capacity of 250,000 gallons, and as sea water is used for sanitary purposes, the daily emergency drain on the reserve supply amounts to only about 5,000 gallons. The great body of water therefore remains practically unchanged from month to month. Three years ago the cisterns were cleaned out and filled, the covers of the manholes cemented down, and all rain or other water inflow excluded. In the warm, dark, tightly closed cisterns the organic matter originally present in the water underwent change, and a slimy sediment collected on the bottom and sides. Water drawn and allowed to stand over night develops an unpleasant odor, and microscopic examination of the sediment discovers many forms of animal and vegetable life, including some which are generally recognized as associated with marked organic impurity of the water containing them, as, for instance, anguillula, vorticels, and paramecia. It is to be regretted that a careful chemical examination of this stored water was not made.

It has been recommended that the cisterns be pumped out one at a time, cleaned and filled with a fresh supply of water, and that all communication between the old and the new water be entirely cut off until all the cisterns have been cleaned and refilled, the old water in the meantime being gradually used up. This recommendation is being carried out. The floors and walls are being thoroughly washed, and every effort is being made to put the cisterns in the best possible sanitary condition. It is to be hoped these efforts may result in an improvement, for a time at least, in the quality of the stored water. If no improvement result, or if after a time the same condition of affairs as exists at present recur, there is no alternative but to endure it or to procure the supply from a purer source, the latter of which is greatly to be desired.

The post of Jefferson Barracks draws its water from the city mains of St. Louis, Mo. Complaint of inadequacy and of turbidity has frequently been made, as, for instance, in the following from a report by Maj. R. H. White, surgeon:

The water supply is inadequate in quantity and of a quality that requires filtration and boiling before use as food. The present population of the post is approximately 931, 653 human and 278 animal, and the monthly water supply 3,333,333⅓ gallons, costing $412, or more than 100 gallons per head daily. The aggregate quantity of water would thus seem to give an allowance to each individual sufficient for sanitary purposes; but in fact the water supply has on many occasions during the month been insufficient for the demands of the bathroom, the water-closet, and other domestic uses of the post. This argues faulty distribution or inadequate pressure, either of which may be easily remedied by the engineer, or perhaps leakage or waste may be implied. Inadequacy of the water supply can and should be corrected.

It is within the fact also to say that the water supply always contains much suspended matter, which may at any time be in part dilute sewage, infected with the germs of typhoid fever and other water-borne diseases. Sedimentation and filtration can be so applied on the reservation as to give an ample supply of clear and pure water at a cost small when compared with the beneficial result. Machinery for the manufacture of ice and for the supply of distilled water, bored or artesian wells in sufficient number, or the two methods combined, would accomplish the same object, and one of these wells within a short distance of the reservation, 140 feet deep, shows what can be done on that plan. The importance of this matter is shown by the recent remark of an English sanitarian: "Every fatal case of typhoid is in fact a violent death, an example of water poisoning, and should be the subject of sanitary inquest."

The water of Las Moras Spring, at Fort Clark, has continued clear and free from contamination by surface washings. In fact, flooding does not appear to have taken place since August, 1894, a result probably due to the removal of the masonry approaches of the footbridge below the springs, which formerly obstructed the channel in times of high water and threw the backwater into the pond. A group of springs rising in the northern edge of the pool has been inclosed in a wooden caisson and a branch pipe inserted to connect with the main intake of the pump. It is as yet considered uncertain whether the inclosed springs are completely isolated from the surrounding water, but this result appears probable. An overflow of the pool by storm water will show whether the inclosed springs are well protected or not. Two of the large tanks for storing the main water supply have been replaced by new ones. But although the water from the springs has continued clear, distilled water has been provided in quantity from 500 to 600 gallons daily from the ice machine for use as drinking water.

The reports from Fort Niobrara characterize the water supply as adequate and of good quality, but susceptible of improvement by pumping from a filtering well instead of directly from the pond. The water is said to be at times covered with a green scum in which the bodies of dead insects, beetles, etc., are entangled. Measures for its improvement are under consideration.

The water from the Missouri River at Fort Leavenworth has been repeatedly condemned. According to the chief surgeon—

It has probably been the cause of many cases of typhoid fever and other diseases, and of how many deaths no one knows. Each year, and almost each month, an appeal is made for better water, but instead of making a radical change and treating the question in a business and humanitarian manner, and furnishing good water, which certainly can be done, a few Pasteur filters have been introduced; but, as might be expected, the great bulk of the water used is direct from the hydrants. The question of better water for this post should certainly receive early attention.

Maj. Calvin De Witt, surgeon.—There is no change in the water supply. The Pasteur filters lately placed in the barracks are of value only as they are kept clean. If the organic matter be allowed to invade the interstices of the filtering material it will become polluted, and the water which passes through it will also become impure. To prevent this, and because the water supplied the post is so very dirty, I recommend that the filters be cleaned once each week; and I suggest that a man from each organization be selected for this purpose, as the unglazed porcelain tubes through which the water is filtered are fragile and require careful handling.

The Potomac River water pumped from near the Aqueduct Bridge for the supply of Fort Myer was described fully in my last annual report. In April last the water had a disagreeable taste and odor, even after passing through the Pasteur filter.

Complaint was made in February and March, 1896, of the water supplied to Davids Island by the New Rochelle Water Company. A bad taste perceptible in the water, particularly in the morning, was ascribed by the company to the presence of algæ in the mains. Samples examined in the laboratory of this office showed an excess of organic matter of vegetable origin in progress of decomposition; but bacteriological examination manifested the freedom of the water from the colon bacillus. The results of the chemical inquiry were, in parts per 100,000: Solids dissolved, 8.2; chlorin, 0.6; nitrites, none; nitrates present—free ammonia, 0.0035; albuminoid, 0.020; oxygen required to oxidize organic matter, 0.356.

On account of the turbidity of the lake supply of Fort Sheridan during the greater part of November and December, 1895, the post surgeon requested that his analytical results be verified in the laboratory of the Army Medical School. The samples on their arrival were turned over to Capt. Thomas U. Raymond, who was spending a part of his leave of absence in the sanitary laboratory of the school. His report was as follows, the figures representing parts per 100,000 of the water:

Date, February 7, 1896: Color, none; odor, none; taste, palatable; total solids, 17.5; loss on ignition, 7; chlorin, 0.447; free ammonia, 0.0008; albuminoid ammonia, 0.010; nitrites, faint trace; nitric acid, 0.0741; oxygen required, 0.2449; total hardness, 7.5; permanent hardness, 7.083.

The inorganic residue, 10.5 parts per 100,000 (total solids 17.5—loss on ignition, 7.0 = 10.5), consists largely of calcium sulphate (permanent hardness, 7.083, in terms of calcium carbonate = 9.633 parts of calcium sulphate—100 : 7.083 :: 136 : 9.633), there being about 9.633 parts of calcium sulphate per 100,000. The remaining 0.867 part of the inorganic residue consists of iron 0.1 part and sodium chlorid about 0.767 part = Na 0.290 + Cl 0.447 part. The faint trace of nitrites in this water is not considered to be of an unfavorable import in view of the fact that the water examined was drawn from the hydrant at Fort Sheridan hospital November 25, 1895, and has since been stored.

A further examination of this water made in the laboratory of the Surgeon-General's Office, July 29, 1896, gave such satisfactory results as: No free ammonia; albuminoid, 0.006; oxygen required, 0.32; total solids, 17; chlorin, 0.6, with a trace of nitrites. This sample was two weeks in transit from Fort Sheridan and it is not improbable that it underwent some change during that time, as the reduction of free ammonia into nitrogen oxides. The most noticeable features of the

analysis were the large amount of oxygen absorbed as compared with the albuminoids and the avidity with which it was taken up. Both of these are explained by the iron present in the water.

The water supply of Fort Reno consists of drinking water wagoned from Caddo Springs, which furnish the Indian school with its water for all purposes. The drinking supply of the post is eked out by condensed water from the ice machine, but occasionally hydrant water is used when the Canadian River, which must be forded to reach the springs, is too high to be crossed. The hydrant water is pumped from a group of driven wells and distributed by pipes. The wells are in the river bottom, about 600 yards from the post and 300 yards from the stream; they are said to reach below an impenetrable bed of clay. A pipe connects them with the river, to be used in case the wells become dry, but the valve is always closed, as the wells continue to furnish an ample supply. On account of the large quantity of lime and magnesia salts dissolved in it the water is not palatable, and is in fact unfit for drinking or economic purposes, as its permanent hardness on recent analysis is equivalent to 27 parts of carbonate of lime per 100,000 of the water; its total solids, 117 parts, equal to 68 grains per U. S. gallon, 25 grains of which consists of chloride of sodium (15.3 chlorine per 100,000 parts). During the year a new spring was discovered and developed in the direction of Caddo Springs, and a board of officers was appointed by the post commander to examine and report upon it. The board sent samples of the water to this office for analysis, which showed in parts per 100,000 of the water 14 of dissolved solids, 7 of hardness (of which 5 were permanent), a trace of free ammonia and 0.003 of albuminoid ammonia, 0.6 of chlorin, no nitrites, and a trace only of nitrates—a spring water of excellent quality. A bacteriological examination by Capt. S. Q. Robinson yielded results in accord with those of the chemical inquiry.

The board finds from its investigation that by using the new spring a saving of at least 1 mile would be made in the distance hauled, and the present dangerous crossing of the Chicago and Rock Island and Pacific railroads would be avoided.

The board also finds that the water from the old spring is not sufficient for the needs of the Cheyenne school and the post. It is believed from all the information obtainable that water from the new spring will be ample at all times for the needs of the post. In view of the facts stated above, the board recommends that the drinking water for the post of Fort Reno, Okla., be obtained from the new spring; that it be obtained as heretofore, by means of the water wagon; and that the quartermaster at this post be directed, after a consultation with the acting Indian agent, and with his approval, to do such work as may be necessary to put the spring and the roads leading to it in proper condition, so that water may be obtained and brought to the post as recommended, at as early a date as practicable.

The source of the water supply at Fort Custer is the Little Big Horn River. A pump forces the water to a reservoir, whence a pipe system supplies the post. The water is at times very turbid from the breaking up of the ice and the melting of snow on the hills. At times it has a foul odor and disagreeable taste. Organic refuse from an agency slaughterhouse and large Indian camps drain into it. Filtration has frequently been recommended. In March, 1896, the number of bacteria per cubic centimeter was, according to Steward Hartung, 4,320 to 5,025. Lieut. D. C. Howard, assistant surgeon, gave the following results of analysis: Color, greenish tint; turbidity, slight; sediment, slight; reaction, distinctly acid before boiling, faintly acid after boiling. In parts per 100,000: Total solids, 35; fixed solids, 27.6; organic and volatile, 7.4, with considerable blackening and incandescence; hardness, temporary, 14.2; permanent, 21.8; total, 36; chlorin, 1.44; oxygen required,

0.4; free ammonia, 0.006 (in three consecutive measures, as follows: 0.025, 0.0031, 0.0031); albuminoid ammonia, 0.0175 (given off as follows: 0.05, 0.025, 0.0125); nitrites, none; nitrates by aluminium, 0.055. Samples of this water are at present under examination in the laboratory of this office.

CLOTHING.

In my last annual report I had occasion to invite attention to adverse criticism by certain medical officers on the quality of the leather in the shoes issued to the troops. No such criticism is found in the reports of the present year; yet in one instance a number of men were disabled on a practice march by abrasions and inflammations of the feet, attributed to ill-fitting shoes. The shoe now furnished by the Quartermaster's Department appears to be of excellent quality, make, and shape, and there seems to be no reason why men should be disabled on a practice march if proper care is taken in having their shoes adapted to the feet before the march is undertaken. The footwear of the infantry soldier is deserving of as much attention as is deemed requisite to be given to the shoeing of battery and troop horses. Men who begin a practice march simultaneously with the process of breaking in a pair of new shoes are likely to suffer from chafings or undue pressure which may disable them temporarily and unnecessarily.

Considerable improvement has been made in the quality of the underwear issued during the past year.

The various articles of clothing have been of good quality and suitable to the climate and service.

Several medical officers at Northern posts have referred cases of bronchial catarrh and rheumatism to needless and thoughtless exposure on the part of the men. They pass from barrack rooms to kitchens, water-closets, or other adjacent buildings in inclement weather in their shirt sleeves and without their caps or otherwise insufficiently protected. Such unnecessary exposure should be prevented. Care should also be taken that the change from heavy to light underwear be not made so early in the season, as many cases of sickness have been attributed to this cause. Dangerous cooling after military or gymnastic exercises should also be guarded against.

FOOD.

The food of the men has been reported almost uniformly as ample in quantity, of excellent quality, and well cooked. In only two instances were complaints made of the beef furnished under contract. In July, 1895, at Fort Wadsworth, N. Y., and in August of the same year at St. Francis Barracks, Fla. In every instance at the former post when complaint was made a board of officers condemned the beef, and a good marketable article was purchased at the expense of the contractor. The complaint at St. Francis Barracks was to the effect that the beef was tough, lean, and stringy, with a disagreeable taste and odor, and with an unusual proportion of bone, as the dressed cattle did not ordinarily weigh more than 300 pounds. The contract provided for good beef and for procuring it in open market if the contractor failed to furnish it; but as the open markets of that vicinity furnished only the same range-fed Florida beef, the surgeon recommended that provision be made for the issue of Western beef to the command. A new contract was made by the chief commissary, and the report for the following month stated that since this new contract went into effect the beef had been of good quality and entirely satisfactory.

A poor quality of bread was reported from three posts. At two of these the baker was probably in fault. At the third the cause was supposed to be an inferior grade of flour in the blend; but this conclusion can hardly be admitted, as the same flour issued to other posts in the department yielded good bread.

HABITS OF THE MEN.

The remarks on sanitary reports concerning the habits of the men are generally satisfactory, and are corroborated by the lessened rates of the past year for venereal diseases and alcoholism.

Facilities for personal cleanliness have been greatly improved at our military posts during the past few years. At present they are rarely referred to as inadequate. The poorest kind of accommodation for bathing was reported from Camp Eagle Pass, Tex., where the bath house consists of a loosely-boarded structure, with no provision for heating and little protection during cold weather. This will no doubt be remedied soon, as plans and estimates for the construction of a permanent bath house have been forwarded. According to the chief surgeon, one of the principal needs of Fort Niobrara, Nebr., is a proper provision for bathing; and as the barracks are already inadequate in size to the strength of the companies, so that any deduction of space for bathrooms is inadvisable, he recommends the construction of a post bath house, fitted with a swimming pool, bath stalls, bath tubs, dressing stalls, and a room for resting after the bath, all of which he considers could be connected profitably with a post gymnasium.

Gymnastic training and athletic sports are held responsible by many medical officers for the increase in the number of injuries during the past year. This view is no doubt correct, but since the increase was not manifested in the rate of nonefficiency, it is evident that the extra cases, which raised the admission rate above the average of the preceding decade, were not of a severe character. The accidents of the gymnasium and the athletic fields are offset by the benefits derived from the training. Men are drawn away from vicious habits, which tend to increase the sick list, and the ability of the system to withstand harmful influences is greatly increased. Hence, although the list of injuries is enlarged by the practice of athletics, the rates of disability from injury and disease are less than in any previous year in the history of our Army.

STATISTICAL TABLES.

The following statistical tables give in detail the data on which the statements of this report are based. They are:

I. Numerical view of the effects of disease and injury on the Army during the calendar year 1895 as compared with the corresponding data of the year 1894 and of the decade ended December 31, 1893.

II. The relative sickness of the troops (white and negro) in the various military departments during the year 1895.

III. The military posts in each department, alphabetically arranged, with mean strength, and admissions for disease and injury; also deaths and discharges, with ratios per thousand of strength for admissions and noneffectiveness, the averages of daily sickness, and the meteorological data for the year 1895.

IV. General view of the results of disease and injury at each of the military stations, arranged in the order of their mean strength.

V. Twenty posts having the highest rates of admission for the year; the said rates compared with those of 1890 to 1894, inclusive.

VI. Twenty posts having the lowest rates of admission for the year; the said rates compared with those of 1890 to 1894, inclusive.

VII. Twenty posts having the highest rates of noneffectiveness during the year; the said rates compared with those of 1890 to 1894, inclusive.

VIII. Twenty posts having the lowest rates of noneffectiveness during the year; the said rates compared with those of 1890 to 1894, inclusive.

IX. Twenty posts having the highest admission rates for disease, excluding venereal diseases, vaccinia, and alcoholism, together with their ratios for deaths, discharges, and constant noneffectiveness; also the corresponding average rates of the Army.

X. Twenty posts having the highest noneffective rates for disease, excluding venereal diseases, vaccinia, and alcoholism, together with the average number sick daily, and average duration of each case; also the corresponding average rates of the Army.

XI. The military posts in each department, showing the rates of admission, death, discharge, and noneffectiveness for disease, not including venereal diseases, vaccinia, nor alcoholism.

XII. The rates per thousand of strength of admission, death, discharge, and noneffectiveness of the Army and of the troops in the several departments for the year, as compared with the ratios for 1894 and for the decade 1884–1893.

XIII. Distribution of certain important diseases at United States military posts during the year.

XIV. Twenty posts giving the largest admission rates for malarial diseases, rheumatism, diarrheal and venereal diseases, respectively.

XV. Twenty posts giving the highest noneffective rates for malarial diseases, rheumatism, diarrheal and venereal diseases, respectively.

XVI. The prevalence of alcoholism at the various posts and its influence on the effective force of the garrisons.

XVII. Discharges for disability (not included elsewhere) contracted before enlistment, by misconduct or bad habits. (See sec. 3, par. 140, A. R.)

XVIII. Number of applicants for enlistment examined during the year, with the number accepted, rejected on primary examination, and declined; also ratios per thousand examined.

XIX. Nativity of accepted recruits, with ratios per thousand accepted.

XX. Causes of rejection among 17,645 recruits, with corresponding ratios per thousand of each race examined.

XXI. Average height, weight, and chest measure of 8,643 recruits accepted during the year.

INTERNATIONAL TABLES.

I. Examination of recruits, year 1895.

II. Movements of sick by departments, absolute numbers and ratios.

III. Movements of sick by branches of military service and by months.

IV. Movements of sick by larger garrisons.

V. Prevalence of important diseases.

VI. Admissions of important diseases by branches of the military service.

VII. Admissions of important diseases by months.

VIII. Deaths according to years of service and age.

TABLE I.—*Numerical view of the effects of disease and injury on the Army during the calendar year 1895 as compared with the corresponding data for 1894 and for the decade 1884–1893.*

United States Army.	White.	Negro.	Total.
Average strength shown—			
By returns of Adjutant-General	a 25,139	a 2,187	a 27,326
By reports of Medical Department	b 23,195	b 2,009	b 25,204
All admissions to sick report—			
During year	26,142	1,840	27,982
Treated in hospital	15,393	1,107	16,500
Treated in quarters	9,839	688	10,527
Treated in field	910	45	955
Ratios of all admissions—			
Per 1,000 of mean strength	1,127.05	915.88	1,110.22
For previous year	1,116.44	811.60	1,089.73
For preceding decade	1,317.40	1,460.57	1,329.94
Admissions for disease	19,785	1,324	21,109
Ratios per 1,000 of mean strength	852.99	659.03	837.53
Ratios per 1,000 for previous year	871.64	575.74	845.52
Ratios per 1,000 for preceding decade	1,065.34	1,155.59	1,072.57
Admissions for injury	6,357	516	6,873
Ratios per 1,000 of mean strength	274.07	256.84	272.69
Ratios per 1,000 for previous year	244.80	235.86	244.21
Ratios per 1,000 for preceding decade	252.07	304.98	257.37
Ratios per 1,000 of mean strength of cases—			
Treated in hospital	663.63	551.02	654.66
Treated in quarters	424.19	342.46	417.67
Treated in field	39.23	22.40	37.90
Number constantly noneffective—			
During year	801.11	53.05	854.15
Ratios per 1,000 of mean strength	34.54	26.40	33.89
Ratios for previous year	35.18	25.93	34.49
Ratios for preceding decade	41.86	42.17	41.87
Days lost on account of sickness—			
During year	292,404	19,362	311,766
Average for each man of Army	12.6	9.6	12.4
Average for each man for previous year	12.8	9.5	12.6
Average for each man for preceding decade	15.3	15.4	15.3
Average days each case was treated	11.2	10.5	11.1
For previous year	11.5	11.7	11.6
For preceding decade	11.8	10.9	11.7
Average days treatment for patients—			
Discharged for disability	85.78	116.55	87.14
Who died	20.45	43.67	21.93
Discharges for disability	239	11	250
Ratios per 1,000 of mean strength	9.51	5.03	9.15
Ratios per 1,000 for previous year	13.56	9.40	13.30
Ratios per 1,000 for preceding decade	23.77	23.62	23.77
Discharges for disease	180	6	186
Ratios per 1,000 of mean strength	7.16	2.74	6.81
Ratios per 1,000 for previous year	10.60	7.61	10.41
Ratios per 1,000 for preceding decade	20.04	19.58	20.03
Discharges for injury	59	5	64
Ratios per 1,000 of mean strength	2.35	2.29	2.34
Ratios per 1,000 for previous year	2.96	1.79	2.89
Ratios per 1,000 for preceding decade	3.73	4.05	3.75
Deaths from all causes	132	9	141
Ratios per 1,000 of mean strength	5.25	4.12	5.16
Ratios per 1,000 for previous year	6.48	6.26	6.69
Ratios per 1,000 for preceding decade	7.66	9.07	7.85
Deaths from disease	91	6	97
Ratios per 1,000 of mean strength	3.62	2.74	3.55
Ratios per 1,000 for previous year	4.44	4.47	4.55
Ratios per 1,000 for preceding decade	5.12	6.34	5.26
Deaths from injury	41	3	44
Ratios per 1,000 of mean strength	1.63	1.37	1.61
Ratios per 1,000 for previous year	2.04	1.79	2.13
Ratios per 1,000 for preceding decade	2.54	2.74	2.58

a Used in computing the ratios of discharges and deaths for the Army.
b Used in computing all ratios for the Army except those of discharges and deaths.

TABLE II.—*Relative sickness among the troops (white and negro) in the various military departments during the year 1895.*

Department.	Mean strength of command.	Admissions.						Admission rate per 1,000 of mean strength.	Troops per 1,000 of mean strength constantly noneffective from sickness.
		Quarters.	Hospital.	Field.	Disease.	Injury.	Total.		
East:									
White	7,875	3,551	6,101	175	7,792	2,035	9,827	1,247.87	34.08
Total	7,875	3,551	6,101	175	7,792	2,035	9,827	1,247.87	34.08
Missouri:									
White	4,111	2,102	2,294	103	3,241	1,258	4,499	1,094.38	35.05
Total	4,111	2,102	2,294	103	3,241	1,258	4,499	1,094.38	35.05
Dakota:									
White	1,575	673	596	98	1,010	357	1,367	867.94	28.36
Negro	990	256	506	23	554	231	785	792.93	26.79
Total	2,565	929	1,102	121	1,564	588	2,152	838.99	27.75
Platte:									
White	2,077	831	1,523	157	1,890	621	2,511	1,208.96	36.17
Negro	419	193	331	6	365	165	530	1,264.92	28.35
Total	2,496	1,024	1,854	163	2,255	786	3,041	1,218.35	34.86
Texas:									
White	1,884	928	1,599	27	1,920	634	2,554	1,355.63	42.26
Total	1,884	928	1,599	27	1,920	634	2,554	1,355.63	42.26
Colorado:									
White	2,588	856	1,700	148	1,991	713	2,704	1,044.82	30.89
Negro	598	238	270	16	405	119	524	876.25	22.95
Total	3,186	1,094	1,970	164	2,396	832	3,228	1,013.18	29.40
California:									
White	1,499	457	771	192	1,047	373	1,420	947.30	27.96
Total	1,499	457	771	192	1,047	373	1,420	947.30	27.96
Columbia:									
White	1,547	438	787	10	871	364	1,235	798.32	27.65
Total	1,547	438	787	10	871	364	1,235	798.32	27.65
General Hospital at Hot Springs:									
White	39	3	22	.....	23	2	25	641.03	.....
Negro	2	1	.....	.....	.....	1	1	500.00	.....
Total	41	4	22	.....	23	3	26	634.15	.....
Discharges and deaths at large:									
White	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....	.....	.....
The Army:									
White	23,195	9,839	15,393	910	19,785	6,357	26,142	1,127.05	34.54
Negro	2,009	688	1,107	45	1,324	516	1,840	915.88	26.40
Total	25,204	10,527	16,500	955	21,109	6,873	27,982	1,110.22	33.89

TABLE III.—*Military posts in each department, alphabetically arranged, with mean strength, and admissions for disease and injury; also discharges and deaths, with ratios per thousand of strength for admissions and noneffectiveness, the averages of daily sickness, and the meteorological data for 1895.*

DEPARTMENT OF THE EAST.

Name of station.	Mean strength.	Cases.			Admission rate per 1,000 of mean strength.	Average number of sick daily.	Constantly noneffective per 1,000 of mean strength.	Discharges for disability.	Deaths.	Altitude of station.	Temperature.			Total precipitation.
		Disease.	Injury.	Total.							Mean.	Maximum.	Minimum.	
										Feet.	°	°	°	*In.*
Adams, Fort, R. I.	289	196	94	290	1,003.46	12.16	42.06	1	2	30	48.5	91	— 7	46.37
Allegheny Arsenal, Pa.	31	20	6	26	838.71	.88	28.55	...	...	704	52.3	98	— 6	27.50
Augusta Arsenal, Ga.	29	22	3	25	862.07	.65	22.29	1	1	600	62.5	100	8	52.10
Baltimore, attending surgeon, Md.	8	1	.....	1	125.00	.05	6.85	...	...	.....	54.2	97	1	40.47
Barrancas, Fort, Fla.	85	72	22	94	1,105.88	3.22	37.87	1	...	30	66.0	93	11	55.30
Boston, attending surgeon, Mass.	14	1	.....	1	71.43	.01	.78	...	...	.....	49.8	96	— 6	40.17
Columbia Arsenal, Tenn.	20	24	2	26	1,300.00	1.06	52.88	...	...	.....	57.6	97	— 4	42.50
Columbus Barracks, Ohio	404	460	113	573	1,418.32	24.50	60.65	4	1	759	51.6	99	— 8	30.74
Columbus, Fort, N. Y.	231	158	49	207	896.10	5.62	24.34	3	5	25	51.4	97	— 3	35.73
Davids Island, N. Y.	232	376	112	488	2,103.45	10.58	45.60	5	...	30	51.4	97	— 3	35.73
Ethan Allen, Fort, Vt.	225	173	121	294	1,306.67	10.41	46.25	3	1	332	47.3	90	—14	31.22
Frankford Arsenal, Pa.	45	34	2	36	800.00	1.42	31.60	1	...	12	53.6	98	— 3	31.01
Hamilton, Fort, N. Y.	287	349	94	443	1,543.55	9.59	33.43	3	2	47	51.4	97	— 3	35.73
Jackson Barracks, La.	132	116	25	141	1,068.18	4.14	31.38	...	...	10	67.5	94	16	56.44
Kennebec Arsenal, Me.	14	13	1	14	1,000.00	.51	36.20	...	...	200	.....	.....	.....	.....
Key West Barracks, Fla.	128	130	33	163	1,273.44	3.67	28.70	4	...	12	75.9	91	49	29.19
Madison Barracks, N. Y.	480	322	123	445	927.08	12.02	25.05	3	2	262	45.3	93	—27	30.08
McHenry, Fort, Md.	188	162	47	209	1,111.70	6.29	33.45	2	2	36	54.2	97	1	40.47
McPherson, Fort, Ga.	567	265	56	321	566.14	14.27	25.17	3	2	1,200	59.7	98	0	45.92
Monroe, Fort, Va.	555	658	160	818	1,473.87	20.33	36.63	4	1	7	58.8	100	2	45.41
Myer, Fort, Va.	270	592	164	756	2,800.00	17.22	63.78	10	1	200	54.2	98	0	34.25
New York, attending surgeon, N. Y.	26	8	.....	8	307.69	.87	33.40	...	...	.....	51.4	97	— 3	35.73
Niagara, Fort, N. Y.	220	177	59	236	1,072.73	6.46	29.38	2	4	271	46.7	94	— 7	22.44
Philadelphia, attending surgeon, Pa.	16	6	2	8	500.00	.20	12.50	...	...	.....	53.6	98	— 3	31.01
Plattsburg Barracks, N. Y.	509	350	110	460	903.73	9.22	18.12	1	...	186	43.7	94	—18	29.40
Porter, Fort, N. Y.	128	51	15	66	515.62	1.32	10.27	1	...	600	46.4	93	—13	32.02
Preble, Fort, Me.	69	56	14	70	1,014.49	1.51	21.88	1	...	51	45.2	93	—11	38.78
Saint Francis Barracks, Fla.	156	119	26	145	929.49	5.94	38.06	4	2	10	67.7	93	16	36.33
Sandy Hook Proving Ground, N. J.	63	79	25	104	1,650.79	1.41	22.44	...	3	.....	51.4	97	— 3	35.73
Schuyler, Fort, N. Y.	128	127	34	161	1,257.81	2.44	19.03	1	1	25	51.4	97	— 3	35.73
Springfield Armory, Mass.	37	71	16	87	2,351.35	1.64	44.21	...	1	250	48.1	96	—10	41.25
Thomas, Fort, Ky.	469	594	105	699	1,490.41	24.48	52.19	7	5	920	53.6	97	—12	29.33
Trumbull, Fort, Conn.	70	37	19	56	800.00	.90	12.84	...	...	25	49.3	96	— 7	35.96
Wadsworth, Fort, N. Y.	207	127	30	157	758.45	5.28	25.53	1	1	160	51.4	97	— 3	35.73
Warren, Fort, Mass.	133	94	31	125	939.85	5.10	38.38	2	1	38	49.8	96	— 6	40.17
Washington Barracks, D. C.	363	700	76	776	2,137.74	16.76	46.18	2	1	106	54.2	98	0	34.25
Watertown Arsenal, Mass.	41	37	4	41	1,000.00	.83	20.31	...	1	100	49.8	96	— 6	40.17
Watervliet Arsenal, N. Y.	61	59	6	65	1,065.57	1.74	28.48	...	...	50	48.5	97	—12	29.80
West Point, N. Y.	386	423	115	538	1,393.78	10.05	26.04	3	1	167	48.0	99	— 5	46.62
Willets Point, N. Y.	419	400	79	479	1,143.20	11.81	28.18	...	4	70	50.7	98	— 4	38.70
Field	140	133	42	175	1,250.00	1.78	12.70	...	1	.....	.....	.....	.....	.....
Total	7,875	7,792	2,035	9,827	1,247.87	268.34	34.08	73	46	.....	.....	.....	.....	.....

TABLE III.—*Military posts in each department, alphabetically arranged, with mean strength, and admissions for disease and injury, etc.*—Continued.

DEPARTMENT OF THE MISSOURI.

Name of station.	Mean strength.	Cases.			Admission rate per 1,000 of mean strength.	Average number of sick daily.	Constantly noneffective per 1,000 of mean strength.	Discharges for disability.	Deaths.	Altitude of station.	Temperature.			Total precipitation.
		Disease.	Injury.	Total.							Mean.	Maximum.	Minimum.	
										Feet.	°	°	°	*In.*
Brady, Fort, Mich	236	131	52	183	775.42	5.80	24.58	1	4	696	38.6	89	—28	30.55
Chicago, headquarters, Ill	33	14	.....	14	424.24	.46	13.95	...	2	661	47.1	95	—15	32.38
Indianapolis Arsenal, Ind	25	29	10	39	1,560.00	.57	22.90	...	...	698	52.1	100	—14	33.54
Jefferson Barracks, Mo	236	202	85	287	1,216.10	8.56	36.29	...	3	475	55.1	96	—12	31.20
Leavenworth, Fort, Kans	796	638	249	887	1,114.32	29.06	36.51	14	8	844	....	....	....	.....
Leavenworth Prison, Kans	83	38	6	44	530.12	1.91	23.01	...	...	844	....	....	....	.....
Reno, Fort, Okla	342	280	73	353	1,032.16	18.73	54.78	4	1	1,400	57.2	104	— 7	22.73
Riley, Fort, Kans	763	666	396	1,062	1,391.87	33.74	44.22	10	6	1,300	....	100	—16	30.74
Rock Island Arsenal, Ill	66	42	9	51	772.73	.94	14.20	...	1	528	48.7	96	—20	27.14
Sheridan, Fort, Ill	761	660	234	894	1,174.77	24.58	32.30	4	1	746	47.1	95	—15	32.38
Sill, Fort, Okla	414	371	85	456	1,101.45	13.58	32.80	1	3	1,200	59.5	105	— 7	29.69
Wayne, Fort, Mich	260	103	23	126	484.62	4.58	17.62	2	1	580	47.2	96	— 8	25.04
Field	96	67	36	103	1,072.92	1.56	16.27	...	1	.....	.....	.....	.....	.....
Total	4,111	3,241	1,258	4,499	1,094.38	144.08	35.05	36	31	.....	.....	.....	.....	.....

DEPARTMENT OF DAKOTA.

Assiniboine, Fort, Mont	330	224	74	298	903.03	7.73	23.41	1	1	2,690	39.8	96	—34	10.94
Buford, Fort, N. Dak	179	118	53	171	955.31	6.96	38.89	3	1	1,899	38.9	96	—40	17.07
Custer, Fort, Mont	310	142	67	209	674.19	7.81	25.19	1	2	3,238	43.3	101	—37	14.20
Harrison, Fort, Mont	28	23	7	30	1,071.43	1.08	38.55	1	1	4,000	42.8	94	—17	10.69
Keogh, Fort, Mont	357	190	98	288	806.72	9.98	27.97	4	...	2,365	43.0	101	—32	12.74
Missoula, Fort, Mont	273	120	38	158	578.75	5.22	19.14	2	...	3,330	41.3	94	—20	9.61
Pembina, Fort, N. Dak	45	22	8	30	666.67	.75	16.56	...	2	900	35.3	90	—41	20.60
Saint Paul, headquarters, Minn	31	.....	1	1	32.26	.05	1.50	...	...	840	43.6	96	—26	24.26
Snelling, Fort, Minn	463	417	108	525	1,133.91	20.84	45.02	5	3	840	43.6	96	—26	24.26
Yates, Fort, N. Dak	277	195	80	275	992.78	7.81	28.20	1	1	1,670	42.4	100	—26	13.58
Yellowstone, Fort, Wyo	109	30	16	46	422.02	1.33	12.19	...	...	6,270	....	87	—26	17.65
Field	163	83	38	121	742.33	1.63	9.98	...	...	.....	.....	.....	.....	.....
Total	2,565	1,564	588	2,152	838.99	71.19	27.75	18	11	.....	.....	.....	.....	.....

DEPARTMENT OF THE PLATTE.

D. A. Russell, Fort, Wyo	409	467	87	554	1,354.52	15.07	36.84	2	2	6,205	43.7	92	—20	14.76
Meade, Fort, S. Dak	467	236	163	399	854.39	12.27	26.28	4	...	3,624	....	....	....	.....
Niobrara, Fort, Nebr	449	401	109	510	1,135.86	17.87	39.80	...	...	2,600	....	....	....	.....
Omaha, Fort, Nebr	492	605	189	794	1,613.82	25.22	51.26	7	3	960	50.6	102	—20	21.69
Omaha, headquarters, Nebr	11	9	.....	9	818.18	.32	29.14	...	...	960	50.6	102	—20	21.69
Robinson, Fort, Nebr	419	363	146	509	1,214.80	11.29	26.95	2	2	3,764	46.3	101	—26	14.60
Washakie, Fort, Wyo	88	70	33	103	1,170.45	2.97	33.75	...	...	5,462	41.2	92	—26	25.24
Field	161	104	59	163	1,012.42	1.99	12.35	...	1	.....	.....	.....	.....	.....
Total	2,496	2,255	786	3,041	1,218.35	87.00	34.86	15	8	.....	.....	.....	.....	.....

TABLE III.—*Military posts in each department, alphabetically arranged, with mean strength, and admissions for disease and injury, etc.*—Continued.

DEPARTMENT OF TEXAS.

Name of station.	Mean strength.	Cases.			Admission rate per 1,000 of mean strength.	Average number of sick daily.	Constantly noneffective per 1,000 of mean strength.	Discharges for disability.	Deaths.	Altitude of station.	Temperature.			Total precipitation.
		Disease.	Injury.	Total.							Mean.	Maximum.	Minimum.	
										Feet.	°	°	°	*In.*
Bliss, Fort, Tex	199	143	53	196	984.92	6.81	34.20	9	...	3,700	62.2	100	8	10.20
Brown, Fort, Tex	116	133	31	164	1,413.79	8.20	70.69	1	1	47	....	100	22	19.20
Clark, Fort, Tex	446	513	183	696	1,560.54	18.02	40.40	1	2	1,133	68.7	105	10	18.28
Eagle Pass, Camp, Tex	66	66	28	94	1,424.24	1.46	22.17	...	...	800	69.5	107	12	24.73
Hancock, Fort, Tex	48	55	26	81	1,687.50	1.71	35.56	1	...	2,500	....	107	—8	.....
McIntosh, Fort, Tex	177	195	64	259	1,463.28	11.34	64.05	2	1	806	71.3	103	18	11.97
Ringgold, Fort, Tex	179	298	74	372	2,078.21	11.44	63.92	2	2	147	72.1	105	20	21.11
Sam Houston, Fort, Tex	610	496	167	663	1,086.89	20.35	33.36	4	4	779	68.0	103	11	26.07
San Antonio, headquarters, Tex	16	2	.....	2	125.00	.04	2.23	...	1	781	68.0	103	11	26.07
Field	27	19	8	27	1,000.00	.27	10.05	...	...	.....	.....	.....	.....	.....
Total	1,884	1,920	634	2,554	1,355.63	79.62	42.26	20	11	.....	.....	.....	.....	.....

DEPARTMENT OF THE COLORADO.

Apache, Fort, Ariz	284	177	128	305	1,073.94	12.58	44.31	7	2	5,200	52.6	96	5	18.03
Bayard, Fort, N. Mex	366	156	74	230	628.42	10.59	28.92	1	2	6,750	54.4	94	5	14.45
Denver, headquarters, Colo	16	7	.....	7	437.50	.35	22.09	...	...	5,290	48.8	98	—15	16.12
Douglas, Fort, Utah	524	360	85	445	849.24	13.83	26.39	9	2	4,920	50.2	97	0	11.95
Du Chesne, Fort, Utah	115	82	42	124	1,078.26	3.01	26.21	1	1	5,000	....	97	—33	4.50
Grant, Fort, Ariz	288	212	93	305	1,059.03	9.19	31.93	3	2	4,916	....	98	13	13.22
Huachuca, Fort, Ariz	250	220	35	255	1,020.00	4.61	18.43	...	1	5,100	60.4	98	17	15.37
Logan, Fort, Colo	590	552	145	697	1,181.36	17.87	30.29	7	2	5,450	48.8	96	—15	16.12
San Carlos, Ariz	56	41	16	57	1,017.86	1.40	25.00	...	1	2,456	....	.....	.....	.....
Stanton, Fort, N. Mex	71	31	17	48	676.06	.59	8.26	...	...	6,152	....	95	—26	.....
Whipple Barracks, Ariz	275	182	50	232	843.64	7.56	27.50	2	3	5,318	53.1	100	6	13.77
Wingate, Fort, N. Mex	262	245	114	359	1,370.23	10.83	41.35	3	2	7,000	49.9	96	—15	17.14
Field	89	131	33	164	1,842.70	1.24	13.88	...	...	.....	.....	.....	.....	.....
Total	3,186	2,396	832	3,228	1,013.18	93.66	29.40	33	18	.....	.....	.....	.....	.....

DEPARTMENT OF CALIFORNIA.

Alcatraz Island, Cal	130	49	11	60	461.54	3.39	26.11	...	...	135	55.6	89	38	17.13
Angel Island, Cal	261	150	25	175	670.50	6.31	24.18	1	1	150	55.6	89	38	17.13
Benicia Barracks, Cal	218	134	54	188	862.39	3.89	17.83	3	1	160	....	.....	.....	.....
Mason, Fort, Cal	68	34	12	46	676.47	.98	14.38	...	...	80	55.6	89	38	17.13
Presidio of San Francisco, Cal	566	530	186	716	1,265.02	21.25	37.55	6	2	72	55.6	89	38	17.13
San Diego Barracks, Cal	69	32	10	42	608.70	3.51	50.82	3	1	6	60.5	90	34	11.33
San Francisco, headquarters, Cal	28	1	.....	1	35.71	.23	8.12	...	...	.....	55.6	89	38	17.13
Field	159	117	75	192	1,207.55	2.36	14.82	...	...	.....	.....	.....	.....	.....
Total	1,499	1,047	373	1,420	947.30	41.91	27.96	13	5	.....	.....	.....	.....	.....

DEPARTMENT OF THE COLUMBIA.

Boise Barracks, Idaho	115	55	28	83	721.74	2.84	24.68	...	...	2,765	49.3	103	0	7.90
Canby, Fort, Wash	125	58	59	117	936.00	3.66	29.30	1	...	8	50.5	90	31	60.39
Sherman, Fort, Idaho	307	207	65	272	885.99	10.48	34.14	4	2	2,140	46.2	96	— 2	25.22
Spokane, Fort, Wash	181	114	46	160	883.98	4.45	24.58	...	...	1,400	48.3	100	— 1	5.13
Townsend, Fort, Wash	13	6	1	7	538.46	.32	24.24	...	...	135	....	.....	.....	.....
Vancouver Barracks, Wash	572	267	108	375	655.59	12.97	22.67	6	4	50	52.0	97	25	30.76
Walla Walla, Fort, Wash	212	156	55	211	995.28	7.99	37.70	1	3	865	53.1	104	11	14.89
Field	22	8	2	10	454.55	.07	3.24	...	...	.....	.....	.....	.....	.....
Total	1,547	871	364	1,235	798.32	42.78	27.65	12	9	.....	.....	.....	.....	.....
General Hospital, Hot Springs, Ark	41	23	3	26	634.15	25.56	.....	16	...	.....	.....	.....	.....	.....
At large	.....	.....	.....	.....	.....	.....	.....	14	2	.....	.....	.....	.....	.....
Total for the Army	25,204	21,109	6,873	27,982	1,110.22	854.15	33.89	250	141	.....	.....	.....	.....	.....

TABLE IV.—*General view of the results of disease and injury at each of the military stations, arranged in the order of their mean strength.*

GROUP 1.—TWENTY-THREE STATIONS, GARRISONED BY 400 MEN OR MORE EACH.

Name of station.	Mean strength.	Admission rate per 1,000 of mean strength.	Constantly non-effective.			Discharges.		Deaths.	
			Daily average in hospital.	Ratio per 1,000 of mean strength.		Number.	Ratio per 1,000 of mean strength.	Number.	Ratio per 1,000 of mean strength.
				Cases in hospital.	All cases.				
Fort Leavenworth, Kans	796	1,114.32	20.94	26.31	36.51	14	17.59	8	10.05
Fort Riley, Kans	763	1,391.87	15.45	20.25	44.22	10	13.11	6	7.86
Fort Sheridan, Ill	761	1,174.77	15.15	19.91	32.30	4	5.26	1	1.31
Fort Sam Houston, Tex	610	1,086.89	18.78	30.79	33.36	4	6.56	4	6.56
Fort Logan, Colo	590	1,181.36	15.18	25.73	30.29	7	11.86	2	3.39
Vancouver Barracks, Wash	572	655.59	9.88	17.47	22.67	6	10.49	4	6.99
Fort McPherson, Ga	567	566.14	12.23	21.56	25.17	3	5.29	2	3.53
Presidio of San Francisco, Cal	566	1,265.02	16.05	28.67	37.55	6	10.60	2	3.53
Fort Monroe, Va	555	1,473.87	12.00	21.63	36.63	4	7.21	1	1.80
Fort Douglas, Utah	524	849.24	11.80	22.51	26.39	9	17.18	2	3.82
Plattsburg Barracks, N. Y	509	903.73	6.38	12.53	18.12	1	1.96	....	....
Fort Omaha, Nebr	492	1,613.82	15.57	31.64	51.26	7	14.23	3	6.10
Madison Barracks, N. Y	480	927.08	6.41	13.36	25.05	3	6.25	2	4.17
Fort Thomas, Ky	469	1,490.41	20.33	43.34	52.19	7	14.93	5	10.66
Fort Meade, S. Dak	467	854.39	9.55	20.45	26.28	4	8.57	....	....
Fort Snelling, Minn	463	1,133.91	13.53	29.22	45.02	5	10.80	3	6.48
Fort Niobrara, Nebr	449	1,135.86	15.70	34.97	39.80	....	....	....	....
Fort Clark, Tex	446	1,560.54	9.32	20.90	40.40	1	2.24	2	4.48
Fort Robinson, Nebr	419	1,214.80	6.85	16.35	26.95	2	4.77	2	4.77
Willets Point, N. Y	419	1,143.20	10.35	24.70	28.18	....	....	4	9.55
Fort Sill, Okla	414	1,101.45	6.99	16.88	32.88	1	2.42	3	7.25
Fort D. A. Russell, Wyo	409	1,354.52	10.75	26.30	36.84	2	4.89	2	4.89
Columbus Barracks, Ohio	404	1,418.32	22.54	55.80	60.65	4	9.90	1	2.48
Mean	526	....	13.12	....	....	....	....	....	....
Summary	12,144	1,150.94	301.72	24.85	34.95	104	8.56	59	4.86

GROUP 2.—EIGHT STATIONS, GARRISONED BY 300 TO 400 MEN EACH.

West Point, N. Y	386	1,393.78	7.12	18.45	26.04	3	7.77	1	2.59
Fort Bayard, N. Mex	366	628.42	8.79	24.02	28.92	1	2.73	2	5.46
Washington Barracks, D. C	363	2,137.74	14.58	40.17	46.18	2	5.51	1	2.75
Fort Keogh, Mont	357	806.72	5.84	16.35	27.97	4	11.20	....	....
Fort Reno, Okla	342	1,032.16	16.21	47.39	54.78	4	11.70	1	2.92
Fort Assiniboine, Mont	330	903.03	5.84	17.69	23.41	1	3.03	1	3.03
Fort Custer, Mont	310	674.19	5.58	17.99	25.19	1	3.23	2	6.45
Fort Sherman, Idaho	307	885.99	6.59	21.70	34.14	4	13.03	2	6.51
Mean	348	....	8.82	....	....	....	....	....	....
Summary	2,761	1,073.52	70.54	25.55	33.37	20	7.24	10	3.62

GROUP 3.—TWENTY-ONE STATIONS, GARRISONED BY 200 TO 300 MEN EACH.

Fort Adams, R. I	289	1,003.46	8.00	27.67	42.06	1	3.46	2	6.92
Fort Grant, Ariz	288	1,059.03	6.73	23.36	31.93	3	10.42	2	6.94
Fort Hamilton, N. Y	287	1,543.55	9.05	31.52	33.43	3	10.45	2	6.97
Fort Apache, Ariz	284	1,073.94	7.02	24.71	44.31	7	24.65	2	7.04
Fort Yates, N. Dak	277	992.78	3.36	12.12	28.20	1	3.61	1	3.61
Whipple Barracks, Ariz	275	843.64	6.30	23.15	27.50	2	7.27	3	10.91
Fort Missoula, Mont	273	578.75	4.50	16.49	19.14	2	7.33	....	....
Fort Myer, Va	270	2,800.00	9.52	35.24	63.78	10	37.04	1	3.70
Fort Wingate, N. Mex	262	1,370.23	5.59	21.59	41.35	3	11.45	2	7.63
Angel Island, Cal	261	670.50	5.40	20.91	24.18	1	3.83	1	3.83
Fort Wayne, Mich	260	484.62	4.33	16.67	17.62	2	7.69	1	3.85
Fort Huachuca, Ariz	250	1,020.00	2.41	9.66	18.43	....	....	1	4.00
Fort Brady, Mich	236	775.42	4.72	20.00	24.58	1	4.24	4	16.95
Jefferson Barracks, Mo	236	1,216.10	7.29	30.90	36.29	....	....	3	12.71
Davids Island, N. Y	232	2,103.45	6.61	28.47	45.60	5	21.55	....	....
Fort Columbus, N. Y	231	896.10	3.98	17.22	24.34	3	12.99	5	21.65
Fort Ethan Allen, Vt	225	1,306.67	8.43	37.46	46.25	3	13.33	1	4.44
Fort Niagara, N. Y	220	1,072.73	4.82	21.93	29.38	2	9.09	4	18.18
Benicia Barracks, Cal	218	862.39	1.88	8.72	17.83	3	13.76	1	4.59
Fort Walla Walla, Wash	212	995.28	5.07	24.17	37.70	1	4.72	3	14.15
Fort Wadsworth, N. Y	207	758.45	4.22	20.37	25.53	1	4.83	1	4.83
Mean	252	....	5.68	....	....	....	....	....	....
Summary	5,293	1,120.35	119.22	22.52	32.55	54	10.20	40	7.56

TABLE IV.—*General view of the results of disease and injury at each of the military stations, arranged in the order of their mean strength*—Continued.

GROUP 4.—EIGHTEEN STATIONS, GARRISONED BY 100 TO 200 MEN EACH.

Name of station.	Mean strength.	Admission rate per 1,000 of mean strength.	Constantly non-effective.			Discharges.		Deaths.	
			Daily average in hospital.	Ratio per 1,000 of mean strength.		Number.	Ratio per 1,000 of mean strength.	Number.	Ratio per 1,000 of mean strength.
				Cases in hospital.	All cases.				
Fort Bliss, Tex	199	984.92	4.96	24.91	34.20	9	45.23	....	.....
Fort McHenry, Md	188	1,111.70	4.76	25.31	33.45	2	10.64	2	10.64
Fort Spokane, Wash	181	883.98	3.18	17.78	24.58	....	.....	....	.....
Fort Buford, N. Dak	179	955.31	4.25	23.77	38.89	3	16.76	1	5.59
Fort Ringgold, Tex	179	2,078.21	9.50	53.05	63.92	2	11.17	2	11.17
Fort McIntosh, Tex	177	1,463.28	9.35	52.84	64.05	2	11.30	1	5.65
St. Francis Barracks, Fla	156	929.49	5.34	34.21	38.06	4	25.64	2	12.82
Fort Warren, Mass	133	939.85	3.50	26.33	38.38	2	15.04	1	7.52
Jackson Barracks, La	132	1,068.18	3.81	28.89	31.38	....	.....	....	.....
Alcatraz Island, Cal	130	461.54	2.09	16.28	26.11	....	.....	....	.....
Key West Barracks, Fla	128	1,273.44	2.88	22.54	28.70	4	31.25	....	.....
Fort Porter, N. Y	128	515.62	1.16	9.07	10.27	1	7.81	....	.....
Fort Schuyler, N. Y	128	1,257.81	1.65	12.91	19.03	1	7.81	1	7.81
Fort Canby, Wash	125	936.00	2.44	19.77	29.30	1	8.00	....	.....
Fort Brown, Tex	116	1,413.79	6.70	57.74	70.69	1	8.62	1	8.62
Boise Barracks, Idaho	115	721.74	2.00	17.58	24.68	....	.....	....	.....
Fort Du Chesne, Utah	115	1,078.26	1.32	11.44	26.21	1	8.70	1	8.70
Fort Yellowstone, Wyo	109	422.02	.89	8.17	12.19	....	.....	....	.....
Mean	145	.....	3.88	.....	.....	....	.....	....	.....
Summary	2,618	1,055.00	69.79	26.66	35.27	33	12.60	12	4.58

GROUP 5.—THIRTY-FIVE STATIONS, GARRISONED BY LESS THAN 100 MEN EACH.

Fort Washakie, Wyo	88	1,170.45	1.71	19.68	33.75	....	.....	....	.....
Fort Barrancas, Fla	85	1,105.88	2.44	28.69	37.87	1	11.76	....	.....
Leavenworth Military Prison, Kans	83	530.12	1.77	21.53	23.01	....	.....	....	.....
Fort Stanton, N. Mex	71	676.06	.37	5.27	8.26	....	.....	....	.....
Fort Trumbull, Conn	70	800.00	.58	8.26	12.84	....	.....	....	.....
Fort Preble, Me	69	1,014.49	1.25	18.07	21.88	1	14.49	....	.....
San Diego Barracks, Cal	69	608.70	3.35	49.10	50.82	3	43.48	1	14.49
Fort Mason, Cal	68	676.47	.28	4.24	14.38	....	.....	....	.....
Camp Eagle Pass, Tex	66	1,424.24	.74	11.29	22.17	....	.....	....	.....
Rock Island Arsenal, Ill	66	772.73	.36	5.54	14.20	....	.....	1	15.15
Sandy Hook Proving Ground, N. J	63	1,650.79	.04	.61	22.44	....	.....	3	47.62
Watervliet Arsenal, N. Y	61	1,065.57	.70	11.50	28.48	....	.....	....	.....
San Carlos, Ariz	56	1,017.86	1.04	18.85	25.00	....	.....	1	17.86
Fort Hancock, Tex	48	1,687.50	1.12	23.66	35.56	1	20.83	....	.....
Frankford Arsenal, Pa	45	800.00	.03	.67	31.60	1	22.22	....	.....
Fort Pembina, N. Dak	45	666.67	.61	13.67	16.56	....	.....	2	44.44
Watertown Arsenal, Mass	41	1,000.00	.33	8.02	20.31	....	.....	1	24.39
Springfield Armory, Mass	37	2,351.35	.13	3.63	44.21	....	.....	1	27.03
Chicago, headquarters, Ill	33	424.24	.....	.....	13.95	....	.....	2	60.60
Allegheny Arsenal, Pa	31	838.71	.08	2.74	28.55	....	.....	....	.....
St. Paul, headquarters, Minn	31	32.26	.....	.....	1.50	....	.....	....	.....
Augusta Arsenal, Ga	29	862.07	.29	10.01	22.29	1	34.48	1	34.48
Fort Harrison, Mont	28	1,071.43	.76	27.40	38.55	1	35.71	1	35.71
San Francisco, headquarters, Cal	28	35.71	.....	.....	8.12	....	.....	....	.....
New York, attending surgeon, N. Y	26	307.69	.....	.....	33.40	....	.....	....	.....
Indianapolis Arsenal, Ind	25	1,560.00	.01	.11	22.90	....	.....	....	.....
Columbia Arsenal, Tenn	20	1,300.00	.....	.....	52.88	....	.....	....	.....
Denver, headquarters, Colo	16	437.50	.....	.....	22.09	....	.....	....	.....
Philadelphia, attending surgeon, Pa	16	500.00	.....	.....	12.50	....	.....	....	.....
San Antonio, headquarters, Tex	16	125.00	.....	.....	2.23	....	.....	1	62.50
Boston, attending surgeon, Mass	14	71.43	.....	.....	.78	....	.....	....	.....
Kennebec Arsenal, Me	14	1,000.00	.36	25.64	36.20	....	.....	....	.....
Fort Townsend, Wash	13	538.46	.13	9.80	24.24	....	.....	....	.....
Omaha, headquarters, Nebr	11	818.18	.....	.....	29.14	....	.....	....	.....
Baltimore, attending surgeon, Md	8	125.00	.....	.....	6.85	....	.....	....	.....
Mean	42	.....	.53	.....	.....	....	.....	....	.....
Summary	1,490	918.12	18.48	12.40	24.50	9	6.04	15	10.07

TABLE IV.—*General view of the results of disease and injury at each of the military stations, arranged in the order of their mean strength*—Continued.

GROUP 6.—FIELD AND SUMMARY.

Name of station.	Mean strength.	Admission rate per 1,000 of mean strength.	Constantly non-effective.			Discharges.		Deaths.	
			Daily average in hospital.	Ratio per 1,000 of mean strength.		Number.	Ratio per 1,000 of mean strength.	Number.	Ratio per 1,000 of mean strength.
				Cases in hospital.	All cases.				
Department of Dakota, field	163	742.33	.....	.....	9.98	....	.....	.....	.....
Department of the Platte, field	161	1,012.42	.....	.....	12.35	....	.....	1	6.21
Department of California, field	159	1,207.55	.....	.....	14.82	....	.....	.....	.....
Department of the East, field	140	1,250.00	.....	.....	12.70	....	.....	1	7.14
Department of the Missouri, field	96	1,072.92	.....	.....	16.27	....	.....	1	10.42
Department of the Colorado, field	89	1,842.70	.....	.....	13.88	....	.....	.....	.....
Department of Texas, field	27	1,000.00	.....	.....	10.05	....	.....	.....	.....
Department of the Columbia, field	22	454.55	.....	.....	3.24	....	.....	.....	.....
Summary	857	1,114.35	.....	.....	12.71	....	.....	3	3.50
General Hospital, Hot Springs, Ark	41	634.15	25.49	.....	.....	16	390.24	....	.....
At large	.....	.....	.....	.....	.....	14	.....	2	.....
Total for the Army	25,204	1,110.22	605.23	24.02	33.89	250	9.15	141	5.16

TABLE V.—*Twenty posts having the highest admission rates for the year 1895; also their admission rates for the years 1890 to 1894, inclusive.*

Name of station.	Mean strength.	Ratios per 1,000 of mean strength.				Admission rates per 1,000 of mean strength.				
		Admissions.	Discharges.	Deaths.	Constantly non-effective.	1894.	1893.	1892.	1891.	1890.
Fort Myer, Va	270	2,800.00	37.04	3.70	63.78	2,167.33	2,034 75	1,618.64	1,063.58	1,350.36
Washington Barracks, D.C	363	2,137.74	5.51	2.75	46.18	1,794.30	2,027.87	1,981.93	1,774.19	1,329.41
Davids Island, N. Y	232	2,103.45	21.55	.....	45.60	1,326.08	2,283.76	2,115.32	1,884.82	1,642.86
Fort Ringgold, Tex	179	2,078.21	11.17	11.17	63.92	1,289.16	1,939.60	1,716.42	1,366.07	865.55
Sandy Hook Proving Ground, N. J	63	1,650.79	.....	47.62	22.44	1,579.71	2,362.07	1,884.62	1,590.91	1,812.50
Fort Omaha, Nebr	492	1,613.82	14.23	6.10	51.26	1,210.84	750.53	1,223.60	1,234.45	672.29
Fort Clark, Tex	446	1,560.54	2.24	4.48	40.40	1,619.04	2,165.60	1,538.94	1,256.72	1,669.44
Fort Hamilton, N. Y	287	1,543.55	10.45	6.97	33.43	1,205.22	1,772.20	2,354.96	2,329.32	1,626.26
Fort Thomas, Ky	469	1,490.41	14.93	10.66	52.19	1,137.50	907.61	1,123.13	1,401.52	1,290.32
Fort Monroe, Va	555	1,473.87	7.21	1.80	36.63	1,060.55	1,379.01	1,797 33	1,379.86	1,709.01
Fort McIntosh, Tex	177	1,463.28	11.30	5.65	64.05	1,235.29	1,218.18	1,442.95	1,261.44	738.46
Camp Eagle Pass, Tex	66	1,424.24	.....	.....	22.17	2,213.11	2,196.43	2,113.21	1,788.46	2,053.57
Columbus Barracks, Ohio	404	1,418.32	9.90	2.48	60.65	1,442.75	2,578.27	2,059.23	2,209.89	1,876.49
Fort Brown, Tex	116	1,413.79	8.62	8.62	70.69	1,550.00	1,879.52	576.27	790.32	1,881.48
West Point, N. Y	386	1,393.78	7.77	2.59	26.04	1,242.18	1,396.87	1,424 00	981.23	1,465.61
Fort Riley, Kans	763	1,391.87	13.11	7.86	44.22	1,222.39	1,358.00	1,158.89	1,408.33	1,283.49
Fort Wingate, N. Mex	262	1,370.23	11.45	7.63	41.35	669.49	1,564.10	1,396.65	1,776.47	1,788.30
Fort D. A. Russell, Wyo	409	1,354.52	4.89	4.89	36.84	958.64	1,091.10	766.90	870.02	1,051.72
Fort Ethan Allen, Vt	225	1,306.67	13.33	4.44	46.25	1,310.34	.....	.....	.....	.....
Key West Barracks, Fla	128	1,273.44	31.25	.....	28.70	2,226.89	1,360.66	.....	.....	.....
The Army	25,204	1,110.22	9.15	5.16	33.89	1,089.73	1,289.04	1,270.42	1,364.78	1,384.25

TABLE VI.—*Twenty posts having the lowest admission rates for the year 1895; also their admission rates for the years 1890 to 1894, inclusive.*

Name of station.	Mean strength.	Ratios per 1,000 of mean strength.				Admission rates per 1,000 of mean strength.				
		Admissions.	Discharges.	Deaths.	Constantly non-effective.	1894.	1893.	1892.	1891.	1890.
Fort Yellowstone, Wyo	109	422.02	.....	.....	12.19	529.41	520.00	1,105.26	1,033.90	1,261.54
Alcatraz Island, Cal	130	461.54	.....	.....	26.11	692.98	694.91	1,025.64	1,097.35	1,076.09
Fort Wayne, Mich	260	484.62	7.69	3.85	17.62	609.44	1,162.60	1,326.18	1,190.87	1,341.23
Fort Porter, N. Y	128	515.62	7.81	.....	10.27	833.33	1,814.16	1,133.33	1,047.17	1,010.53
Fort McPherson, Ga	567	566.14	5.29	3.53	25.17	534.68	1,391.41	1,634.09	2,394.98	2,489.36
Fort Missoula, Mont	273	578.75	7.33	.....	19.14	552.63	773.87	603.17	983.87	1,285.71
San Diego Barracks, Cal	69	608.70	43.48	14.49	50.82	929.58	1,348.48	942.03	1,261.54	1,311.48
Fort Bayard, N. Mex	366	628.42	2.73	5.46	28.92	557.93	851.19	1,348.99	1,276.73	1,482.88
Vancouver Barracks, Wash	572	655.59	10.49	6.99	22.67	471.40	518.18	727.27	841.49	1,211.90
Angel Island, Cal	261	670.50	3.83	3.83	24.18	590.10	826.09	960.14	1,310.34	920.21
Fort Custer, Mont	310	674.19	3.23	6.45	25.19	279.88	333.33	1,534.18	1,985.56	1,380.66
Fort Stanton, N. Mex	71	676.06	.....	.....	8.26	819.05	757.01	1,250.00	1,427.48	1,661.65
Fort Mason, Cal	68	676.47	.....	.....	14.38	373.13	741.94	689.66	838.71	1,031.25
Boise Barracks, Idaho	115	721.74	.....	.....	24.68	726.50	798.17	693.88	927.93	1,152.38
Fort Wadsworth, N. Y	207	758.45	4.83	4.83	25.53	1,059.78	1,204.55	1,108.57	1,528.30	1,072.07
Rock Island Arsenal, Ill	66	772.73	.....	15.15	14.20	812.50	1,184.62	1,292.31	1,093.75	1,483.33
Fort Brady, Mich	236	775.42	4.24	16.95	24.58	928.99	970.59	923.08	801.72	1,273.68
Fort Trumbull, Conn	70	800.00	.....	.....	12.84	446.15	593.75	1,948.39	769.23	1,115.38
Fort Keogh, Mont	357	806.72	11.20	.....	27.97	1,266.67	1,633.99	1,264.25	1,328.40	674.35
Whipple Barracks, Ariz	275	843.64	7.27	10.91	27.50	817.07	1,336.21	1,135.42	1,235.54	1,684.65
The Army	25,204	1,110.22	9.15	5.16	33.89	1,089.73	1,289.04	1,270.42	1,364.78	1,384.25

TABLE VII.—*Twenty posts having the highest noneffective rates for the year 1895; also their noneffective rates for the years 1890 to 1894, inclusive.*

Name of station.	Mean strength.	Constantly noneffective per 1,000 of mean strength.	Average sick daily.	Average of days that each case was treated.	Constantly noneffective per 1,000 of mean strength.				
					1894.	1893.	1892.	1891.	1890.
Fort Brown, Tex	116	70.69	8.20	18.25	59.54	60.90	36.91	38.18	65.23
Fort McIntosh, Tex	177	64.05	11.34	15.98	50.04	65.62	68.91	54.97	25.31
Fort Ringgold, Tex	179	63.92	11.44	11.23	54.60	76.51	70.14	52.05	26.61
Fort Myer, Va	270	63.78	17.22	8.31	53.18	62.57	40.55	35.98	37.20
Columbus Barracks, Ohio	404	60.65	24.50	15.61	66.66	92.16	71.98	77.13	77.55
Fort Reno, Okla	342	54.78	18.73	19.37	43.53	59.28	67.57	59.47	56.53
Fort Thomas, Ky	469	52.19	24.48	12.78	36.34	26.10	42.19	32.77	16.35
Fort Omaha, Nebr	492	51.26	25.22	11.59	45.55	28.01	33.49	40.74	31.83
San Diego Barracks, Cal	69	50.82	3.51	30.48	59.81	49.73	78.88	90.15	122.48
Fort Ethan Allen, Vt	225	46.25	10.41	12.92	46.58	.....	.....	.....	.....
Washington Barracks, D. C	363	46.18	16.76	7.88	42.33	54.27	43.22	47.61	51.86
Davids Island, N. Y	232	45.60	10.58	7.91	36.76	48.44	46.31	51.62	52.45
Fort Snelling, Minn	463	45.02	20.84	14.49	38.47	39.41	43.56	38.79	36.42
Fort Apache, Ariz	284	44.31	12.58	15.06	34.15	32.00	39.22	62.27	55.51
Fort Riley, Kans	763	44.22	33.74	11.60	38.02	38.93	27.95	58.18	36.45
Fort Adams, R. I	289	42.06	12.16	15.30	36.17	39.77	32.62	33.52	25.38
Fort Wingate, N. Mex	262	41.35	10.83	11.01	52.35	48.68	36.12	42.68	60.82
Fort Clark, Tex	446	40.40	18.02	9.45	52.39	79.79	60.77	39.61	65.25
Fort Niobrara, Nebr	449	39.80	17.87	12.79	32.35	40.22	39.50	43.21	32.78
Fort Buford, N. Dak	179	38.89	6.96	14.86	26.99	34.27	28.55	26.48	32.86
The Army	25,204	33.89	854.15	11.14	34.49	40.15	39.60	42.01	42.71

TABLE VIII.—*Twenty posts having the lowest noneffective rates for the year 1895; also their noneffective rates for the years 1890 to 1894, inclusive.*

Name of station.	Mean strength.	Constantly noneffective per 1,000 of mean strength.	Average sick daily.	Average of days that each case was treated.	Constantly noneffective per 1,000 of mean strength.				
					1894.	1893.	1892.	1891.	1890.
Fort Stanton, N. Mex	71	8.26	0.59	4.46	13.52	18.56	43.28	33.63	67.83
Fort Porter, N. Y	128	10.27	1.32	7.27	17.76	40.22	35.91	29.18	33.28
Fort Yellowstone, Wyo	109	12.19	1.33	10.54	9.86	20.77	23.62	35.20	39.41
Fort Trumbull, Conn	70	12.84	.90	5.86	11.00	19.52	36.93	22.15	34.19
Rock Island Arsenal, Ill	66	14.20	.94	6.71	20.59	28.20	21.48	15.50	36.37
Fort Mason, Cal	68	14.38	.98	7.76	14.93	46.49	21.72	30.27	42.51
Fort Wayne, Mich	260	17.62	4.58	13.27	21.94	37.99	50.78	44.52	37.84
Benicia Barracks, Cal	218	17.83	3.89	7.55	24.49	23.43	21.24	24.14	42.03
Plattsburg Barracks, N. Y	509	18.12	9.22	7.32	20.45	28.20	25.62	37.63	34.92
Fort Huachuca, Ariz	250	18.43	4.61	6.60	27.55	38.63	24.54	19.39	22.02
Fort Schuyler, N. Y	128	19.03	2.44	5.52	29.50	31.03	33.68	29.81	33.58
Fort Missoula, Mont	273	19.14	5.22	12.07	18.23	18.16	20.64	20.90	28.93
Fort Preble, Me	69	21.88	1.51	7.87	43.63	28.10	49.94	16.52	31.91
Camp Eagle Pass, Tex	66	22.17	1.46	5.68	60.95	68.74	76.30	49.21	59 59
Sandy Hook Proving Ground, N. J.	63	22.44	1.41	4.96	30.22	25.98	19.13	16.07	17.04
Vancouver Barracks, Wash	572	22.67	12.97	12.62	18.23	15.06	28.10	33.51	39.02
Fort Assiniboine, Mont	330	23.41	7.73	9.46	26.15	31.29	40.64	30.29	35.61
Angel Island, Cal	261	24.18	6.31	13.17	24.40	40.04	36.63	50.04	27.44
Fort Columbus, N. Y	231	24.34	5.62	9.91	36.78	38.89	38.31	30.45	39.27
Fort Brady, Mich	236	24.58	5.80	11.57	31.52	34.13	28.60	16.89	31.49
The Army	25,204	33.89	854.15	11.14	34.49	40.15	39.60	42.01	42.71

TABLE IX.—*Twenty posts having the highest admission rates for disease, excluding venereal diseases, vaccinia, and alcoholism; also their ratios for deaths, discharges, and constant noneffectiveness, and the corresponding average rates for the Army, year 1895.*

Name of station.	Mean strength.	Ratio per 1,000 of mean strength.			
		Admissions.	Discharges.	Deaths.	Constantly noneffective.
Fort Myer, Va	270	1,959.26	29.63	3.70	36.27
Washington Barracks, D. C	363	1,732.78	2.75	2.75	29.68
Davids Island, N. Y	232	1,232.77	17.24	.....	25.75
Sandy Hook Proving Ground, N. J	63	1,222.21	.....	.....	12.00
Fort Ringgold, Tex	179	1,167.59	5.59	5.59	26.09
Fort Hamilton, N. Y	287	1,069.67	10.45	6.97	19.39
Fort Monroe, Va	555	1,059.45	7.21	.....	26.41
West Point, N. Y	386	1,049.22	7.77	2.59	16.96
Fort Omaha, Nebr	492	1,010.16	14.23	4.06	28.80
Fort Clark, Tex	446	1,006.73	2.24	2.24	23.58
Fort Thomas, Ky	469	950.96	12.79	10.66	28.61
Watervliet Arsenal, N. Y	61	934.42	.....	.....	24.12
Camp Eagle Pass, Tex	66	924.25	.....	.....	12.66
Fort Brown, Tex	116	922.41	8.62	8.62	33.56
Fort Schuyler, N. Y	128	906.25	7.81	.....	11.84
Fort D. A. Russell, Wyo	409	897.32	2.44	.....	24.18
Key West Barracks, Fla	128	867.19	31.25	.....	18.14
Willets Point, N. Y	419	866.36	.....	7.16	17.68
Fort Wingate, N. Mex	262	858.78	3.82	7.63	28.88
Fort Sill, Okla	414	838.17	.....	4.83	20.33
The Army	25,204	707.00	6.81	3.33	19.20

TABLE X.—*Twenty posts having the highest noneffective rates for disease, excluding venereal diseases, vaccinia, and alcoholism; also the average number sick daily, the average duration of each case, and the corresponding average rates of the Army, year 1895.*

Name of station.	Mean strength.	Constantly noneffective per 1,000 of mean strength.	Average number of sick daily.	Average number of days each case was treated.
Fort Myer, Va	270	36.27	9.79	6.76
Fort Reno, Okla	342	35.13	12.01	17.06
Fort Brown, Tex	116	33.56	3.89	13.28
Fort Snelling, Minn	463	30.57	14.16	14.89
San Diego Barracks, Cal	69	29.93	2.07	39.68
Washington Barracks, D. C	363	29.68	10.77	6.25
Fort Wingate, N. Mex	262	28.88	7.56	12.27
Fort Omaha, Nebr	492	28.80	14.16	10.40
Fort Thomas, Ky	469	28.61	13.42	10.98
Fort Monroe, Va	555	26.41	14.66	9.10
Fort Ringgold, Tex	179	26.09	4.67	8.15
Columbus Barracks, Ohio	404	26.00	10.51	12.14
Davids Island, N. Y	232	25.75	5.97	7.62
Saint Francis Barracks, Fla	156	25.71	4.01	15.09
Fort D. A. Russell, Wyo	40	24.18	9.89	9.84
Watervliet Arsenal, N. Y	61	24.12	1.47	9.42
Fort Clark, Tex	446	23.58	10.51	8.55
Fort Warren, Mass	133	23.41	3.11	14.75
Fort Barrancas, Fla	85	22.88	1.97	12.68
Fort Apache, Ariz	284	22.55	6.41	14.34
The Army	25,204	19.20	483.88	9.91

TABLE XI.—*The military posts in each department, showing the rates of admission, death, discharge, and constant noneffectiveness for disease, excluding venereal diseases, vaccinia, and alcoholism, year 1895.*

DEPARTMENT OF THE EAST.

Name of station.	Mean strength.	Ratio per 1,000 of mean strength.			
		Admissions.	Discharges.	Deaths.	Constantly noneffective.
Fort Myer, Va	270	1,958.26	29.63	3.70	36.27
Springfield Armory, Mass	37	1,837.83	.....	27.03	29.85
Washington Barracks, D. C	363	1,732.78	2.75	2.75	29.68
Davids Island, N. Y	232	1,232.77	17.24	.....	25.75
Sandy Hook Proving Ground, N. J	63	1,222.21	.....	.....	12.00
Columbia Arsenal, Tenn	20	1,100.00	.....	.....	23.43
Fort Hamilton, N. Y	287	1,069.67	10.45	6.97	19.39
Fort Monroe, Va	555	1,059.45	7.21	.....	26.41
West Point, N. Y	386	1,049.22	7.77	2.59	16.96
Fort Thomas, Ky	469	950.96	12.79	10.66	28.61
Watervliet Arsenal, N. Y	61	934.42	.....	.....	24.12
Kennebec Arsenal, Me	14	928.57	.....	.....	34.83
Fort Schuyler, N. Y	128	906.25	7.81	.....	11.84
Watertown Arsenal, Mass	41	878.05	.....	24.39	17.30
Key West Barracks, Fla	128	867.19	31.25	.....	18.14
Willets Point, N. Y	419	866.36	.....	7.16	17.68
Columbus Barracks, Ohio	404	782.18	7.42	.....	26.00
Fort McHenry, Md	188	760.63	5.32	10.64	14.97
Augusta Arsenal, Ga	29	724.14	34.48	.....	20.59
Fort Niagara, N. Y	220	718.19	9.09	4.55	20.62
Frankford Arsenal, Pa	45	711.12	22.22	.....	28.74
Jackson Barracks, La	132	666.67	.....	.....	17.37
Fort Barrancas, Fla	85	658.83	11.76	.....	22.88
Allegheny Arsenal, Pa	31	645.16	.....	.....	21.12
Fort Ethan Allen, Vt	225	631.12	8.89	.....	21.14
Saint Francis Barracks, Fla	156	721.80	25.64	.....	25.71
Fort Preble, Me	69	608.69	14.49	.....	14.62
Fort Columbus, N. Y	231	606.05	8.66	12.99	12.47
Fort Warren, Mass	133	578.95	15.04	7.52	23.41
Plattsburg Barracks, N. Y	509	575.64	1.96	.....	10.01
Madison Barracks, N. Y	480	554.16	4.17	2.08	14.69
Fort Adams, R. I	289	550.18	3.46	3.46	14.64
Fort Wadsworth, N. Y	207	531.40	4.83	4.83	14.83
Fort Trumbull, Conn	70	471.42	.....	.....	7.59
Philadelphia, attending surgeon, Pa	16	375.00	.....	.....	9.25
Fort McPherson, Ga	567	356.26	3.53	3.53	13.05
Fort Porter, N. Y	128	312.50	.....	.....	6.51
New York, attending surgeon, N. Y	26	307.69	.....	.....	33.40
Baltimore, attending surgeon, Md	8	125.00	.....	.....	2.05
Boston, attending surgeon, Mass	14	71.43	.....	.....	.78
Field	140	814.29	.....	.....	7.81
Total	7,875	840.38	7.75	3.42	19.53

DEPARTMENT OF THE MISSOURI.

Indianapolis Arsenal, Ind	25	1,160.00	.....	.....	12.05
Fort Sill, Okla	414	838.17	.....	4.83	20.33
Fort Reno, Okla	342	751.46	5.85	2.92	35.13
Fort Riley, Kans	763	740.50	11.80	2.62	21.71
Fort Sheridan, Ill	761	721.41	1.31	.....	16.86
Jefferson Barracks, Mo	236	690.67	.....	12.71	21.23
Fort Leavenworth, Kans	796	645.74	11.31	5.02	16.05
Rock Island Arsenal, Ill	66	590.92	.....	15.15	11.96
Chicago, headquarters, Ill	33	424.24	.....	60.60	13.95
Fort Brady, Mich	236	381.35	.....	8.47	12.82
Leavenworth Military Prison, Kans	83	301.21	.....	.....	8.55
Fort Wayne, Mich	260	300.00	7.69	3.85	10.57
Field	96	677.09	.....	.....	6.97
Total	4,111	665.29	5.59	4.38	18.57

TABLE XI.—*The military posts in each department, showing the rates of admission, death, discharge, and constant noneffectiveness for disease, excluding venereal diseases, vaccinia, and alcoholism, year 1895*—Continued.

DEPARTMENT OF DAKOTA.

Name of station.	Mean strength.	Ratio per 1,000 of mean strength.			
		Admissions.	Discharges.	Deaths.	Constantly noneffective.
Fort Snelling, Minn	463	749.46	8.64	6.48	30.57
Fort Yates, N. Dak	277	653.43	3.61	3.61	16.02
Fort Assinniboine, Mont	330	627.28	3.03	.....	15.37
Fort Buford, N. Dak	179	614.52	11.17	5.59	20.81
Fort Harrison, Mont	28	535.71	35.71	35.71	20.55
Fort Keogh, Mont	357	490.19	5.60	.....	16.02
Fort Pembina, N. Dak	45	444.45	.....	.....	10.05
Fort Custer, Mont	310	396.76	.....	3.23	14.59
Fort Missoula, Mont	273	391.94	3.66	.....	10.48
Fort Yellowstone, Wyo	109	247.71	.....	.....	4.09
Saint Paul, headquarters, Minn	31	.....	.....	.....	.....
Field	163	484.67	.....	.....	6.18
Total	2,565	542.30	4.68	2.73	16.75

DEPARTMENT OF THE PLATTE.

Fort Omaha, Nebr	492	1,010.16	14.23	4.06	28.80
Fort D. A. Russell, Wyo	409	897.32	2.44	.....	24.18
Omaha, headquarters, Nebr	11	818.18	.....	.....	29.14
Fort Robinson, Nebr	419	778.04	2.39	2.39	14.27
Fort Washakie, Wyo	88	738.64	.....	.....	20.80
Fort Niobrara, Nebr	449	679.29	.....	.....	20.56
Fort Meade, S. Dak	467	428.27	6.42	.....	11.74
Field	161	602.48	.....	6.21	6.04
Total	2,496	747.60	4.81	1.60	19.20

DEPARTMENT OF TEXAS.

Fort Ringgold, Tex	179	1,167.59	5.59	5.59	26.09
Fort Clark, Tex	446	1,006.73	2.24	2.24	23.58
Fort Hancock, Tex	48	958.33	.....	.....	15.30
Camp Eagle Pass, Tex	66	924.25	.....	.....	12.66
Fort Brown, Tex	116	922.41	8.62	8.62	33.56
Fort McIntosh, Tex	177	774.01	11.30	5.65	19.99
Fort Sam Houston, Tex	610	675.37	3.28	4.92	19.73
Fort Bliss, Tex	199	597.98	35.18	.....	22.44
San Antonio, headquarters, Tex	16	125.00	.....	.....	2.23
Field	27	592.59	.....	.....	5.08
Total	1,884	826.97	7.44	3.72	21.68

DEPARTMENT OF THE COLORADO.

Fort Wingate, N. Mex	262	858.78	3.82	7.63	28.88
Fort Huachuca, Ariz	250	800.00	.....	.....	13.54
Fort Logan, Colo	590	750.81	6.47	3.39	16.48
Fort Du Chesne, Utah	115	669.56	.....	8.70	13.30
San Carlos, Ariz	56	642.86	.....	.....	9.58
Fort Grant, Ariz	288	586.81	.....	6.94	15.77
Fort Douglas, Utah	524	583.98	9.55	3.82	15.94
Fort Apache, Ariz	284	573.94	17.61	7.04	22.55
Whipple Barracks, Ariz	275	552.73	3.64	7.27	16.37
Denver, headquarters, Colo	16	437.50	.....	.....	22.09
Fort Stanton, N. Mex	71	436.62	.....	.....	4.40
Fort Bayard, N. Mex	366	336.06	2.73	5.46	15.27
Field	89	1,370.79	.....	.....	8.43
Total	3,186	644.69	5.65	4.71	16.81

TABLE XI.—*The military posts in each department, showing the rates of admission, death, discharge, and constant noneffectiveness for disease, excluding venereal diseases, vaccinia, and alcoholism, year 1895*—Continued.

DEPARTMENT OF CALIFORNIA.

Name of station.	Mean strength.	Ratio per 1,000 of mean strength.			
		Admissions.	Discharges.	Deaths.	Constantly noneffective.
Presidio of San Francisco, Cal	566	779.15	7.07	1.77	17.38
Benicia Barracks, Cal	218	513.77	4.59	4.59	8.12
Angel Island, Cal	261	498.08	3.83	.....	18.23
Fort Mason, Cal	68	397.06	.....	.....	8.26
San Diego Barracks, Cal	69	275.36	43.48	14.49	29.93
Alcatraz Island, Cal	130	253.87	.....	.....	12.77
San Francisco, headquarters, Cal	28	35.71	.....	.....	8.12
Field	159	710.69	.....	.....	7.89
Total	1,499	584.40	6.00	2.00	14.76

DEPARTMENT OF THE COLUMBIA.

Fort Walla Walla, Wash	212	622.65	4.72	14.15	21.85
Fort Sherman, Idaho	307	573.28	9.77	6.51	21.85
Fort Spokane, Wash	181	541.45	.....	.....	14.17
Fort Townsend, Wash	13	461.54	.....	.....	19.18
Boise Barracks, Idaho	115	434.78	.....	.....	14.48
Fort Canby, Wash	125	368.00	8.00	.....	9.48
Vancouver Barracks, Wash	572	321.67	5.24	5.24	10.20
Field	22	318.19	.....	.....	2.37
Total	1,547	451.85	5.17	5.17	14.80
General Hospital, Hot Springs, Ark	41	536.59	365.85	.....	.....
Total for the Army	25,204	707.00	6.81	3.33	19.20

TABLE XII.—*Ratios of admission to sick report, discharge, death, and constantly noneffective of the Army and of the troops in the several departments for the year 1895, as compared with the ratios for the Army for 1894, and for the decade 1884–1893.*

For the decade 1884–1893.	White.				Negro.				Indian.				Total.			
Mean strength	A. G., 23,996.		S. G., 21,830.		A. G., 2,447.		S. G., 2,227.		A. G., 183.		S. G., 174.		A. G., 26,626.		S. G., 24,231.	
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Constantly noneffective. (a)	Admissions.	Discharges.	Deaths.	Constantly noneffective. (a)	Admissions. (b)	Discharges. (b)	Deaths. (b)	Constantly noneffective. (b)	Admissions.	Discharges.	Deaths.	Constantly noneffective. (a)
SPECIAL.																
Vaccinia	30.79	.....	.....	1.15	25.37	.....	.....	0.86	125.22	.....	.....	4.99	30.97	.....	.....	1.16
Typhoid fever	6.05	0.03	0.72	.92	2.87	.....	0.78	.34	.57	.....	.....	.02	5.72	0.03	0.72	.86
Malarial infections	104.53	.12	.15	2.66	96.63	0.04	.49	2.03	36.19	.....	.....	.46	103.32	.11	.18	2.57
Rheumatic fever	5.28	.08	.03	.61	5.52	.04	.04	.52	4.02	0.55	.....	.57	5.29	.08	.03	.60
Tuberculosis of the lungs	2.95	1.66	.45	.73	4.18	2.04	.86	1.12	25.27	12.04	7.11	3.40	3.23	1.77	.53	.79
Syphilis	20.36	2.55	.01	1.80	26.90	3.72	.....	2.14	17.81	2.74	.....	1.89	20.94	2.66	.01	1.83
Gonorrhea	37.49	.32	.....	2.11	34.13	.16	.....	1.59	51.13	.....	.....	2.70	37.28	.30	.....	2.07
All venereal diseases	75.28	2.97	.01	5.19	85.58	3.88	.....	5.67	86.16	2.74	.....	5.48	76.32	3.05	.01	5.23
Alcoholism and direct results	48.56	.22	.22	.47	4.45	.04	.....	.05	5.17	.....	.....	.08	44.20	.20	.20	.43
Neuralgia	31.81	.18	.....	.66	44.14	.08	.....	.61	14.93	.....	.....	.17	32.82	.17	.....	.65
Tonsillitis	43.62	.004	.01	.66	58.42	.....	.....	.79	29.29	.....	.....	.39	44.88	.004	.01	.67
Colic and constipation	36.75	.01	.....	.29	56.12	.04	.....	.42	35.04	.....	.....	.35	38.52	.02	.....	.30
Diarrheal diseases	129.91	.32	.15	1.47	129.23	.16	.20	1.29	48.25	.....	.....	.60	129.26	.30	.15	1.44
Diseases of the heart	6.33	1.58	.41	.56	5.52	1.47	.37	.31	2.87	1.09	.....	.19	6.23	1.56	.41	.53
Coryza	45.30	.01	.....	.28	56.62	.....	.....	.32	11.49	.....	.....	.07	46.09	.01	.....	.31
Bronchitis	71.40	.32	.05	1.55	77.77	.16	.....	1.36	60.89	.....	.....	.81	71.92	.30	.05	1.52
Pneumonia	3.96	.08	.70	.44	7.14	.04	1.47	.66	9.19	.....	1.09	.59	4.29	.08	.78	.46
Diseases of the kidneys	1.87	.25	.27	.21	2.92	.29	.33	.21	.....	.....	.....	.....	1.96	.25	.28	.21
Rheumatism and myalgia	79.68	2.05	.03	3.90	121.60	2.37	.04	4.99	53.42	1.64	.....	1.62	83.34	2.07	.03	3.98
Boils and abscesses	45.22	.02	.004	1.02	31.61	.08	.....	.76	44.80	.....	.....	1.19	43.96	.03	.004	1.00
Conjunctivitis	12.67	.10	.....	.33	17.20	.16	.....	.49	47.68	.....	.....	1.33	13.33	.11	.....	.36
All diseases of the eye	18.81	1.15	.....	.81	28.92	1.19	.....	1.08	64.33	.55	.....	2.15	20.07	1.15	.....	.85
All diseases of the ear	8.32	.68	.004	.37	3.82	.16	.....	.19	8.62	.....	.....	.11	7.91	.63	.004	.35
Contusions and sprains	134.64	.27	.004	3.34	152.36	.29	.04	3.62	131.53	.....	.....	2.52	136.25	.27	.01	3.36
Dislocations	2.51	.13	.004	.21	2.16	.12	.....	.11	6.32	.....	.....	.42	2.50	.12	.004	.20
Fractures, not gunshot	6.94	.60	.10	1.18	5.75	.33	.12	.91	12.06	.....	1.64	1.46	6.86	.57	.11	1.16
Wounds, not gunshot	49.43	.19	.08	1.51	69.82	.25	.08	2.01	97.64	.....	.....	2.28	51.66	.19	.08	1.56
Wounds, gunshot	3.74	.73	1.01	.59	8.49	1.10	1.63	1.06	6.32	1.09	4.38	.95	4.20	.77	1.10	.63
GROUPED.																
Infectious diseases, general and local	298.88	5.06	1.79	13.51	311.63	6.58	2.70	12.86	357.27	16.41	7.11	17.89	300.47	5.28	1.91	13.50
Diseases of nutrition, general	2.77	.63	.10	.27	2.38	.45	.....	.19	1.15	.....	.55	.03	2.72	.60	.09	.26
Diseases of the nervous system	115.65	3.87	.84	2.46	92.32	3.02	.37	1.66	44.23	1.64	.55	.77	112.99	3.78	.79	2.37

Diseases of the digestive system	295.39	.93	.68	4.61	339.11	.82	.41	4.41	189.55	.....	.....	2.68	298.64	.92	.65	4.57
Diseases of the circulatory system	7.71	1.96	.53	.73	5.84	1.59	.61	.39	2.87	1.09	.....	.19	7.50	1.92	.53	.70
Diseases of the respiratory organs	129.14	.76	.85	2.70	158.28	.41	1.72	2.79	93.62	1.64	1.09	2.36	131.56	.74	.93	2.71
Diseases of the genito-urinary system	12.45	1.11	.28	.92	14.68	1.10	.33	.98	9.19	.55	.....	.23	12.64	1.10	.29	.92
Diseases of the lymphatic system and ductless glands	5.21	.08	.004	.48	6.56	.04	.04	.54	11.49	.....	.....	.90	5.38	.08	.01	.49
Diseases of the muscles, bones, and joints	85.01	3.30	.01	3.98	126.63	3.68	.08	5.37	56.29	1.64	.....	1.40	88.62	3.32	.02	4.08
Diseases of the integument and subcutaneous connective tissue	81.10	.34	.02	2.18	57.74	.33	.08	1.70	74.10	.....	.....	2.18	78.90	.34	.02	2.14
Diseases of the organs of special sense	28.88	1.97	.01	1.33	33.90	1.47	.....	1.32	74.67	.55	.....	2.32	29.67	1.91	.01	1.34
Unclassified	3.15	.03	.004	.08	6.51	.08	.....	.10	3.45	.....	.....	.01	3.46	.04	.004	.08
General injuries	2.64	.02	1.11	.06	.94	.04	.65	.03	.....	.....	.55	.....	2.47	.02	1.07	.06
Injuries to special parts	249.43	3.71	1.43	8.56	304.04	4.01	2.08	9.83	313.04	2.19	6.02	9.18	254.91	3.73	1.52	8.68
Total for diseases	1,065.34	20.04	5.12	33.24	1,155.59	19.58	6.34	32.31	917.86	23.52	9.30	30.95	1,072.57	20.03	5.26	33.13
Total for injuries	252.07	3.73	2.54	8.62	304.98	4.05	2.74	9.86	313.04	2.19	6.56	9.18	257.37	3.75	2.58	8.74
Total for all causes	1,317.40	23.77	7.66	41.86	1,460.57	23.62	9.07	42.17	1,230.90	25.71	15.86	40.13	1,329.94	23.77	7.85	41.87

a For 1887–1893, seven years of decade.

b For 1891–1893, three years of decade.

TABLE XII.—*Ratios of admission to sick report, discharge, death, and constantly noneffective, etc.*—Continued.

For the year 1894.	White.				Negro.				Indian.				Total.			
Mean strength	A. G., 24,995.		S. G., 22,904.		A. G., 2,235		S. G., 2,086.		A. G., 444.		S. G., 386.		A. G., 27,674.		S. G., 25,376.	
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Constantly noneffective.	Admissions.	Discharges.	Deaths.	Constantly noneffective.	Admissions.	Discharges.	Deaths.	Constantly noneffective.	Admissions.	Discharges.	Deaths.	Constantly noneffective.
SPECIAL.																
Vaccinia	35.19	.....	.....	0.90	23.97	.....	.....	0.52	20.73	.....	.....	0.34	34.05	.....	.....	0.86
Typhoid fever	6.59	.....	0.80	.98	1.44	.....	.....	.07	.....	.....	.....	.....	6.07	.....	0.72	.89
Malarial infections	79.33	.....	.08	1.98	34.52	.....	.....	.83	18.14	.....	.....	.52	74.72	.....	.07	1.88
Rheumatic fever	4.58	.....	.....	.52	5.27	.....	.....	.71	5.18	.....	.....	.63	4.65	.....	.....	.54
Tuberculosis of the lungs	2.66	1.48	.52	.63	1.92	1.34	0.45	.44	25.91	9.01	6.76	4.24	2.96	1.59	.61	.67
Syphilis	12.62	1.16	.04	1.30	8.15	.89	.....	1.56	5.18	2.25	.....	1.14	12.14	1.16	.04	1.32
Gonorrhea	46.80	.16	.....	2.72	27.80	.....	.....	1.16	116.58	.....	.....	5.27	46.30	.14	.....	2.63
All venereal diseases	82.21	1.32	.04	5.47	47.46	.89	.....	3.39	152.85	2.25	.....	7.08	80.43	1.30	.04	5.32
Alcoholism and direct results	33.79	.....	.32	.43	4.79	.....	.....	.02	2.59	.....	.....	.01	30.94	.....	.29	.39
Neuralgia	17.25	.12	.....	.49	23.01	.....	.....	.47	15.54	.....	.....	.16	17.69	.11	.....	.49
Tonsillitis	40.04	.....	.....	.64	29.24	.....	.....	.39	31.09	.....	.....	.50	39.02	.....	.....	.62
Colic and constipation	24.67	.04	.....	.28	30.68	.....	.....	.31	15.54	.....	.....	.11	25.02	.04	.....	.28
Diarrheal diseases	99.59	.04	.12	.99	53.21	.....	.....	.56	33.68	.....	.....	.35	94.77	.04	.11	.94
Diseases of the heart	4.06	.96	.40	.36	2.88	.89	.45	.23	.....	.....	2.25	.....	3.90	.94	.43	.34
Coryza	33.84	.....	.....	.31	37.87	.....	.....	.34	18.14	.....	.....	.26	33.93	.....	.....	.31
Bronchitis	37.15	.08	.....	.69	23.01	.....	.....	.48	38.86	.....	.....	.85	36.02	.07	.....	.68
Pneumonia	3.14	.....	.64	.31	4.31	.45	.89	.47	15.54	.....	.....	1.22	3.43	.04	.65	.33
Diseases of the kidneys	1.48	.20	.08	.25	.96	.45	.45	.34	.....	.....	.....	.....	1.42	.22	.11	.25
Rheumatism and myalgia	62.87	.92	.....	2.78	72.87	.45	.....	2.99	38.86	.....	.....	1.14	63.33	.87	.....	2.77
Boils and abscesses	39.91	.....	.....	.84	14.86	.....	.....	.27	31.09	.....	.....	1.31	37.71	.....	.....	.80
Conjunctivitis	10.13	.08	.....	.31	4.79	.45	.....	.28	31.09	.....	.....	.66	10.01	.11	.....	.32
All diseases of the eye	17.42	1.00	.....	.78	8.15	.89	.....	.91	51.81	.....	.....	1.23	17.18	.98	.....	.80
All diseases of the ear	5.72	.24	.04	.20	2.88	.....	.....	.08	7.77	.....	2.25	.38	5.52	.22	.07	.20
Contusions and sprains	128.32	.20	.04	3.10	117.93	.....	.....	2.38	116.58	.....	.....	5.26	127.29	.18	.04	3.07
Dislocations	2.40	.12	.....	.19	2.40	.....	.....	.12	5.18	.....	.....	.97	2.44	.11	.....	.20
Fractures, not gunshot	6.59	.44	.04	1.17	.96	.....	.45	.07	10.36	.....	2.25	1.82	6.19	.40	.11	1.09
Wounds, not gunshot	50.12	.24	.04	1.33	58.49	.....	.....	2.04	62.18	.....	.....	1.25	50.99	.22	.04	1.39
Wounds, gunshot	3.23	.52	.40	.52	3.84	.45	1.34	.79	10.36	.....	6.76	1.53	3.39	.51	.76	.55
GROUPED.																
Infectious diseases, general and local	283.09	2.84	1.72	12.48	160.59	2.24	1.34	7.00	318.65	11.26	6.76	15.44	273.57	2.93	1.77	12.07
Local infections (also entered under diseases of organs)	125.47	.20	.68	3.03	74.78	.45	.89	2.12	116.58	.....	.....	4.64	121.18	.22	.69	2.98
Diseases of nutrition, general	1.40	.44	.04	.12	.48	.....	.....	.02	2.59	.....	.....	.02	1.34	.40	.04	11

Diseases of the nervous system	70.59	1.84	.92	1.76	41.71	1.34	.45	1.52	28.50	.....	.....	.27	67.59	1.77	.87	1.72
Diseases of the digestive system	245.41	.60	.44	3.81	165.39	.45	.45	2.45	139.90	.....	.....	2.09	237.23	.58	.43	3.67
Diseases of the circulatory system	5.11	1.04	.48	.46	3.36	.89	.89	.23	.....	.....	2.25	.....	4.89	1.01	.54	.43
Diseases of the respiratory organs	80.64	.36	.68	1.74	69.03	.45	.89	1.80	85.49	.....	.....	2.94	79.76	.36	.69	1.76
Diseases of the genito-urinary system	10.04	.60	.08	.77	8.63	.45	.45	.69	2.59	.....	.....	.10	9.81	.58	.11	.75
Diseases of the lymphatic system and ductless glands	3.97	.....	.....	.33	4.31	.....	.....	.28	10.36	.....	.....	1.08	4.10	.....	.....	.34
Diseases of the muscles, bones, and joints	68.55	1.60	.....	2.94	78.14	.89	.....	2.93	41.45	2.25	.....	1.32	68.92	1.55	.....	2.91
Diseases of the integument and subcutaneous connective tissue	75.71	.....	.....	1.75	30.68	.....	.....	.74	62.18	.....	.....	2.26	71.80	.....	.....	1.67
Diseases of the organs of special sense	24.67	1.28	.04	1.11	11.50	.89	.....	1.07	62.18	.....	2.25	1.63	24.16	1.23	.07	1.12
Unclassified	2.45	.....	.04	.04	1.92	.....	.....	.03	.....	.....	.....	.....	2.36	.....	.04	.04
General injuries	3.49	.12	1.24	.08	1.92	.....	.....	.01	.....	.....	.....	.....	3.31	.11	1.12	.07
Injuries to special parts	241.31	2.84	.80	7.79	233 94	1.79	1.79	7.15	253.89	4.50	9.01	12.36	240.90	2.78	1.01	7.81
Total for diseases	871.64	10.60	4.44	27.31	575.74	7.61	4.47	18.77	753.89	13.51	11.26	27.16	845.52	10.41	4.55	26.60
Total for injuries	244.80	2.96	2.04	7.87	235.86	1.79	1.79	7.16	253.89	4.50	9.01	12.36	244.21	2.89	2.13	7.88
Total for all causes	1,116.44	13.56	6.48	35.18	811.60	9.40	6.26	25.93	1,007.77	18.02	20.27	39.52	1,089.73	13.30	6.69	34.49

TABLE XII.—*Ratios of admission to sick report, discharge, death, and constant noneffective, etc.*—Continued.

For the year 1895.	White.				Negro.				Total.			
Mean strength	A. G., 25,139.		S. G., 23,195.		A. G., 2,187.		S. G., 2,009.		A. G., 27,326.		S. G., 25,204.	
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Constantly noneffective.	Admissions.	Discharges.	Deaths.	Constantly noneffective.	Admissions.	Discharges.	Deaths.	Constantly noneffective.
SPECIAL.												
Vaccinia	27.98	.....	.....	0.57	11.95	.....	.....	0.22	26.70	.....	.....	0.55
Typhoid fever	4.61	.....	0.52	.72	1.00	.....	.....	.11	4.32	.....	0.48	.67
Malarial infections	87.60	.....	.08	1.80	24.39	.....	.....	.44	82.56	.....	.07	1.70
Rheumatic fever	4.10	0.08	.....	.50	3.98	.....	.....	.39	4.09	0.07	.....	.49
Tuberculosis of the lungs	2.46	1.11	.36	.54	1.99	0.46	0.46	.33	2.42	1.06	.37	.52
Syphilis	10.91	.....	.08	1.23	13.94	.....	.46	1.59	11.15	.....	.11	1.26
Gonorrhea	47.68	.....	.....	3.08	26.88	.....	.....	1.36	46.02	.....	.....	2.94
All venereal diseases	75.57	.....	.08	5.40	52.26	.....	.46	3.48	73.72	.....	.11	5.24
Alcoholism, and direct results	32.16	.....	.12	.47	6.47	.....	.....	.05	30.11	.....	.11	.44
Neuralgia	15.69	.08	.....	.52	21.40	.....	.....	.37	16.15	.07	.....	.51
Tonsillitis	41.60	.....	.....	.65	43.31	.....	.....	.59	41.74	.....	.....	.65
Colic and constipation	28.59	.....	.....	.26	49.78	.....	.....	.39	30.27	.....	.....	.27
Diarrheal diseases	88.08	.....	.08	.81	51.27	.....	.....	.50	85.14	.....	.07	.78
Diseases of the heart	4.61	1.19	.40	.53	2.49	.46	.....	.23	4.44	1.13	.37	.51
Coryza	17.03	.....	.....	.17	14.93	.....	.....	.15	16.86	.....	.....	.17
Bronchitis	55.31	.08	.....	.85	50.28	.....	.....	.62	54.91	.07	.....	.83
Pneumonia	2.97	.....	.48	.32	2.99	.....	.....	.22	2.98	.....	.44	.32
Diseases of the kidneys	.95	.16	.04	.19	1.00	.....	.46	.14	.95	.15	.07	.18
Rheumatism and myalgia	61.40	.44	.....	2.75	95.07	.46	.....	2.79	64.08	.44	.....	2.76
Boils and abscesses	44.92	.04	.....	.96	17.92	.....	.....	.45	42.77	.04	.....	.92
Conjuntivitis	10.99	.....	.....	.25	12.44	.....	.....	.36	11.11	.....	.....	.26
All diseases of the eye	15.69	.44	.....	.55	24.39	.46	.....	.90	16.39	.44	.....	.58
All diseases of the ear	6.64	.44	.....	.33	1.99	.....	.....	.03	6.27	.40	.....	.30
Contusions and sprains	138.18	.20	.....	3.41	117.97	.....	.....	2.27	136.57	.18	.....	3.32
Dislocations	3.28	.....	.04	.19	1.00	.....	.....	.14	3.09	.....	.04	.19
Fractures not gunshot	8.15	.32	.04	1.28	4.98	.91	.....	1.47	7.89	.37	.04	1.29
Wounds not gunshot	52.60	.28	.....	1.37	04.21	.46	.46	1.72	53.52	.29	.04	1.40
Wounds, gunshot	2.28	.68	.80	.46	3.48	.46	.46	.42	2.38	.66	.77	.46
GROUPED.												
Infectious diseases, general and local	274.50	1.47	1.55	11.45	136.88	.46	.91	5.84	263.53	1.39	1.50	11.00
Local infections (also entered under diseases of organs)	155.16	.16	.72	3.57	113.99	.....	.....	2.67	151.88	.15	.66	3.50
Diseases of nutrition, general	1.29	.16	.08	.08	1.00	.....	.46	.23	1.27	.15	.11	.09
Diseases of the nervous system	62.43	1.55	.36	1.91	36.84	.....	.....	.97	60.39	1.43	.33	1.84

Diseases of the digestive system	242.55	.16	.56	3.49	232.46	.....	.46	3.19	241.74	.15	.55	3.46
Diseases of the circulatory system	6.08	1.43	.40	.62	2.49	.46	.....	.23	5.79	1.35	.37	.59
Diseases of the respiratory organs	82.34	.28	.64	1.72	74.17	.....	.46	1.66	81.69	.26	.62	1.72
Diseases of the genito-urinary system	6.64	.24	.04	.49	6.97	.....	.46	.80	6.66	.22	.07	.52
Diseases of the lymphatic system and ductless glands	3.19	.04	.....	.33	2.49	.....	.....	.10	3.13	.04	.....	.31
Diseases of the muscles, bones, and joints	67.69	.80	.....	2.90	100.55	1.37	.....	3.07	70.30	.84	.....	2.91
Diseases of the integument and subcutaneous connective tissue	79.02	.12	.....	1.93	36.84	.....	.....	1.47	75.66	.11	.....	1.89
Diseases of the organs of special sense	24.53	.91	.....	1.04	27.38	.46	.....	.95	24.76	.88	.....	1.04
Unclassified	2.72	.....	.....	.05	1.00	.....	.....	.005	2.58	.....	.....	.05
General injuries	6.77	.....	.76	.18	8.46	.....	.46	.17	6.90	.....	.73	.18
Injuries to special parts	267.30	2.35	.88	8.34	248.38	2.29	.91	7.71	265.79	2.34	.88	8.29
Total for diseases	852.99	7.16	3.62	26.02	659.03	2.74	2.74	18.53	837.53	6.81	3.55	25.43
Total for injuries	274.07	2.35	1.63	8.52	256.84	2.29	1.37	7.88	272.69	2.34	1.61	8.46
Total for all causes	1,127.05	9.51	5.25	34.54	915.88	5.03	4.12	26.40	1,110.22	9.15	5.16	33.89

TABLE XII.—*Ratios of admission to sick report, discharge, death, and constant noneffective, etc.*—Continued.

For the year 1895.	Department of the East.				Department of the Missouri.				Department of Dakota.				Department of the Platte.			
Mean strength	7,875.				4,111.				2,565.				2,496.			
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Constantly noneffective.	Admissions.	Discharges.	Deaths.	Constantly noneffective.	Admissions.	Discharges.	Deaths.	Constantly noneffective.	Admissions.	Discharges.	Deaths.	Constantly noneffective.
SPECIAL.																
Vaccinia	35.56	.....	.....	0.70	35.27	.....	.....	0.59	9.75	.....	.....	0.18	19.63	.....	.....	0.53
Typhoid fever	4.06	.....	0.51	.64	3.65	.....	0.73	.80	.78	.....	.....	.21	4.01	.....	.....	.37
Malarial infections	162.16	.....	.13	2.60	65.68	.....	.24	2.11	11.70	.....	.....	.29	42.47	.....	.....	.93
Rheumatic fever	4.32	0.13	.....	.51	3.65	.....	.....	.25	3.90	.....	.....	.30	5.21	.....	.....	.54
Tuberculosis of the lungs	4.44	2.03	.51	.69	1.95	0.73	.49	.27	1.56	0.39	.....	.67	1.60	0.80	.....	.53
Syphilis	11.81	.....	.....	1.34	9.24	.....	.24	1.23	6.63	.....	0.39	.75	7.21	.....	.....	.64
Gonorrhea	50.92	.....	.....	3.37	49.38	.....	.....	3.17	30.80	.....	.....	1.95	48.48	.....	.....	2.70
All venereal diseases	81.52	.....	.....	6.11	72.73	.....	.24	5.10	44.44	.....	.39	2.97	69.31	.....	.....	4.11
Alcoholism and direct results	32.00	.....	.13	.44	15.08	.....	.....	.17	13.26	.....	.39	.10	66.91	.....	0.40	1.55
Neuralgia	16.89	.13	.....	.38	15.33	.....	.....	.40	20.27	.....	.....	.34	21.23	.....	.....	1.09
Tonsillitis	44.57	.....	.....	.65	36.25	.....	.....	.54	38.21	.....	.....	.66	72.52	.....	.....	1.16
Colic and constipation	32.89	.....	.....	.28	19.46	.....	.....	.16	26.90	.....	.....	.26	49.68	.....	.....	.42
Diarrheal diseases	91.43	.....	.....	.74	79.54	.....	.....	.77	61.99	.....	.....	.51	80.93	.....	.....	.61
Diseases of the heart	3.43	.63	.51	.33	4.62	1.46	.24	.67	2.73	.78	.....	.31	3.61	.80	.....	.42
Coryza	27.17	.....	.....	.26	7.30	.....	.....	.08	10.53	.....	.....	.12	19.63	.....	.....	.22
Bronchitis	60.57	.25	.....	.98	60.33	.....	.....	.83	60.04	.....	.....	.72	68.51	.....	.....	1.05
Pneumonia	2.54	.....	.63	.23	3.16	.....	.49	.41	6.24	.....	.78	.66	4.41	.....	.40	.44
Diseases of the kidneys	1.27	.25	.....	.07	.49	.24	.....	.30	.78	.39	.78	.15	1.60	.....	.....	.13
Rheumatism and myalgia	64.25	.25	.....	2.13	55.22	.....	.....	2.02	58.09	.39	.....	1.83	92.95	.....	.....	2.97
Boils and abscesses	38.10	.....	.....	.90	66.65	.24	.....	1.29	21.44	.....	.....	.44	38.86	.....	.....	.72
Conjunctivitis	7.87	.....	.....	.18	14.11	.....	.....	.33	12.09	.....	.....	.37	8.01	.....	.....	.15
All diseases of the eye	12.83	.63	.....	.49	19.46	.....	.....	.54	17.93	.....	.....	.72	14.02	1.60	.....	.79
All diseases of the ear	5.84	.25	.....	.21	7.05	.73	.....	.32	5.85	.39	.....	.40	9.62	.40	.....	.53
Contusions and sprains	133.21	.....	.....	3.19	167.84	.49	.....	4.32	101.36	.....	.....	2.10	156.25	.....	.....	3.61
Dislocations	3.05	.....	.13	.15	3.89	.....	.....	.32	2.73	.....	.....	.13	2.80	.....	.....	.30
Fractures, not gunshot	7.36	.51	.13	1.01	9.00	.24	.....	1.89	8.19	1.17	.....	2.00	8.01	.....	.....	1.27
Wounds, not gunshot	52.19	.25	.....	1.38	50.35	.24	.....	1.45	47.57	.....	.....	1.06	62.10	.....	.40	1.89
Wounds, gunshot	1.65	.13	.89	.12	2.68	1.22	1.46	.77	4.29	.78	.39	.95	1.20	.....	.80	.13
GROUPED.																
Infectious diseases, general and local	389.21	2.29	1.27	13.54	242.52	.97	2.68	10.65	120.47	.78	.39	6.15	193.51	.80	.40	8.61
Local infections (also entered under diseases of organs)	152.25	.25	.89	3.47	180.00	.24	.73	4.10	141.13	.....	1.17	3.63	183.09	.....	.80	3.88
Diseases of nutrition, general	2.41	.38	.....	.08	.97	.....	.24	.12	.78	.....	.39	.19	2.00	.....	.....	.03

Diseases of the nervous system	65.65	1.40	.38	1.63	43.06	.49	.24	1.29	43.67	.78	.39	1.61	107.77	.....	.80	3.30
Diseases of the digestive system	254.48	.....	.51	3.42	214.06	.....	.73	3.13	199.22	.....	.39	2.94	297.68	.80	.40	4.35
Diseases of the circulatory system	4.70	.89	.51	.38	7.05	1.70	.24	.85	4.29	.78	.....	.33	5.61	1.20	.....	.56
Diseases of the respiratory organs	96.76	.51	.89	1.88	80.52	.24	.49	1.80	84.21	.....	1.17	2.13	99.36	.....	.40	2.36
Diseases of the genito-urinary system	5.59	.38	.....	.34	7.78	.24	.....	.78	8.19	.78	.78	.92	6.41	.....	.....	.44
Diseases of the lymphatic system and ductless glands	3.43	.13	.....	.43	1.95	.....	.....	.21	2.34	.....	.....	.08	1.20	.....	.....	.08
Diseases of the muscles, bones, and joints	69.33	.76	.....	2.24	60.33	.73	.....	2.67	72.52	1.17	.....	2.67	96.15	.....	.....	2.74
Diseases of the integument and subcutaneous connective tissue	75.68	.13	.....	1.95	100.22	.24	.....	1.98	42.10	.....	.....	1.24	67.31	.....	.....	1.57
Diseases of the organs of special sense	20.44	.89	.....	.82	27.73	.97	.....	.90	30.02	.39	.....	1.73	24.04	2.00	.....	1.33
Unclassified	1.78	.....	.....	.04	2.19	.....	.....	.04	1.95	.....	.....	.01	2.40	.....	.....	.02
General injuries	6.22	.....	1.14	.21	5.11	.....	1.46	.07	4.68	.....	.39	.06	6.41	.....	.....	.05
Injuries to special parts	252.19	1.52	1.14	7.10	300.90	3.16	1.46	10.56	224.56	2.34	.39	7.68	308.49	1.20	1.20	9.42
Total for diseases	989.46	7.75	3.56	26.76	788.37	5.59	4.62	24.43	609.75	4.68	3.51	20.00	903.45	4.81	2.00	25.38
Total for injuries	258.41	1.52	2.29	7.31	306.01	3.16	2.92	10.62	229.24	2.34	.78	7.75	314.90	1.20	1.20	9.47
Total for all causes	1,247.87	9.27	5.84	34.08	1,094.38	8.76	7.54	35.05	838.99	7.02	4.29	27.75	1,218.35	6.01	3.21	34.86

TABLE XII.—*Ratios of admission to sick report, discharge, death, and constant noneffective, etc.*—Continued.

For the year 1895.	Department of Texas.				Department of the Colorado.				Department of California.				Department of the Columbia.			
Mean strength	1,884.				3,186.				1,499.				1,547.			
Causes of admission to sick report.	Admissions.	Discharges.	Deaths.	Constantly noneffective.	Admissions.	Discharges.	Deaths.	Constantly noneffective.	Admissions.	Discharges.	Deaths.	Constantly noneffective.	Admissions.	Discharges.	Deaths.	Constantly noneffective.
SPECIAL.																
Vaccinia	14.33	.....	.....	0.36	22.91	.....	.....	0.47	12.67	.....	.....	0.35	35.55	.....	.....	0.85
Typhoid fever	17.52	.....	2.12	2.26	3.45	.....	0.31	.48	.....	.....	.....	.29	3.23	.....	0.65	.49
Malarial infections	72.19	.....	.....	2.26	27.31	.....	.....	.96	98.73	.....	.....	1.79	16.81	.....	.....	.28
Rheumatic fever	4.25	.....	.....	.57	5.96	.....	.....	.49	.67	.....	.....	.14	1.94	0.65	.....	.94
Tuberculosis of the lungs	.53	1.06	.....	.87	.94	0.63	.31	.21	1.33	0.67	1.33	.29	2.59	1.29	.65	.59
Syphilis	24.42	.....	.....	3.22	14.75	.....	.....	1.49	9.34	.....	.67	.76	5.17	.....	.....	.27
Gonorrhea	67.94	.....	.....	4.21	32.33	.....	.....	2.29	52.71	.....	.....	3.01	29.73	.....	.....	2.02
All venereal diseases	138.00	.....	.....	10.34	58.07	.....	.....	4.44	75.38	.....	.67	4.43	45.90	.....	.....	2.98
Alcoholism and direct results	39.81	.....	.....	.40	26.37	.....	.....	.28	26.02	.....	.....	.29	29.73	.....	.....	.40
Neuralgia	12.74	.....	.....	.24	16.64	.31	.....	.63	9.34	.....	.....	.25	9.70	.....	.....	.29
Tonsillitis	11 68	.....	.....	.28	49.91	.....	.....	.78	18.68	.....	.....	.28	38.78	.....	.....	.64
Colic and constipation	41.40	.....	.....	.40	36.10	.....	.....	.29	16.01	.....	.....	.09	8.40	.....	.....	.13
Diarrheal diseases	146.50	.....	1.06	1.68	86.63	.....	.....	.99	63.38	.....	.....	.49	57.54	.....	.....	.41
Diseases of the heart	4.78	1.59	.53	.24	5.02	.94	.63	.63	6.67	3.34	.....	.46	6.46	.....	1.29	.47
Coryza	4.78	.....	.....	.04	21.03	.....	.....	.20	5.34	.....	.....	.03	13.57	.....	.....	.15
Bronchitis	33.97	.....	.....	.52	41.43	.....	.....	.65	58.71	.....	.....	.98	32.32	.....	.....	.51
Pneumonia	1.06	.....	.....	.02	1.88	.....	.31	.30	2.00	.....	.....	.16	2.59	.....	.65	.28
Diseases of the kidneys	1.06	.....	.....	.10	1.26	.....	.....	.36	.....	.....	.....	.04	.....	.....	.....	.47
Rheumatism and myalgia	81.74	1.06	.....	2.63	65.91	.63	.....	2.27	44.70	.....	.....	2.36	45.25	.65	.....	2.71
Boils and abscesses	98.19	.....	.....	1.95	24.80	.....	.....	.57	22.68	.....	.....	.56	34.26	.....	.....	.98
Conjunctivitis	14.86	.....	.....	.38	15.38	.....	.....	.37	13.34	.....	.....	.30	7.76	.....	.....	.13
All diseases of the eye	18.58	1.06	.....	.64	22.60	.....	.....	.53	18.01	.....	.....	.63	10.34	.....	.....	.22
All diseases of the ear	7.96	1.06	.....	.36	4.71	.63	.....	.18	2.67	.....	.....	.33	5.82	.....	.....	.35
Contusions and sprains	157.64	.....	.....	3.72	110.49	.31	.....	2.62	139.43	.....	.....	3.45	126.05	.65	.....	3.26
Dislocations	2.12	.....	.....	.16	1.88	.....	.....	.03	3.34	.....	.....	.12	5.82	.....	.....	.41
Fractures, not gunshot	7.43	.53	.....	1.06	5.96	.....	.....	.75	8.01	.67	.....	1.35	11.64	.....	.....	1.37
Wounds, not gunshot	76.43	.....	.....	1.56	60.58	1.57	.....	1.59	34.69	.....	.....	.88	42.02	.....	.....	1.13
Wounds, gunshot	2.65	2.12	1.06	.59	3.14	.94	.94	.57	2.00	1.33	.....	.54	2.59	.65	.....	.62
GROUPED.																
Infectious diseases, general and local	325.90	1.59	2.12	18.84	180.16	.94	1.88	8.57	250.17	2.00	2.67	9.55	142.86	1.94	1.94	6.99
Local infections (also entered under diseases of organs)	170.91	.....	.53	4.06	125.24	.....	.31	2.76	105.40	.....	.....	2.14	118.94	.65	.65	3.14
Diseases of nutrition, general	.53	.....	.....	.01	.....	.....	.....	.18	.67	.....	.....	.03	.....	.65	.....	.....

Diseases of the nervous system	71.13	.....	.....	.95	55.56	1.57	.31	1.84	42.03	.67	.....	1.44	47.19	.....	.65	1.12
Diseases of the digestive system	281.85	.....	1.06	3.99	275.89	.63	.94	3.99	182.79	.....	.....	2.13	170.65	.....	.65	2.79
Diseases of the circulatory system	4.78	1.59	.53	.24	5.65	1.26	.63	.70	7.34	3.34	.....	.50	7.76	.65	1.29	.60
Diseases of the respiratory organs	48.30	.53	.....	.91	67.48	.....	.94	1.24	70.05	.....	.....	1.21	58.82	.65	.65	1.44
Diseases of the genito-urinary system	8.49	.....	.....	.32	7.85	.....	.....	.51	4.00	.....	.....	.15	4.52	.....	.....	.71
Diseases of the lymphatic system and ductless glands	10.08	.....	.....	.63	1.57	.....	.....	.24	2.00	.....	.....	.19	3.88	.....	.....	.38
Diseases of the muscles, bones, and joints	91.30	1.06	.....	2.70	71.88	.63	.....	2.10	48.03	.....	.....	2.26	51.07	1.29	.....	2.49
Diseases of the integument and subcutaneous connective tissue	145.97	.53	.....	3.12	50.22	.....	.....	1.67	64.71	.....	.....	1.32	57.54	.....	.....	1.71
Diseases of the organs of special sense	28 13	2.12	.....	1.04	31.07	.63	.....	.83	20.68	.....	.....	.96	17.45	.....	.....	.75
Unclassified	2.65	.....	.....	.04	4.71	.....	.....	.12	6.00	.....	.....	.09	1.29	.....	.....	.04
General injuries	17.52	.....	1.06	.45	10.36	.....	.....	.28	5.34	.....	.67	.27	1.29	.....	.65	.05
Injuries to special parts	319.00	3.18	1.06	9.03	250.78	4.71	.94	7.12	243.50	2.67	.....	7.86	234.00	2.59	.....	8.57
Total for diseases	1,019.11	7.43	3.72	32.79	752.04	5.65	4.71	22.00	698.47	6.00	2.67	19.83	563.03	5.17	5.17	19.03
Total for injuries	336.52	3.18	2.12	9.48	261.14	4.71	.94	7.40	248.83	2.67	.67	8.13	235.29	2.59	.65	8.62
Total for all causes	1,355.63	10.62	5.84	42.26	1,013.18	10.36	5.65	29.40	947.30	8.67	3.34	27.96	798.32	7.76	5.82	27.65

TABLE XIII.—*Distribution of certain important diseases at United States military posts during the year 1895.*

Name of station.	Scarlet fever.	Measles.	Smallpox.	Influenza.	Mumps.	Diphtheria.	Typhoid fever.	Erysipelas.	Tonsillitis.	Bronchitis.	Pneumonia.	Total.
Adams, Fort, R. I	....	1	....	31	1	....	1	1	13	7	....	55
Alcatraz Island, Cal	....	....	....	3	....	....	....	....	1	....	....	4
Allegheny Arsenal, Pa	....	....	....	1	....	....	....	....	....	2	2	5
Angel Island, Cal	....	....	....	43	1	....	....	....	4	5	....	53
Apache, Fort, Ariz	....	....	....	4	....	....	....	....	19	11	1	35
Assinniboine, Fort, Mont	....	....	....	18	1	....	1	....	4	48	....	72
Augusta Arsenal, Ga	....	....	....	3	....	....	....	....	....	1	....	4
Baltimore, attending surgeon, Md	....	....	....	....	....	....	....	....	....	1	....	1
Barrancas, Fort, Fla	....	....	....	3	9	....	1	....	5	3	....	21
Bayard, Fort, N. Mex	....	....	....	....	....	....	....	....	23	9	2	34
Benicia Barracks, Cal	....	....	....	8	....	....	....	....	2	9	....	19
Bliss, Fort, Tex	....	1	....	2	....	....	....	....	1	5	....	9
Boise Barracks, Idaho	....	....	....	5	....	....	....	....	1	2	1	9
Boston, attending surgeon, Mass	....	....	....	....	....	....	....	....	1	....	....	1
Brady, Fort, Mich	....	1	....	3	....	....	....	1	9	12	2	28
Brown, Fort, Tex	....	5	....	....	....	....	1	1	1	....	....	8
Buford, Fort, N. Dak	....	....	....	5	....	....	....	....	2	14	3	24
Canby, Fort, Wash	....	....	....	15	....	....	1	....	1	2	1	20
Chicago, headquarters, Ill	....	....	....	3	....	....	....	....	4	1	....	8
Clark, Fort, Tex	....	2	....	1	....	....	....	....	6	35	....	44
Columbia Arsenal, Tenn	....	....	....	5	....	....	....	....	....	1	....	6
Columbus Barracks, Ohio	....	....	....	2	....	....	....	....	32	19	....	53
Columbus, Fort, N. Y	....	....	....	16	....	....	1	1	8	9	....	35
Custer, Fort, Mont	....	....	....	....	....	5	....	1	6	2	....	14
D. A. Russell, Fort, Wyo	....	2	....	2	....	....	....	2	51	68	1	126
Davids Island, N. Y	2	....	....	51	....	....	....	2	15	33	1	104
Denver, headquarters, Colo	....	....	....	6	....	....	....	....	....	....	....	6
Douglas, Fort, Utah	....	1	....	7	3	....	....	3	50	14	2	80
Du Chesne, Fort, Utah	....	....	....	3	....	....	....	....	1	1	....	5
Eagle Pass, Camp, Tex	....	....	....	....	....	....	3	....	....	3	....	6
Ethan Allen, Fort, Vt	....	....	....	29	....	....	1	....	8	6	1	45
Frankford Arsenal, Pa	....	....	....	8	....	....	....	....	1	....	....	9
Grant, Fort, Ariz	....	....	....	....	....	....	....	....	18	11	....	29
Hamilton, Fort, N. Y	....	....	....	6	....	....	....	....	17	....	....	23
Hancock, Fort, Tex	....	....	....	....	....	....	1	....	....	....	....	1
Harrison, Fort, Mont	1	....	....	....	....	....	....	....	5	1	....	7
Hot Springs General Hospital	....	....	....	1	....	....	1	....	4	....	....	6
Huachuca, Fort, Ariz	....	....	....	40	....	....	....	....	3	11	....	54
Indianapolis Arsenal, Ind	....	....	....	....	....	....	....	1	....	5	....	6
Jackson Barracks, La	....	7	....	4	7	....	2	....	....	6	1	27
Jefferson Barracks, Mo	....	....	....	44	....	....	2	....	4	7	2	59
Kennebec Arsenal, Me	....	....	....	1	....	....	1	....	....	1	....	3
Keogh, Fort, Mont	....	....	....	11	....	....	....	....	21	18	1	51
Key West Barracks, Fla	....	....	....	8	....	....	3	....	....	5	....	16
Leavenworth, Fort, Kans	....	....	....	33	....	....	7	....	31	40	3	114
Leavenworth Military Prison, Kans	....	....	....	4	....	....	....	....	1	....	....	5
Logan, Fort, Colo	....	....	....	28	1	....	3	....	17	52	....	101
Madison Barracks, N. Y	....	....	....	....	....	....	....	....	19	29	....	48
Mason, Fort, Cal	....	....	....	14	1	....	....	....	....	....	....	15
McHenry, Fort, Md	1	1	....	11	....	....	1	....	1	13	1	29
McIntosh, Fort, Tex	....	1	....	....	....	....	....	....	2	6	....	9
McPherson, Fort, Ga	....	1	....	6	8	....	....	....	20	14	1	50
Meade, Fort, S. Dak	....	....	....	2	....	....	....	1	14	14	2	33
Missoula, Fort, Mont	....	....	....	....	....	....	....	....	3	10	....	13
Monroe, Fort, Va	....	....	....	38	59	....	4	1	55	49	1	207
Myer, Fort, Va	....	....	....	25	....	....	3	....	10	17	1	56
New York, attending surgeon, N. Y	....	....	....	6	....	....	....	....	....	....	....	6
Niagara, Fort, N. Y	....	....	....	....	1	....	....	....	4	13	2	20
Niobrara, Fort, Nebr	....	....	....	5	5	....	3	1	44	33	7	98
Omaha, Fort, Nebr	....	....	....	26	5	13	....	1	12	24	....	81
Omaha, headquarters, Nebr	....	....	....	5	....	....	....	....	....	....	....	5
Pembina, Fort, N. Dak	....	....	....	....	2	....	....	....	1	5	1	9
Philadelphia, attending surgeon, Pa	....	....	....	3	....	....	....	....	....	1	....	4
Plattsburg Barracks, N. Y	....	....	....	32	....	....	....	....	13	35	....	80
Porter, Fort, N. Y	....	3	....	2	5	....	....	1	2	2	2	17
Preble, Fort, Me	....	....	....	....	1	....	....	....	4	7	....	12
Presidio of San Francisco, Cal	....	....	....	7	5	....	....	....	21	73	1	107
Reno, Fort, Okla	....	....	....	....	....	....	1	....	13	12	2	28
Riley, Fort, Kans	....	....	....	23	....	....	....	....	52	35	1	111
Ringgold, Fort, Tex	....	1	....	16	....	....	....	....	1	5	....	23
Robinson, Fort, Nebr	....	....	....	14	....	....	....	2	58	22	1	97
Rock Island Arsenal, Ill	....	....	....	3	....	....	....	....	....	6	....	9
Saint Francis Barracks, Fla	....	....	....	....	....	....	....	....	4	7	....	11
Saint Paul, headquarters, Minn	....	....	....	....	....	....	....	....	....	....	....	....
Sam Houston, Fort, Tex	....	1	....	12	7	1	28	1	11	9	1	71
San Antonio, headquarters, Tex	....	....	....	....	....	....	....	....	....	....	1	1

TABLE XIII.—*Distribution of certain important diseases at United States military posts during the year 1895*—Continued.

Name of station.	Scarlet fever.	Measles.	Smallpox.	Influenza.	Mumps.	Diphtheria.	Typhoid fever.	Erysipelas.	Tonsillitis.	Bronchitis.	Pneumonia.	Total.
San Carlos, Ariz	....	....	....	.....	.....	....	.....	....	1	.....	....	1
San Diego Barracks, Cal	....	....	....	.....	.....	....	.....	....	.....	1	1	2
Sandy Hook Proving Ground, N. J	....	....	....	5	.....	....	.....	....	1	8	....	14
San Francisco, headquarters, Cal	....	....	....	.....	.....	....	.....	....	.....	.....	....	.....
Schuyler, Fort, N. Y	....	....	....	2	.....	....	.....	....	11	18	....	31
Sheridan, Fort, Ill	....	1	....	85	.....	....	1	2	25	100	1	215
Sherman, Fort, Idaho	....	....	....	.....	.....	....	1	....	25	13	....	39
Sill, Fort, Okla	....	....	....	.....	19	....	2	....	3	27	2	53
Snelling, Fort, Minn	1	....	....	52	.....	....	.....	....	37	30	5	125
Spokane, Fort, Wash	....	....	....	3	.....	....	.....	1	4	9	....	17
Springfield Armory, Mass	....	4	....	1	.....	....	.....	....	2	6	....	13
Stanton, Fort, N. Mex	....	....	....	.....	.....	....	.....	....	.....	.....	....	.....
Thomas, Fort, Ky	....	1	....	73	.....	....	9	....	60	28	1	172
Townsend, Fort, Wash	....	....	....	.....	.....	....	.....	....	.....	.....	....	.....
Trumbull, Fort, Conn	....	....	....	.....	1	1	1	....	1	.....	....	4
Vancouver Barracks, Wash	1	....	....	.....	.....	....	.....	2	25	19	2	49
Wadsworth, Fort, N. Y	....	....	....	20	.....	....	.....	1	.....	8	....	29
Walla Walla, Fort, Wash	....	....	....	22	1	....	3	1	4	4	....	35
Warren, Fort, Mass	....	....	....	5	.....	....	.....	....	5	19	....	29
Washakie, Fort, Wyo	....	....	....	.....	.....	....	7	....	.....	4	....	11
Washington Barracks, D. C	....	....	....	55	.....	....	2	1	7	10	1	76
Watertown Arsenal, Mass	....	....	....	2	.....	....	.....	....	5	3	2	12
Watervliet Arsenal, N. Y	....	....	....	9	.....	....	1	....	2	13	....	25
Wayne, Fort, Mich	....	1	....	3	.....	....	1	....	5	3	....	13
West Point, N. Y	....	1	....	38	.....	....	.....	1	13	51	2	106
Whipple Barracks, Ariz	....	....	....	22	.....	....	4	2	10	5	....	43
Willets Point, N. Y	....	1	....	13	.....	....	.....	1	10	29	1	55
Wingate, Fort, N. Mex	....	....	....	34	.....	....	.....	2	17	17	1	71
Yates, Fort, N. Dak	....	....	....	.....	.....	1	.....	....	15	22	6	44
Yellowstone, Fort, Wyo	....	1	....	5	.....	....	.....	....	2	2	....	10
Field	....	....	....	.....	1	....	7	1	8	14	1	32
The Army	6	38	....	1,156	144	21	109	36	1,052	1,384	75	4,0 1

TABLE XIV.—*Twenty posts giving the highest admission rates for malarial diseases, rheumatism, and diarrheal and venereal diseases, respectively, during 1895.*

I.—MALARIAL DISEASES.

Name of station.	Mean strength.	Ratio per 1,000 of mean strength.			
		Admissions.	Discharges.	Deaths.	Constantly non-effective.
Fort Myer, Va	270	1,092.59	.....	.....	14.07
Washington Barracks, D. C	363	1,079.89	.....	.....	13.71
Fort Hamilton, N. Y	287	355.40	.....	.....	4.32
Fort Stanton, N. Mex	71	352.11	.....	.....	3.28
Fort Brown, Tex	116	301.72	.....	.....	10.89
West Point, N. Y	386	297.93	.....	2.59	4.20
Presidio of San Francisco, Cal	566	203.18	.....	.....	3.35
Fort Reno, Okla	342	201.75	.....	.....	9.89
Fort Sill, Okla	414	200.48	.....	.....	3.63
Fort Monroe, Va	555	162.16	.....	.....	2.66
Fort Wadsworth, N. Y	207	159.42	.....	.....	3.47
Willets Point, N. Y	419	140.81	.....	.....	2.13
San Carlos, Ariz	56	107.14	.....	.....	2.64
Fort McHenry, Md	188	106.38	.....	.....	1.30
Davids Island, N. Y	232	103.45	.....	.....	1.87
Fort Bliss, Tex	199	100.50	.....	.....	1.32
Fort Sam Houston, Tex	610	81.97	.....	.....	1.67
Fort Robinson, Nebr	419	81.14	.....	.....	1.52
Jefferson Barracks, Mo	236	80.51	.....	.....	2.05
Fort Washakie, Wyo	88	79.54	.....	.....	1.59
The Army	25,204	82.56	.....	.07	1.70

TABLE XIV.—*Twenty posts giving the highest admission rates for malarial diseases, rheumatism, and diarrrheal and venereal diseases, respectively, during 1895*—Cont'd.

II.—RHEUMATISM.

Name of station.	Mean strength.	Ratio per 1,000 of mean strength.			
		Admissions.	Discharges.	Deaths.	Constantly non-effective.
Rock Island Arsenal, Ill	66	181.81	.....	.....	2.37
Camp Eagle Pass, Tex	66	166.67	.....	.....	1.37
Fort Omaha, Nebr	492	158.54	.....	.....	5.26
Fort Wingate, N. Mex	262	148.85	.....	.....	6.20
Fort Ringgold, Tex	179	128.50	.....	.....	4.52
Fort DuChesne, Utah	115	121.74	.....	.....	3.74
West Point, N. Y	386	113.99	.....	.....	1.96
Fort Ethan Allen, Vt	225	111.11	.....	.....	2.39
Fort Robinson, Nebr	419	109.79	.....	.....	1.49
Fort Niagara, N. Y	220	109.09	.....	.....	2.17
Fort Huachuca, Ariz	250	108.00	.....	.....	2.12
Fort Assinniboine, Mont	330	103.03	.....	.....	2.22
Columbus Barracks, Ohio	404	99.01	.....	.....	4.85
Fort Missoula, Mont	273	98.90	.....	.....	2.63
Fort D. A. Russell, Wyo	409	97.80	.....	.....	4.39
Fort Hamilton, N. Y	287	94.08	.....	.....	2.78
Fort Myer, Va	270	92.59	3.70	.....	3.55
Davids Island, N. Y	232	90.52	.....	.....	3.97
Fort Sherman, Idaho	307	87.94	.....	.....	3.30
Fort McIntosh, Tex	177	84.75	.....	.....	3.02
The Army	25,204	64.08	.44	.....	2.76

III.—DIARRHEAL DISEASES.

Sandy Hook Proving Ground, N. J	63	317.46	.....	.....	1.87
San Carlos, Ariz	56	303.57	.....	.....	4.31
Fort Myer, Va	270	218.52	.....	.....	1.81
Fort Monroe, Va	555	210.81	.....	.....	1.79
Fort Clark, Tex	446	204.04	.....	2.24	3.29
Fort Omaha, Nebr	492	199.19	.....	.....	1.31
Fort Ringgold, Tex	179	189.94	.....	5.59	1.53
Fort McHenry, Md	188	186.17	.....	.....	1.18
Camp Eagle Pass, Tex	66	181.82	.....	.....	1.16
Fort McIntosh, Tex	177	180.79	.....	.....	2.07
Watervliet Arsenal, N. Y	61	180.33	.....	.....	2.07
Davids Island, N. Y	232	150.86	.....	.....	1.05
Fort Grant, Ariz	288	131.95	.....	.....	2.20
Fort Yates, N. Dak	277	129.96	.....	.....	.77
Washington Barracks, D. C	363	126.72	.....	.....	1.05
Fort Washakie, Wyo	88	125.00	.....	.....	.93
Fort Walla Walla, Wash	212	117.92	.....	.....	.81
Fort Bliss, Tex	199	115.59	.....	.....	1.09
Fort Sam Houston, Tex	610	114.75	.....	.....	.93
Key West Barracks, Fla	128	109.37	.....	.....	.83
The Army	25,204	85.14	.....	.07	.78

IV.—VENEREAL DISEASES.

Fort Ringgold, Tex	179	374.30	.....	.....	25.18
Fort McIntosh, Tex	177	265.54	.....	.....	32.95
Fort Brown, Tex	116	206.90	.....	.....	18.78
Columbus Barracks, Ohio	404	200.50	.....	.....	20.68
Fort Thomas, Ky	469	194.03	.....	.....	15.29
San Diego Barracks, Cal	69	188.41	.....	.....	12.27
Jackson Barracks, La	132	181.82	.....	.....	9.88
Fort Myer, Va	270	140.74	.....	.....	10.04
Fort Leavenworth, Kans	796	130.65	.....	1.26	8.89
Washington Barracks, D. C	363	123.97	.....	.....	7.32
Fort Ethan Allen, Vt	225	120.00	.....	.....	7.25
Fort D. A. Russell, Mo	409	114.91	.....	.....	4.54
Fort McPherson, Ga	567	105.82	.....	.....	7.29
Fort Snelling, Minn	463	103.67	.....	.....	8.31
St. Francis Barracks, Fla	156	102.56	.....	.....	9.01
Fort Bliss, Tex	199	100.50	.....	.....	5.23
Fort Logan, Colo	590	98.35	.....	.....	6.92
Presidio of San Francisco, Cal	566	97.18	.....	.....	6.16
Fort Omaha, Nebr	492	95.53	.....	.....	8.07
Fort Clark, Tex	446	94.17	.....	.....	5.31
The Army	25,204	73.72	.....	.11	5.24

TABLE XV.—*Twenty posts giving the highest noneffective rates for malarial diseases, rheumatism, and diarrheal and venereal diseases, respectively, during 1895.*

I.—MALARIAL DISEASES.

Name of station.	Mean strength.	Constantly noneffective per 1,000 of mean strength.	Average number of sick daily.	Average number of days each case was treated.
Fort Myer, Va	270	14.07	3.80	4.70
Washington Barracks, D. C	363	13.71	4.98	4.63
Fort Brown, Tex	116	10.89	1.26	13.17
Fort Reno, Okla	342	9.89	3.38	17.90
Fort Hamilton, N. Y	287	4.32	1.24	4.44
West Point, N. Y	386	4.20	1.62	5.15
Fort Sill, Okla	414	3.63	1.50	6.60
Fort Wadsworth, N. Y	207	3.47	.72	7.94
Fort McPherson, Ga	567	3.43	1.94	22.16
Presidio of San Francisco, Cal	566	3.35	1.89	6.01
Fort Stanton, N. Mex	71	3.28	.23	3.40
St. Francis Barracks, Fla	156	3.06	.48	21.75
Fort Clark, Tex	446	2.99	1.33	27.00
Fort Monroe, Va	555	2.66	1.47	5.98
San Carlos, Ariz	56	2.64	.15	9.00
Willets Point, N. Y	419	2.13	.89	5.51
Fort Riley, Kans	763	2.12	1.62	12.85
Jefferson Barracks, Mo	236	2.05	.48	9.32
Fort Apache, Ariz	284	1.98	.56	34.17
Fort Wingate, N. Mex	262	1.97	.52	62.67
The Army	25,204	1.70	42.75	7.50

II.—RHEUMATISM.

Alcatraz Island, Cal	130	8.32	1.08	131.67
Fort Wingate, N. Mex	262	6.20	1.62	15.21
Fort Walla Walla, Wash	212	5.84	1.24	56.50
Fort Brown, Tex	116	5.29	.61	28.00
Fort Omaha, Nebr	492	5.26	2.59	12.12
Columbus Barracks, Ohio	404	4.85	1.96	17.87
Fort Spokane, Wash	181	4.63	.84	51.00
Fort Ringgold, Tex	179	4.52	.81	12.83
Fort D. A. Russell, Wyo	409	4.39	1.79	16.37
Fort Reno, Okla	342	4.34	1.48	30.11
Davids Island, N. Y	232	3.97	.92	16.00
Fort Thomas, Ky	469	3.75	1.76	20.71
Fort DuChesne, Utah	115	3.74	.43	11.21
Fort Myer, Va	270	3.55	.96	14.00
St. Francis Barracks, Fla	156	3.44	.54	17.82
Fort Sherman, Idaho	307	3.30	1.01	13.70
Fort Riley, Kans	763	3.27	2.50	16.00
Fort Snelling, Minn	463	3.27	1.52	21.27
Fort Bliss, Tex	199	3.24	.64	14.69
Presidio of San Francisco, Cal	566	3.15	1.78	16.69
The Army	25,204	2.76	69.46	15.70

TABLE XV.—*Twenty posts giving the highest noneffective rates for malarial diseases, rheumatism, and diarrheal and venereal diseases, respectively, during 1895*—Continued.

III.—DIARRHEAL DISEASES.

Name of station.	Mean strength.	Constantly noneffective per 1,000 of mean strength.	Average number of sick daily.	Average number of days each case was treated.
San Carlos, Ariz	56	4.31	0.24	5.18
Fort Clark, Tex	446	3.29	1.47	5.89
Fort Grant, Ariz	288	2.20	.63	6.08
Fort McIntosh, Tex	177	2.07	.37	4.19
Watervliet Arsenal, N. Y	61	2.07	.13	4.18
Sandy Hook Proving Ground, N. J	63	1.87	.12	2.15
Fort Reno, Okla	342	1.83	.62	6.71
Fort Myer, Va	270	1.81	.49	3.02
Fort Monroe, Va	555	1.79	.99	3.10
Fort Brown, Tex	116	1.54	.18	6.50
Fort Ringgold, Tex	179	1.53	.27	2.94
Fort Omaha, Nebr	492	1.31	.64	2.40
Fort Sill, Okla	414	1.29	.53	5.13
Fort Apache, Ariz	284	1.24	.35	4.78
Fort McHenry, Md	188	1.18	.22	2.31
Camp Eagle Pass, Tex	66	1.16	.08	2.33
Fort Wadsworth, N. Y	207	1.15	.24	7.91
Fort Logan, Colo	590	1.10	.65	4.09
Fort Bliss, Tex	199	1.09	.22	3.43
Washington Barracks, D. C	363	1.05	.38	3.02
The Army	25,204	.78	19.76	3.36

IV.—VENEREAL DISEASES.

Fort McIntosh, Tex	177	32.95	5.83	45.30
Fort Ringgold, Tex	179	25.18	4.51	24.55
Columbus Barracks, Ohio	404	20.68	8.35	37.64
Fort Brown, Tex	116	18.78	2.18	33.13
Fort Thomas, Ky	469	15.29	7.17	28.76
San Diego Barracks, Cal	69	12.27	.85	23.77
Fort McHenry, Md	188	11.24	2.11	55.07
Fort Myer, Va	270	10.04	2.71	26.03
Jackson Barracks, La	132	9.88	1.30	19.83
St. Francis Barracks, Fla	156	9.01	1.41	32.06
Fort Leavenworth, Kans	796	8.89	7.07	24.83
Fort Snelling, Minn	463	8.31	3.85	29.25
Fort Omaha, Nebr	492	8.07	3.97	30.85
Fort Reno, Okla	342	7.91	2.71	49.40
Alcatraz Island, Cal	130	7.59	.99	30.00
Fort Adams, R. I	289	7.48	2.16	43.83
Washington Barracks, D. C	363	7.32	2.66	21.56
Fort McPherson, Ga	567	7.29	4.13	25.13
Fort Ethan Allen, Vt	225	7.25	1.63	22.04
Fort Walla Walla, Wash	212	7.22	1.53	29.42
The Army	25,204	5.24	132.19	25.97

TABLE XVI.—*Prevalence of alcoholism at the various posts, and its influence on the effective force of the garrisons, for the year 1895.*

Name of station.	Mean strength.	Ratio per 1,000 of mean strength.		Name of station.	Mean strength.	Ratio per 1,000 of mean strength.	
		Admissions.	Constantly non-effective.			Admissions.	Constantly non-effective.
Fort Preble, Me	69	188.41	1.31	Fort Douglas, Utah	524	28.62	0.20
Fort Omaha, Nebr	492	123.98	1.72	Fort Thomas, Ky	469	27.72	.51
Fort D. A. Russell, Wyo	409	114.91	1.66	Springfield Armory, Mass	37	27.03	.15
Fort Niobrara, Nebr	449	104.68	4.97	Fort Clark, Tex	446	26.91	.47
Fort Hancock, Tex	48	104.17	.68	Angel Island, Cal	261	26.82	.54
Fort Ringgold, Tex	179	94.98	.95	Fort McHenry, Md	188	26.60	.35
Fort Hamilton, N. Y	287	69.69	1.66	Watertown Arsenal, N. Y	41	24.39	.20
Fort Warren, Mass	133	67.67	.89	Key West Barracks, Fla	128	23.44	.26
Fort McIntosh, Tex	177	62.15	.43	Fort Monroe, Va	555	23.42	.38
Leavenworth Military Prison, Kans	83	60.24	.40	Frankford Arsenal, Pa	45	22.22	.73
Fort Barrancas, Fla	85	58.82	1.06	Fort Pembina, N. Dak	45	22.22	.24
Fort Spokane, Wash	181	55.25	.62	Fort Apache, Ariz	284	21.13	.34
Willets Point, N. Y	419	54.89	.51	Fort Huachuca, Ariz	250	20.00	.11
Fort Grant, Ariz	288	52.08	.68	Fort Wadsworth, N. Y	207	19.32	.26
Davids Island, N. Y	232	47.41	.71	Fort Meade, S. Dak	467	19.27	.21
Madison Barracks, N. Y	480	43.75	.78	San Carlos, Ariz	56	17.86	.10
Whipple Barracks, Ariz	275	43.64	.56	Fort Columbus, N. Y	231	17.32	.56
Fort Sherman, Idaho	307	42.35	.71	Fort Brown, Tex	116	17.24	.24
Fort Adams, R. I	289	41.52	.46	Alcatraz Island, Cal	130	15.38	.13
Fort Myer, Va	270	40.74	.60	Fort Assinniboine, Mont	330	15.15	.14
Columbus Barracks, Ohio	404	39.60	.56	Fort Bliss, Tex	199	15.08	.10
Fort Schuyler, N. Y	128	39.06	.41	Fort Missoula, Mont	273	14.65	.14
Fort Logan, Colo	590	38.98	.30	Fort Yates, N. Dak	277	14.44	.07
Fort Brady, Mich	236	38.14	.48	Fort Trumbull, Conn	70	14.29	.16
Fort Sam Houston, Tex	610	37.75	.34	Fort Ethan Allen, Vt	225	13.33	.06
Presidio of San Francisco, Cal	566	37.10	.39	Fort Washakie, Wyo	88	11.36	.03
Fort Niagara, N. Y	220	36.36	.22	Fort Keogh, Mont	357	11.20	.08
Vancouver Barracks, Wash	572	34.97	.46	Fort Riley, Kans	763	10.48	.12
Augusta Arsenal, Ga	29	34.48	.38	West Point, N. Y	386	10.36	.07
Watervliet Arsenal, N. Y	61	32.79	.27	Fort Sill, Okla	414	9.66	.09
Benicia Barracks, Cal	218	32.11	.19	Fort Walla Walla, Wash	212	9.43	.10
Saint Francis Barracks, Fla	156	32.05	.39	Fort Yellowstone, Wyo	109	9.17	.03
Sandy Hook Proving Ground, N. J	63	31.75	.13	Fort Leavenworth, Kans	796	8.79	.05
Plattsburg Barracks, N. Y	509	31.43	.38	Fort DuChesne, Utah	115	8.70	.07
Rock Island Arsenal, Ill	66	30.30	.42	Fort Bayard, N. Mex	366	8.20	.22
Washington Barracks, D. C	363	30.30	.39	Fort Wayne, Mich	260	7.69	.05
Jackson Barracks, La	132	30.30	.15	Fort Reno, Okla	342	5.85	.05
Camp Eagle Pass, Tex	66	30.30	.08	Fort McPherson, Ga	567	5.29	.02
Fort Snelling, Minn	463	30.24	.24	Fort Wingate, N. Mex	262	3.82	.07
Fort Sheridan, Ill	761	30.22	.42	Fort Custer, Mont	310	3.23	.03
Fort Mason, Cal	68	29.41	.12	Field	857	7.00	.06
				The Army	25,204	30.11	.44

The following posts have no cases of alcoholism reported in 1895: Boise Barracks, Idaho; Fort Buford N. Dak.; Fort Canby, Wash.; Jefferson Barracks, Mo.; Fort Porter, N. Y.; Fort Robinson, Nebr.; San Diego Barracks, Cal.; Fort Stanton, N. Mex.

TABLE XVII.—*Discharges for disability (not included elsewhere) contracted before enlistment, or by misconduct or bad habits (sec. 3, par. 140, A. R.), year 1895.*

Name of station.	Tuberculosis, lungs.	Syphilis.	Gonorrhea.	Chancroid, and results.	Nutrition, diseases of.	Cerebral congestion.	Epilepsy.	Insanity.	Neurasthenia.	Other nervous diseases.	Dyspepsia.	Fistula in ano.	Valvular disease.	Varicose veins.	Asthma.	Muscular rheumatism.	Whitlow.	Others, muscles, etc.	Integumentary diseases.	Diseases of the eye.	Deafness.	Fracture.	Hernia, inguinal.	Wounds, incised.	Wounds, gunshot.	Secondary results, local injury.	Total discharges.
Fort Thomas, Ky		3	2										1			1			1				1				9
Fort Sam Houston, Tex		1							1	1													4				7
Fort Logan, Colo	1									1								1	1	1							5
Fort McPherson, Ga		3						1						1													5
Fort Leavenworth, Kans			2		1									1													4
Fort McHenry, Md		3	1																								4
Fort Ethan Allen, Vt	2																										2
Madison Barracks, N. Y					1																1						2
Fort Myer, Va				1										1													2
Fort Omaha, Nebr											1											1					2
Fort Reno, Okla				1			1																			1	2
Fort Riley, Kans							1																				2
Fort Sheridan, Ill												1					1										2
Fort Warren, Mass			1						1																		2
Washington Barracks, D. C	1	1																					1				1
Fort Apache, Ariz							1																				1
Fort Bayard, N. Mex																								1			1
Fort Brady, Mich																											1
Columbus Barracks, Ohio		1																									1
Fort Columbus, N. Y							1																				1
Fort Hamilton, N. Y							1																				1
Jefferson Barracks, Mo							1																				1
Fort Keogh, Mont															1												1
Fort Monroe, Va											1																1
Fort Niagara, N. Y	1																										1
Plattsburg Barracks, N. Y			1																								1
Fort Robinson, Nebr							1																				1
Fort Sherman, Idaho																									1		1
Fort Snelling, Minn		1																									1
Willets Point, N. Y		1																									1
Total	5	14	7	1	3	1	6	1	2	3	1	1	1	3	1	1	1	1	2	1	1	1	6	1	1	1	67

TABLE XVII.—*Discharges for disability (not included elsewhere) contracted before enlistment, or by misconduct or bad habits (sec. 3, par. 140, A. R.), year 1895*—Continued.

DISCHARGES FOR DISABILITY, BY MONTHS.

Name of station.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Fort Thomas, Ky	....	....	....	....	....	....	1	....	....	1	4	3
Fort Sam Houston, Tex	....	....	....	....	....	2	2	1	1	1	....	....
Fort Logan, Colo	....	....	....	....	....	1	1	....	2	....	1	....
Fort McPherson, Ga	....	....	1	....	....	....	....	1	2	....	1	....
Fort Leavenworth, Kans	....	....	....	....	....	1	....	....	....	....	2	1
Fort McHenry, Md	....	....	....	....	1	....	....	....	....	....	3	....
Fort Ethan Allen, Vt	....	....	1	....	....	1	....	....	....	....	....	....
Madison Barracks, N. Y	....	....	1	1	....	....	....	....	....	....	....	....
Fort Myer, Va	....	....	....	....	....	....	1	....	....	....	1	....
Fort Omaha, Nebr	....	....	....	....	....	....	1	1	....	....	....	....
Fort Reno, Okla	1	1	....	....	....	....	....	....	....	....	....	....
Fort Riley, Kans	....	1	....	1	....	....	....	....	....	....	....	....
Fort Sheridan, Ill	....	....	....	....	2	....	....	....	....	....	....	....
Fort Warren, Mass	....	....	....	....	....	2	....	....	....	....	....	....
Washington Barracks, D. C	....	1	....	....	....	....	....	....	....	....	1	....
Fort Apache, Ariz	....	....	....	....	1	....	....	....	....	....	....	....
Fort Bayard, N. Mex	1	....	....	....	....	....	....	....	....	....	....	....
Fort Brady, Mich	....	....	....	....	1	....	....	....	....	....	....	....
Columbus Barracks, Ohio	....	....	....	....	....	....	....	....	....	....	1	....
Fort Columbus, N. Y	....	....	....	....	1	....	....	....	....	....	....	....
Fort Hamilton, N. Y	....	....	....	....	....	....	....	....	....	....	....	1
Jefferson Barracks, Mo	....	....	....	....	....	....	....	....	....	....	1	....
Fort Keogh, Mont	....	....	....	....	....	1	....	....	....	....	....	....
Fort Monroe, Va	....	....	....	....	....	....	....	....	....	....	1	....
Fort Niagara, N. Y	....	....	....	....	....	1	....	....	....	....	....	....
Plattsburg Barracks, N. Y	....	....	....	....	....	....	....	1	....	....	....	....
Fort Robinson, Nebr	....	....	....	....	....	....	....	....	....	....	....	1
Fort Sherman, Idaho	....	....	....	....	....	....	....	....	1	....	....	....
Fort Snelling, Minn	....	....	....	....	....	1	....	....	....	....	....	....
Willets Point, N. Y	....	....	....	....	1	....	....	....	....	....	....	....
Total	2	3	3	2	7	10	6	4	6	2	16	6

TABLE XVIII.—*Number of white and negro applicants for enlistment physically examined during the year 1895, with the number accepted, rejected on primary examination, and declined, and ratios per thousand.*

	White.		Negro.		Total.	
	Number.	Ratio per 1,000 white examined.	Number.	Ratio per 1,000 negroes examined.	Number.	Ratio per 1,000 examined.
Examined	16,548	1,000.00	1,097	1,000.00	17,645	1,000.00
Accepted	8,050	486.46	593	540.57	8,643	489.83
Rejected on primary examination	7,883	476.37	471	429.35	8,354	473.45
Declined	615	37.16	33	30.08	648	36.72

In addition to the foregoing, 35 scouts and 8 Indian applicants for enlistment as soldiers were examined, of whom 42 were accepted and 1 was rejected.

TABLE XIX.—*Nativity of white and negro recruits accepted during the year 1895, with ratios per thousand accepted.*

Nativity.	White.		Negro.		Total.	
	Number.	Ratio per 1,000 accepted.	Number.	Ratio per 1,000 accepted.	Number.	Ratio per 1,000 accepted.
United States	5,699	659.38	586	67.80	6,285	727.18
England	197	22.79	.....	.....	197	22.79
Scotland	50	5.79	.....	.....	50	5.79
Wales	9	1.04	.....	.....	9	1.04
Ireland	652	75.44	.....	.....	652	75.44
Canada	138	15.96	3	.35	141	16.31
Other British possessions	12	1.39	.....	.....	12	1.39
France	22	2.55	.....	.....	22	2.55
Belgium	9	1.04	.....	.....	9	1.04
Holland	17	1.97	.....	.....	17	1.97
Denmark	78	9.02	.....	.....	78	9.02
Norway	46	5.32	.....	.....	46	5.32
Sweden	116	13.42	.....	.....	116	13.42
Germany	769	88.97	.....	.....	769	88.97
Switzerland	38	4.40	.....	.....	38	4.40
Austria	83	9.60	.....	.....	83	9.60
Bohemia	10	1.16	.....	.....	10	1.16
Hungary	11	1.27	.....	.....	11	1.27
Poland	6	.69	.....	.....	6	.69
Russia	59	6.83	.....	.....	59	6.83
Finland	5	.58	.....	.....	5	.58
Italy	14	1.62	.....	.....	14	1.62
Other countries	10	1.16	4	.46	14	1.62
Total foreign	2,351	272.01	7	.81	2,358	272.82
Total	8,050	931.39	593	68.61	8,643	1,000.00

TABLE XX.—*Causes of rejection on primary examination among 17,645 recruits physically examined during the year 1895, with corresponding ratios per thousand of each race examined.*

Number examined	White, 16,548.		Negro, 1,097.		Total, 17,645.	
Cause of rejection.	Number rejected.	Ratios per 1,000.	Number rejected.	Ratios per 1,000.	Number rejected.	Ratios per 1,000.
Venereal diseases	230	13.90	34	30.99	264	14.96
Other infectious diseases	120	7.25	3	2.73	123	6.97
Diseases of nutrition, general	12	.73			12	.68
Diseases of the nervous system	12	.73	1	.92	13	.74
Diseases of the digestive system	638	38.55	28	25.52	666	37.75
Diseases of the circulatory system	891	53.84	28	25.52	919	52.08
Diseases of the respiratory organs	48	2.91	2	1.82	50	2.83
Diseases of the genito-urinary system	686	41.45	36	32.81	722	40.92
Diseases of the lymphatic system, and ductless glands	34	2.05	10	9.12	44	2.49
Diseases of the muscles, bones, and joints	90	5.44	6	5.47	96	5.44
Diseases of the integument and subcutaneous connective tissue	130	7.86	7	6.38	137	7.76
Diseases of the eye	1,009	60.96	44	40.11	1,053	59.67
Diseases of the ear	113	6.83	4	3.65	117	6.63
Diseases of the nose	16	.97			16	.91
Hernia	193	11.66	10	9.12	203	11.50
Other injuries	85	5.14	4	3.65	89	5.04
Over height	2	.12			2	.11
Under height	140	8.46	10	9.12	150	8.50
Over weight and obesity	36	2.18	2	1.82	38	2.15
Under weight	620	37.46	24	21.88	644	36.50
Imperfect physique	1,439	86.95	88	80.22	1,527	86.54
Mental insufficiency	25	1.51	2	1.82	27	1.53
Over age	41	2.48	3	2.73	44	2.49
Minors	238	14.38	16	14.59	254	14.39
Married, or having dependent relatives	45	2.72	4	3.65	49	2.78
Illiteracy	100	6.04	73	66.54	173	9.80
Imperfect knowledge of English	110	6.65			110	6.23
Reenlistment disapproved for various reasons	20	1.21	1	.92	21	1.19
Character bad or doubtful	178	10.76	6	5.47	184	10.43
References none or unsatisfactory	134	8.10	5	4.56	139	7.88
Aliens	75	4.53			75	4.25
General unfitness and undesirable	334	20.18	19	17.32	353	20.01
No vacancies	3	.18			3	.17
Unclassified	36	2.18	1	.92	37	2.10
Total	7,883	476.37	471	429.35	8,354	473.45

TABLE XXI.—*Average height, weight, and chest measure of 8,643 recruits accepted*

Age.	Whole number accepted.					Average height (in inches).				
	White.			Negro.	Total white and negro.	White.			Negro.	Total white and negro.
	Native.	Foreign born.	Total.			Native.	Foreign born.	Total.		
16	6	2	8	1	9	64.46	65.75	64.78	65.00	64.81
17	7	3	10	0	10	66.64	65.25	66.23	.....	66.23
18	22	1	23	3	26	66.98	68.75	67.05	67.92	67.15
19	19	3	22	3	25	67.78	64.33	67.31	65.17	67.07
Under 20 (average 18)	54	9	63	7	70	66.94	65.44	66.72	66.32	66.68
20	20	2	22	1	23	67.94	66.63	67.82	65.00	67.70
21	1,600	254	1,854	104	1,958	67.79	67.26	67.72	67.31	67.70
22	730	162	892	57	949	67.74	67.20	67.64	66.79	67.58
23	463	118	581	40	621	67.68	67.09	67.56	67.37	67.55
24	473	157	630	22	652	67.70	67.20	67.57	67.40	67.57
20 to 24 (average 22)	3,286	693	3,979	224	4,203	67.75	67.20	67.66	67.19	67.63
25	420	160	580	32	612	67.61	67.21	67.50	67.39	67.49
26	376	172	548	47	595	67.67	67.05	67.47	67.42	67.47
27	289	134	423	30	453	67.72	67.28	67.58	67.33	67.57
28	233	117	349	21	370	67.62	67.21	67.48	68.32	67.53
29	159	88	247	17	264	67.70	66.98	67.44	67.96	67.47
25 to 29 (average, 26.6)	1,476	671	2,147	147	2,294	67.66	67.15	67.50	67.59	67.51
30	68	43	111	15	126	67.51	68.04	67.71	66.98	67.63
31	84	103	187	17	204	67.40	67.20	67.29	68.03	67.35
32	80	95	175	13	188	67.46	67.13	67.28	66.52	67.23
33	53	65	118	13	131	67.60	67.28	67.43	66.67	67.35
34	63	54	117	14	131	67.41	66.95	67.20	66.89	67.17
30 to 34 (average, 31.9)	348	360	708	72	780	67.47	67.26	67.36	67.07	67.34
35	38	57	95	12	107	66.97	67.23	67.13	67.50	67.17
36	63	43	106	13	119	67.67	67.03	67.41	68.02	67.47
37	42	37	79	10	89	67.83	67.10	67.49	68.33	67.58
38	37	21	58	10	68	68.24	67.00	67.79	67.60	67.76
39	37	25	62	3	65	66.87	66.70	66.80	67.25	66.82
35 to 39 (average, 36.7)	217	183	400	48	448	67.54	67.06	67.32	67.82	67.37
40 to 49 (average, 44.7)	278	334	612	83	695	67.41	67.14	67.26	67.67	67.31
50 and over (average, 52.5)	40	101	141	12	153	67.99	66.53	66.95	66.77	66.93
16 and over (average, 27.2)	5,699	2,351	8,050	593	8,643	67.68	67.14	67.52	67.37	67.51

during the year 1895 (native white, 5,699; foreign-born white, 2,351; negro, 593).

Average weight (in pounds).					Average chest measure (in inches).									
White.			Negro.	Total white and negro.	White.						Negro.		Total white and negro.	
					Native.		Foreign born.		Total.					
Native.	Foreign born.	Total.			Expiration.	Inspiration.	Expiration.	Inspiration.	Expiration.	Inspiration.	Expiration.	Inspiration.	Expiration.	Inspiration.
116.50	135.00	121.13	150.00	124.33	30.21	32.46	32.50	35.50	30.78	33.22	34.00	37.00	31.14	33.64
122.71	120.00	121.90	.....	121.90	30.82	33.50	30.17	33.25	30.63	33.43	.....	.....	30.63	33.43
131.55	128.00	131.39	153.33	133.92	32.74	35.55	34.00	36.50	32.79	35.60	33.17	35.58	32.84	35.60
142.21	117.00	138.77	129.00	137.60	33.49	36.26	31.00	33.50	33.15	35.89	32.17	35.08	33.03	35.79
132.48	123.22	131.16	142.43	132.29	32.47	35.19	31.39	34.19	32.32	35.53	32.86	35.57	32.37	35.10
142.10	129.00	140.91	125.00	140.22	33.53	36.29	32.75	35.50	33.45	36.22	32.50	34.75	33.41	36.15
142.67	142.10	142.59	144.43	142.69	33.87	36.76	34.07	36.92	33.90	36.79	32.97	36.46	33.90	36.77
144.11	140.84	143.52	145.09	143.61	34.04	36.92	34.26	37.07	34.08	36.94	33.95	36.50	34.07	36.92
144.52	144.85	144.59	149.35	144.89	34.17	37.03	34.53	37.42	34.24	37.11	34.28	36.86	34.24	37.09
144.92	146.37	145.28	147.77	145.37	34.20	37.15	34.57	37.50	34.30	37.24	34.16	36.61	34.29	37.22
143.57	143.21	143.51	145.72	143.63	33.99	36.89	34.30	37.17	34.05	36.94	34.03	36.55	34.05	36.92
145.97	146.32	146.07	147.44	146.14	34.31	37.24	34.92	37.87	34.48	37.41	34.26	36.93	34.47	37.38
146.81	145.78	146.49	150.79	146.83	34.33	37.34	34.39	37.40	34.35	37.36	34.60	37.31	34.37	37.36
148.55	148.22	148.44	148.03	148.42	34.59	37.59	34.77	37.91	34.65	37.69	34.29	36.98	34.63	37.65
146.08	146.52	146.23	152.24	146.57	34.30	37.27	34.61	37.63	34.40	37.39	34.07	36.74	34.38	37.35
148.33	144.32	146.90	152.65	147.27	34.44	37.44	34.85	37.86	34.59	37.59	34.66	37.24	34.59	37.57
146.96	146.33	146.76	149.92	146.97	34.38	37.36	34.69	37.71	34.48	37.47	34.39	37.07	34.47	37.44
146.49	152.58	148.85	154.80	149.56	34.46	37.53	35.17	38.19	34.73	37.79	34.93	37.85	34.76	37.79
149.06	149.71	149.42	151.35	149.58	34.63	37.68	34.97	37.97	34.81	37.84	33.85	36.47	34.73	37.73
148.28	150.33	149.39	148.54	149.33	34.51	37.59	34.97	38.10	34.76	37.87	34.19	36.88	34.72	37.80
152.40	152.78	152.61	144.62	151.82	35.30	38.30	35.31	38.26	35.30	38.28	33.44	36.02	35.12	38.06
152.32	149.93	151.22	146.43	150.70	35.31	38.17	35.18	38.12	35.25	38.15	33.48	36.39	35.06	37.96
149.53	150.80	150.15	149.39	150.08	34.79	37.82	35.08	38.10	34.94	37.96	33.99	46.74	34.85	37.85
149.16	152.40	151.11	160.33	152.14	34.79	37.68	35.21	38.21	35.04	38.00	35.19	37.88	35.06	37.99
153.19	145.91	150.24	151.31	150.35	34.99	37.98	34.57	37.70	34.82	37.87	33.77	36.63	34.70	37.73
151.50	153.51	152.44	162.20	153.54	35.16	38.07	35.39	38.39	35.27	38.22	34.65	37.35	35.20	38.12
154.38	147.33	151.83	158.70	152.84	35.39	38.22	34.73	37.70	35.15	38.03	35.00	37.75	35.13	37.99
152.22	144.92	149.27	148.33	149.23	35.07	37.99	34.88	37.67	35.00	37.86	35.25	37 58	35.01	37.85
152.19	149.50	150.96	157.19	151.63	35.07	37.99	34.99	38.00	35.04	37.99	34.66	37.39	34.99	37.93
154.69	151.79	153.11	157.23	153.60	35.48	38.26	35.51	38.34	35.50	38.30	34.78	37.42	35.41	38.20
158.68	149.85	152.35	152.92	152.40	35.98	38.88	35.49	38.20	35.63	38.39	34.50	37.08	35.54	38.28
145.68	147.18	146.12	149.85	146.37	34.26	37.17	34.80	37.73	34.41	37.34	34.27	36.89	34.40	37.31

INTERNATIONAL TABLE I.—*Examination of recruits during the year 1895.*

No.		White.	Negro.	Total.
1	Total number of recruits examined	16,548	1,097	17,645
	Of each 1,000 of these—			
2	Were accepted for service	486.46	540.57	489.83
3	Were rejected for under height	8.46	9.12	8.50
4	Were rejected for disabilities	467.91	420.24	464.95
	Of each 1,000 accepted recruits the heights were as follows (in inches):			
5	Under 61	.62	.....	.58
6	61 to 62	.62	.....	.58
7	62 to 63	2.98	3.37	3.01
8	63 to 64	9.57	5.06	9.26
9	64 to 65	84.84	97.81	85.73
10	65 to 66	125.22	139.97	126.23
11	66 to 67	170.93	173.69	171.12
12	67 to 68	179.13	183.81	179.45
13	68 to 69	171.43	165.26	171.01
14	69 to 70	119.01	114.67	118.71
15	70 to 71	69.69	80.94	70.46
16	71 to 72	39.88	15.18	38.18
17	72 to 73	17.14	15.18	17.01
18	73 to 74	5.96	3.37	5.79
19	74 upward	2.98	1.69	2.89
	Causes of rejection (exclusive of under height) expressed in ratios per 1,000 of examined recruits:			
20	Physical debility	.73	.....	.68
21	Tuberculosis of lungs or other organs	7.07	1.82	6.74
22	Imperfect vision	59.34	39.20	58.09
23	Heart disease	30.70	17.32	29.87
24	Goiter	.24	.....	.23
25	Varicose veins, varicocele, hemorrhoids	72.70	40.11	70.67
26	Hernia	11.66	9.12	11.50
27	Flat feet	3.99	2.73	3.91

INTERNATIONAL TABLE II.—*Movements of sick by departments.* (*a*)

	Mean strength.	Admitted sick—			Sick disposed of.				Total days sick.
		To quarters.	To hospitals.	Total admissions.	Returned to duty (recovered).	Died. (*b*)	Otherwise disposed of.	Total.	
Department of the East	7,343	3,340	6,093	9,433	9,082	22	270	9,374	91,834
Department of the Missouri	3,821	2,011	2,289	4,300	4,138	16	130	4,284	49,044
Department of Dakota	2,415	959	1,101	2,060	1,992	7	51	2,050	23,967
Department of the Platte	2,362	1,079	1,850	2,929	2,837	1	73	2,911	29,258
Department of Texas	1,775	874	1,596	2,470	2,396	5	80	2,481	28,122
Department of the Colorado	3,019	1,127	1,968	3,095	2,968	11	94	3,073	31,141
Department of California	1,400	599	771	1,370	1,338	4	37	1,379	14,176
Department of the Columbia	1,459	413	785	1,198	1,141	7	43	1,191	14,571
General hospital and at large	35	3	20	23	61	....	23	84	8,330
Total Army	23,629	10,405	16,473	26,878	25,953	73	801	26,827	290,443

	In 1,000 of mean strength.			In 1,000 sick disposed of.			Average days sickness to each person.	
	Total admissions.	Admissions to hospital.	Deaths.	Returned to duty.	Died.	Otherwise disposed of.	Of mean strength.	Of total sick disposed of.
Department of the East	1,284.62	829.77	3.00	968.85	2.35	28.80	12.50	9.80
Department of the Missouri	1,125.36	599.06	4.19	965.92	3.73	30.35	12.84	11.45
Department of Dakota	853.00	455.90	2.90	971.71	3.42	24.88	9.92	11.69
Department of the Platte	1,240.05	783.24	.42	974.58	.34	25.08	12.39	10.05
Department of Texas	1,391.55	899.15	2.82	965.74	2.02	32.25	15.84	11.34
Department of the Colorado	1,025.18	651.87	3.64	965.83	3.58	30.59	10.31	10.13
Department of California	978.57	550.71	2.86	970.27	2.90	26.83	10.12	10.28
Department of the Columbia	821.11	538.04	4.80	958.02	5.88	36.11	9.99	12.24
General hospital and at large	657.14	571.43	.....	726.19	.....	273.81	238.00	99.17
Total Army	1,137.50	697.16	3.09	967.42	2.72	29.86	12.29	10.83

a Officers and citizen employees not included. *b* Exclusive of suicides and fatal accidents.

INTERNATIONAL TABLE III.—*Movements of sick by branches of military service and by months.*

	Absolute numbers.						Proportions per 1,000.				
		Sick admissions.		Sick disposed of.			In 1,000 of mean strength there were—			In 1,000 sick disposed of there were—	
	Mean strength.	Total.	To hospital.	Total.	As fit for duty (recovered).	By deaths.	Total sick admissions.	Admissions to hospital.	Deaths.	Fit for duty (recovered).	Deaths.
ARM OF SERVICE.											
Infantry	11,926	12,253	7,601	12,346	11,910	34	1,027.42	637.35	2.85	964.69	2.75
Cavalry	5,588	7,323	4,401	7,246	7,019	23	1,310.49	787.58	5.90	968.68	3.17
Artillery	3,653	5,104	3,247	5,065	4,918	5	1,397.21	888.86	1.37	970.98	.99
Ordnance	537	547	102	532	519	3	1,018.62	189.94	5.59	975.56	5.64
Engineers	448	642	513	639	631	3	1,433.04	1,145.09	6.70	987.48	4.70
Medical Department	682	372	234	360	344	3	545.45	343.11	4.40	955.56	8.33
All others	795	637	375	639	612	2	801.26	471.70	2.52	957.75	3.13
MONTH.											
January	23,762	2,239	1,357	2,143	2,074	5	94.23	57.11	.21	967.80	2.33
February	23,969	2,171	1,373	2,063	1,997	12	90.58	57.28	.50	968.01	5.82
March	23,868	2,522	1,584	2,549	2,471	5	105.67	66.37	.21	969.40	1.96
April	23,643	2,233	1,381	2,205	2,136	6	94.44	58.41	.25	968.71	2.72
May	23,673	2,038	1,235	2,148	2,079	2	86.09	52.17	.08	967.88	.93
June	23,677	1,983	1,227	2,039	1,964	4	83.75	51.82	.17	963.22	1.96
July	23,454	2,414	1,377	2,329	2,257	2	102.92	58.71	.08	969.08	.86
August	23,355	2,486	1,414	2,422	2,357	5	106.44	60.54	.21	973.17	2.06
September	23,300	2,450	1,357	2,462	2,389	5	105.15	58.24	.21	970.35	2.03
October	23,469	2,340	1,490	2,342	2,267	6	99.71	63.49	.26	967.98	2.56
November	23,787	1,969	1,320	2,045	1,954	11	71.43	55.50	.46	955.50	5.38
December	23,615	2,033	1,358	2,080	2,008	10	86.09	57.50	.42	965.39	4.81

INTERNATIONAL TABLE IV.—*Movements of sick by larger garrisons.*

Garrison	Mean enlisted strength.	In 1,000 of mean strength.			Garrison.	Mean enlisted strength.	In 1,000 of mean strength.		
		Total admissions.	Admissions to hospital.	Deaths.			Total admissions.	Admissions to hospital.	Deaths.
Adams, Fort, R. I	272	1,007.35	573.54	3.68	Niobrara, Fort, Nebr	429	1,149.18	953.38	.....
Apache, Fort, Ariz	272	1,077.21	411.76	3.68	Omaha Fort, Nebr	469	1,639.66	609.81	4.26
Assinniboine, Fort, Mont	314	904.46	624.20	3.19	Plattsburg Barracks, N. Y	482	890.04	450.21	.....
Bayard, Fort, N. Mex	351	629.63	566.95	5.70	Presidio of San Francisco, Cal	538	1,276.95	840.15	3.72
Clark, Fort, Tex	425	1,571.76	715.29	4.71	Reno, Fort, Okla	325	1,049.23	883.08	3.08
Columbus Barracks, Ohio	383	1,464.75	1,334.20	2.61	Riley, Fort, Kans	718	1,435.93	569.64	8.36
Custer, Fort, Mont	295	654.24	471.19	6.78	Robinson, Fort, Nebr	394	1,215.74	804.57	2.54
D. A. Russell, Fort, Wyo	391	1,375.96	1,135.55	5.12	Sam Houston, Fort, Tex	580	1,106.90	946.55	6.90
Douglas, Fort, Utah	497	849.09	706.24	4.02	Sheridan, Fort, Ill	712	1,191.01	547.75	1.40
Grant, Fort, Ariz	278	1,069.60	831.50	7.33	Sherman, Fort, Idaho	292	897.26	455.48	6.85
Hamilton, Fort, N. Y	270	1,581.48	1,470.37	7.41	Sill, Fort, Okla	393	1,124.68	396.95	7.63
Keogh, Fort, Mont	340	829.41	314.71	.....	Snelling, Fort, Minn	437	1,116.70	629.29	6.87
Leavenworth, Fort, Kans	713	1,154.28	664.80	11.22	Thomas, Fort, Ky	445	1,505.62	1,184.27	8.99
Logan, Fort, Colo	560	1,173.21	880.36	1.79	Vancouver Barracks, Wash	534	683.52	529.96	7.49
Madison Barracks, N. Y	456	907.89	440.79	4.39	Washington Barracks, D. C	341	2,249.27	2,014.66	2.93
McPherson, Fort, Ga	538	550.19	469.67	.....	West Point, N. Y	334	1,541.92	1,089.82	.....
Meade, Fort, S. Dak	444	867.12	765.77	.....	Whipple Barracks, Ariz	260	876.92	819.23	11.54
Missoula, Fort, Mont	257	607.04	416.34	.....	Willets Point, N. Y	399	1,155.39	977.44	10.02
Monroe, Fort, Va	513	1,518.52	553.61	1.95	Yates, Fort, N. Dak	265	1,022.64	354.72	3.77
Myer, Fort, Va	255	2,890.20	1,572.55	3.92					

INTERNATIONAL TABLE V.—*Movements of sick, according to most important diseases.*

No.	Diseases of the international nosological table.	Remaining under treatment at close of year 1894.	Admitted in 1895.	Total remaining and admitted.	Disposed of in 1895—				Remaining under treatment at close of year 1895.	Total days sick in 1895.	In 1,000 of mean strength.		In 1,000 disposed of—			Sick days to each case of the total disposed of.
					As fit for duty (recovered).	Died.	Otherwise.	Total.			Admissions.	Deaths.	Fit for duty (recovered).	Died.	Otherwise.	
1	Alcoholismus acutus, including delirium tremens	17	749	766	724	.....	27	751	15	3,934	31.70	.....	964.05	.....	35.95	5.24
2	Bronchitis acuta	17	1,141	1,158	1,126	1	10	1,137	21	5,562	48.29	0.04	990.32	0.88	8.80	4.89
3	Cholera asiatica	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	Cholera nostras	.....	93	93	89	.....	4	93	.....	280	3.94	.....	956.99	.....	43.01	3.01
5	Diphtheria et croup	4	21	25	18	.....	.....	18	7	347	.89	.....	1,000.00	.....	.....	19.28
6	Dysenteria	1	46	47	42	1	3	46	1	878	1.95	.04	913.04	21.74	65.22	19.09
7	Erysipelas	3	32	35	32	1	1	34	1	575	1.35	.04	941.18	29.41	29.41	16.91
8	Febris intermittens (malaria)	9	1,652	1,661	1,636	.....	18	1,654	7	8,318	69.91	.....	989.12	.....	10.88	5.03
9	Febris recurrens	7	344	351	333	2	10	345	6	5,495	14.56	.08	965.22	5.79	28.99	15.93
10	Gonorrhea	61	1,157	1,218	1,069	.....	71	1,140	78	26,968	48.97	.....	937.72	.....	62.28	23.66
11	Hernia	4	63	67	29	.....	26	55	12	2,547	2.67	.....	527.27	.....	472.73	46.31
12	Influenza	3	1,023	1,026	1,000	4	16	1,020	6	6,660	43.30	.17	980.39	3.92	15.69	6.53
13	Insolatio (hitzschlag, coup de chaleur)	.....	29	29	26	.....	1	27	2	393	1.23	.....	962.96	.....	37.04	14.56
14	Meningitis cerebro spinalis epidemica	.....	1	1	1	.....	.....	1	.....	10	.04	.....	1,000.00	.....	.....	10.00
15	Morbilli	1	37	38	33	.....	3	36	2	534	1.57	.....	916.66	.....	83.34	14.83
16	Parotitis epidemica	5	142	147	141	.....	2	143	4	1,956	6.01	.....	986.01	.....	13.99	13.68
17	Pneumonia crouposa sive lobaris	4	68	72	49	10	7	66	6	2,552	2.88	.42	742.42	151.52	106.06	38.67
18	Rheumatismus articulorum	25	320	345	298	.....	29	327	18	12,375	13.54	.....	911.32	.....	88.68	37.85
19	Scarlatina	.....	5	5	4	.....	.....	4	1	149	.21	.....	1,000.00	.....	.....	37.25
20	Scorbutus	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	Syphilis	24	281	305	239	3	41	283	22	11,546	11.89	.13	844.52	10.60	144.88	40.80
22	Trachoma	.....	5	5	5	.....	.....	5	.....	67	.21	.....	1,000.00	.....	.....	13.40
23	Tuberculosis pulmonum	7	60	67	16	10	30	56	11	3,899	2.54	.42	285.71	178.57	535.72	69.62
24	Tuberculosis ceterorum organorum	.....	11	11	5	1	3	9	2	1,107	.47	.04	555.56	111.11	333.33	123.00
25	Typhus abdominalis	16	108	124	98	12	6	116	8	5,937	4.57	.51	844.83	103.45	51.72	51.18
26	Typhus exanthematicus	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	Variola	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	Morbi auris	7	151	158	136	.....	15	151	7	2,562	6.39	.....	900.66	.....	99.34	16.97
29	Morbi cordis	7	102	109	64	5	32	101	8	4,185	4.32	.21	633.66	49.51	316.83	41.44
30	Morbi cutis	34	1,861	1,895	1,827	.....	31	1,858	37	16,769	78.76	.....	983.32	.....	16.68	9.02
31	Morbi mentis	40	1,439	1,479	1,357	2	80	1,439	40	13,511	60.90	.08	943.02	1.39	55.59	9.39
32	Morbi oculi	13	392	405	370	.....	22	392	13	4,772	16.59	.....	943.88	.....	56.12	12.17
33	Morbi systemat. urin. et sexual (excl. ven. et syph.)	13	148	161	133	2	14	149	12	3,170	6.26	.08	892.62	13.42	93.96	21.28

INTERNATIONAL TABLE VI.—*Admissions of important diseases by branches of military service.*

No.	Diseases of the international nosological table.	Absolute number of admissions.							Admissions per 1,000 of mean strength.						
		Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Hospital Corps.	All others.	Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Hospital Corps.	All others.
1	Alcoholismus acutus, including delirium tremens	434	114	145	11	23	5	17	36.39	20.40	39.69	20.49	51.34	7.33	21.38
2	Bronchitis acuta	539	266	212	45	46	7	26	45.20	47.60	58.03	83.80	102.68	10.26	32.70
3	Cholera asiatica	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	Cholera nostras	18	30	20	.....	10	7	8	1.51	5.37	5.47	.....	22.32	10.26	10.06
5	Diphtheria et croup	14	5	2	.....	.....	.....	.....	1.17	.89	.55	.....	.....	.....	.....
6	Dysenteria	16	18	4	.....	1	2	5	1.34	3.22	1.10	.....	2.23	2.93	6.29
7	Erysipelas	15	7	6	1	1	2	.....	1.26	1.25	1.64	1.86	2.23	2.93	.....
8	Febris intermittens (malaria)	240	541	709	12	74	42	34	20.12	96.81	194.08	22.35	165.18	61.59	42.77
9	Febris recurrens	106	128	75	6	9	12	8	8.89	22.90	20.53	11.17	20.09	17.59	10.06
10	Gonorrhea	630	273	202	2	9	3	38	52.83	48.85	55.30	3.72	20.09	4.40	47.80
11	Hernia	29	19	12	2	.....	1	.....	2.43	3.40	3.28	3.72	.....	1.47	.....
12	Influenza	415	221	259	27	16	41	44	34.80	39.55	70.90	50.28	35.72	60.12	55.34
13	Insolatio (hitzschlag, coup de chaleur)	4	5	16	2	1	.....	1	.34	.89	4.38	3.72	2.23	.....	1.26
14	Meningitis cerebro spinalis epidemica	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1.47	.....
15	Morbilli	15	8	9	4	1	.....	.....	1.26	1.43	2.46	7.45	2.23	.....	.....
16	Parotitis epidemica	48	11	82	.....	.....	1	.....	4.02	1.97	22.45	.....	.....	1.47	.....
17	Pneumonia crouposa sive lobaris	39	11	6	4	.....	3	5	3.27	1.97	1.64	7.45	.....	4.40	6.29
18	Rheumatismus articulorum	187	64	49	2	5	9	4	15.68	11.45	13.41	3.72	11.16	13.20	5.03
19	Scarlatina	4	.....	.....	.....	.....	.....	1	.34	.....	.....	.....	.....	.....	1.26
20	Scorbutus	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	Syphilis	153	69	44	1	7	4	3	12.83	12.35	12.05	1.86	15.63	5.86	3.77
22	Trachoma	2	3	.....	.....	.....	.....	.....	.17	.54	.....	.....	.....	.....	.....
23	Tuberculosis pulmonum	26	12	16	.....	2	2	2	2.18	2.15	4.38	.....	4.46	2.93	2.52
24	Tuberculosis ceterorum organorum	4	6	1	.....	.....	.....	.....	.34	1.07	.27	.....	.....	.....	.....
25	Typhus abdominalis	44	31	24	2	.....	6	1	3.69	5.55	6.57	3.72	.....	8.80	1.26
26	Typhus exanthematicus	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	Variola	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	Morbi auris	87	32	22	2	2	3	3	7.30	5.73	6.02	3.72	4.46	4.40	3.77
29	Morbi cordis	66	20	13	.....	2	.....	1	5.53	3.58	3.56	.....	4.46	.....	1.26
30	Morbi cutis	787	592	358	40	37	21	26	66.00	105.94	98.00	74.49	82.59	30.79	32.70
31	Morbi mentis	784	276	250	32	41	23	33	65.74	49.34	68.44	59.59	91.52	33.72	41.51
32	Morbi oculi	187	112	53	13	7	3	11	15.68	20.04	14.51	24.21	15.63	4.40	13.84
33	Morbi systemat. urin. et sexual (excl. ven. et syph.)	75	40	18	4	6	2	3	6.29	7.16	4.93	7.45	13.39	2.93	3.77

INTERNATIONAL TABLE VII.—*Admissions of important diseases by months (absolute numbers).*

No.	Diseases of the international nosological table.	Admissions by months.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	Alcoholismus acutus, including delirium tremens	75	59	69	58	61	64	55	51	56	79	55	67
2	Bronchitis acuta	168	162	174	86	55	36	21	23	54	92	116	154
3	Cholera asiatica												
4	Cholera nostras	1		2	7	2	11	21	26	12	4	5	2
5	Diphtheria et croup											7	14
6	Dysenteria	1	4	3		3	2	8	7	6	6	4	2
7	Erysipelas	2	5	8	2	1	3	4	1	2	1	1	2
8	Febris intermittens (malaria)	35	23	35	78	117	130	182	226	336	293	134	63
9	Febris recurrens	8	13	10	31	26	21	23	70	59	46	26	11
10	Gonorrhea	91	86	106	93	95	88	89	105	109	101	101	93
11	Hernia	8	2	2	9	8	2	8	4	7	4	1	8
12	Influenza	119	223	405	158	68	6	11	2	1		2	28
13	Insolatio (hitzschlag, coup de chaleur)				1	3	6	8	7	4			
14	Meningitis cerebro spinalis epidemica										1		
15	Morbilli	4		13	7	5	4				1	1	2
16	Parotitis epidemica	16	22	31	25	10	5	6	3	2	3	6	13
17	Pneumonia crouposa sive lobaris	12	20	8	4	2	2	1		3	4	8	4
18	Rheumatismus articulorum	46	32	33	30	32	30	21	27	17	20	15	17
19	Scarlatina			2		1	1						
20	Scorbutus												
21	Syphilis	29	24	30	16	36	19	24	34	17	18	18	16
22	Trachoma		1	1		1	1				1		
23	Tuberculosis pulmonum	7	6	3	3	6	7	4	7	2	4	7	4
24	Tuberculosis ceterorum organorum	1	4	3		1						1	1
25	Typhus abdominalis	3		2		9	12	14	17	22	20	7	2
26	Typhus exanthematicus												
27	Variola												
28	Morbi auris	13	16	21	16	9	7	18	14	9	14	8	6
29	Morbi cordis	4	10	13	12	9	8	9	11	7	4	6	9
30	Morbi cutis	126	101	127	153	125	193	195	213	196	171	131	130
31	Morbi mentis	130	124	134	118	124	106	119	105	111	140	106	122
32	Morbi oculi	31	33	43	45	36	32	30	32	25	35	21	29
33	Morbi systemat. urin. et sexual. (excl. ven. et syph.)	14	14	18	10	16	3	18	7	5	12	16	15

INTERNATIONAL TABLE VIII.—*Deaths according to years of service and age.*

Causes of death.	Deaths.				
	Years of service.		Ages.		
	First year.	Second year and over.	Twentieth to twenty-fifth year.	Twenty-sixth to thirtieth year.	Thirty-first year and over.
From diseases	9	75	17	21	46
Suicides *a*	.....	19	4	1	14
Accidents and injuries	5	38	12	12	19
Total	14	113	29	33	65

a Included in other classifications.

Respectfully submitted.

GEO. M. STERNBERG,
Surgeon-General, United States Army.

Hon. DANIEL S. LAMONT,
Secretary of War.

REPORT OF THE PAYMASTER-GENERAL.

ANNUAL REPORT OF THE PAYMASTER-GENERAL.

WAR DEPARTMENT,
PAYMASTER-GENERAL'S OFFICE,
Washington, D. C., September 29, 1896.

SIR: I have the honor to submit the following as the report of this office for the fiscal year ended June 30, 1896:

July 1, 1895, officers of the Pay Department were charged with public funds aggregating	$1,013,319.74
During the fiscal year 1896 these officers received—	
From the United States Treasury	14,435,390.07
From soldiers' deposits	420,338.87
From army paymasters' collections	202,440.16
Total balances and receipts	16,074,488.84
Accounted for as follows:	
Expended on account of pay of Army	$14,003,266.00
Expended on account of mileage to officers	115,010.75
Expended on account of pay of Military Academy	277,085.83
Expended on account of volunteers (Treasury certificates)	506,140.96
Surplus funds deposited to credit United States Treasurer	33,744.86
Army paymasters' collections deposited to credit United States Treasurer	202,440.16
Balances charged officers June 30, 1896	936,800.28
Total	16,074,488.84

A comparison of the expenditures of the last fiscal year with those of the preceding year shows a net increase of $755,527.24.

Increase:		
To the Army	$782,634.29	
To the Military Academy	52,774.12	
		$835,408.41
Decrease:		
Mileage to officers	12,717.46	
Pay of volunteers	67,163.71	
		79,881.17
Net increase as above stated		755,527.24

The increased disbursements to the Army are due principally to new legislation, as follows: By act of February 12, 1895, the pay of enlisted men serving in the first year of their enlistment was restored from $9 to

$13 per month, and by appropriation bill dated March 16, 1896, provision is made for paying monthly the service pay due soldiers, instead of retaining the same until discharge. This last act will continue the increase on account of pay of the Army until those soldiers in service at the date of the act, March 16, 1896, are discharged, for from that date not only is the entire pay proper of a soldier paid monthly, but also all service pay which had accrued at date of the act.

The increase of disbursements on account of the Military Academy was caused by the operation of the appropriation bill dated January 16, 1895, which included in the appropriation for pay of the Military Academy "Pay of general army service (Quartermaster's Department)" and "Pay of cavalry detachment," the two detachments having formerly been paid from "Pay, etc., of the Army."

The decrease of expenditures on account of pay of volunteers is quite marked, and would indicate that claims of this character are growing less in number.

The amount appropriated for mileage for the fiscal year 1896 was $140,000. Of this sum $103,790.55 was expended during the year, leaving a balance of $36,209.45. Of this latter sum $5,292.78 has been disbursed since June 30, 1896, upon orders issued previous to that date, leaving an actual balance on hand of $30,916.67. It is estimated that there will be an additional disbursement from this balance of about $2,500 on account of vouchers not yet presented.

The following comparative table will show in detail wherein the saving in mileage has occurred in this fiscal year, as compared with the previous fiscal year:

Comparative statement of mileage disbursements for the fiscal years 1895 and 1896.

	1895.	1896.
Change of station	$42,356.28	$38,358.51
European travel	2,400.36	1,450.13
Recruiting duty	5,691.11	6,809.22
Boards of examination to examine officers	11,185.00	8,733.60
Board of Ordnance and Fortifications	863.10	1,931.10
Ordnance Department: Gun construction, foundry, steel, power, and proving-ground inspection	2,541.46	2,744.13
Inspection by officers of the Inspector-General's Department	5,598.97	5,142.05
Inspection by other than officers of the Inspector-General's Department	6,495.42	6,839.47
Medical boards and inspection by medical officers	1,786.04	1,134.90
Military Prison Commission and inspection of Military Prison	484.28	
Instruction and inspection of National Guard	3,813.57	1,567.47
Boards of survey	159.30	
Retiring boards and officers retired and ordered home	3,216.46	2,233.26
Payment of troops	15,402.23	6,902.25
Duty at World's Columbian Exposition	107.36	
Treasurer and professors Military Academy, Military Academy duty	231.57	344.69
Courts-martial (to and from)	8,011.54	8,880.21
Returning from conducting prisoners and insane men	184.72	442.52
Commanding generals and aids	5,928.35	6,423.63
Rifle teams and inspection of rifle ranges	7,338.94	620.94
Instructions of Secretary of War—duty confidential	3,703.32	3,136.92
Attending funerals of officers and other deceased officials	640.87	95.55
Total	127,635.25	103,790.55

The following is a statement of the annual disbursements on account of mileage for the past ten fiscal years:

1886	$157,769.36	1892	$214,589.43
1887	136,956.46	1893	183,915.97
1888	134,877.74	1894	155,228.84
1889	167,520.85	1895	139,243.44
1890	185,404.99	1896	109,083.33
1891	240,234.82		

In the matter of payment for travel of officers over those railroads known as "50 per cent land-grant roads," of which the Northern Pacific Railroad is an example, the practice has been for officers so traveling to pay full fare and charge the cost of the same in their mileage accounts, the Government thereby losing the benefit of the 50 per cent proviso.

The Comptroller of the Treasury, in discussing the question of payment for such travel, holds that for all travel over any "free," "bond-aided," or "50 per cent" land-grant railroad, transportation should be obtained for the entire journey. As the cost of transportation furnished over the "50 per cent roads" constitutes a charge against the appropriation for the Pay Department for the payment of mileage to officers traveling on duty without troops, it is believed that the settlement of such accounts with said roads would be much simplified and facilitated, if paymasters were authorized to issue transportation requests when travel involved the use of such roads; and in making such settlements, only the accounts of the officers of that department having control of the appropriation from which payment to the officers and to the roads must be made, would need to be consulted. Legislation to that end is therefore recommended.

STATEMENT OF DEPOSITS MADE DURING THE FISCAL YEAR 1896.

The number of deposits made during the first five months (July 1 to November 30) was 2,029. The total amount deposited during the same period was $184,361.71. The average number of deposits per month was 529, and the average amount of each deposit was $69.70. The number of deposits during the remaining seven months (December 1, 1895, to June 30, 1896) was 5,909, and the total amount deposited during the same period was $235,977.16.

The average number of deposits per month was 844, and the average amount of each deposit was $39.33.

In corresponding periods of the preceding fiscal year (1895) deposits were as follows: From July 1 to November 30, 1894, the number of deposits was 2,312, and the total amount deposited was $124,988.12. The average number of deposits was 447, and the average amount of each deposit was $50.45. From December 1, 1894, to June 30, 1895, the number of deposits was 3,972, and the total amount deposited was $193,282.61. The average number of deposits per month was 562, and the average amount of each deposit was $48.66.

It thus appears that, since the present system of payments went into full effect (December 1, 1895), while the average number of deposits per month has increased from 329 to 844, the average amount of each deposit has decreased from $69.70 to $39.93, and as compared with the preceding fiscal year (1895) a corresponding increase in the number of deposits and decrease in the amount deposited.

It also appears that the actual increase in the amount deposited in the fiscal year 1896 over the amount deposited in 1895 was about $102,000. Of this amount 58 per cent was deposited in the first five months, and 42 per cent in the last seven months, showing a falling off of over 50 per cent in the average amount deposited per month in the last period (seven months), as compared with the first period (five months).

There is shown also a slight increase in the average amount of each deposit as compared with the fiscal year 1895, and an increase of about 10 per cent in the number of deposits as compared with the same year.

Recapitulation of soldiers' deposits.

Fiscal year.	Number of deposits.	Amount deposited.	Fiscal year.	Number of deposits.	Amount deposited.
1873	.....	$209, 850. 38	1885	7, 033	$427, 617. 96
1874	.....	346, 609. 56	1886	7, 261	469, 031. 55
1875	.....	325, 255. 80	1887	6, 889	436, 574. 98
1876	.....	435, 912. 68	1888	7, 400	386, 944. 10
1877	5, 524	328, 585. 05	1889	7, 829	383, 798. 34
1878	5, 524	346, 243. 94	1890	7, 634	395, 128. 82
1879	6, 807	470, 770. 38	1891	6, 790	403, 473. 15
1880	8, 635	477, 174. 44	1892	5, 570	334, 464. 70
1881	8, 942	524, 112. 72	1893	5, 870	282, 248. 04
1882	6, 890	448, 561. 83	1894	5, 914	361, 830. 76
1883	7, 902	407, 544. 68	1895	6, 284	318, 270. 73
1884	7, 114	389, 267. 55	1896	8, 778	420, 338. 87

PAYMASTERS' ACCOUNTS

have, as a rule, been promptly rendered, though much difficulty has been experienced in several of the military departments in securing prompt return of pay rolls by company commanders after payment, and they have thereby been much embarrassed in the rendition of their accounts, which, under the law requiring accounts to be forwarded within ten days after the close of the month to which they relate, they have been obliged to forward in an incomplete condition, owing to the non-receipt of pay rolls involving in some cases several thousand dollars. It is hoped that, under recent instructions on the subject issued from the War Department, no further trouble will be experienced on that score.

In this connection it is recommended that Congress be requested to provide that accounts may, when necessary, be retained in this office thirty days, instead of twenty days, as now provided, thus affording paymasters full opportunity to furnish evidence to remove suspensions, which, under the limited time now allowed, must remain as suspensions against them when the account is forwarded to the Auditor, to be removed by him when the desired evidence is obtained, thus cumbering

the books of this office with many charges which would be avoided were the time extended. It should not be understood that all or a large part of the accounts would be retained during the whole period allowed, nor are they now, as when an account is found to be correct in all particulars it is forwarded to the Auditor as soon as the examination and record thereof are completed. It is believed that the additional ten days requested will afford ample opportunity for the removal of all suspensions which can be removed by explanation.

PAYMENTS.

All military posts in the United States, including arsenals and recruiting and other detachments, are now paid monthly. Of the 85 military posts, 22 have been paid by the paymaster in person, and 63 have been paid by check or funds shipped by express. Of the 17 arsenals, 3 have been paid in person and 14 have been paid by check. This is the first year in which payments to all the military posts in the country have been made monthly. The payments have been made promptly and with the accuracy of well-trained and experienced disbursing officers.

WORK OF THE PAY CORPS.

The number of individual payments made during the year was 361,805, of which 318,840 were to enlisted men and 42,965 were to officers of the Army.

These payments involved computation on 71,223 vouchers, of which 8,711 were company and detachment rolls, 6,847 were final statements, 2,158 were mileage accounts, 12,000 were pay accounts of retired enlisted men, and 40,807 were pay accounts of officers.

There was involved also the drawing of 80,460 official checks, and, in addition to payments made in person since December 1, 1895, the counting, placing in envelopes, packing, and shipping by express of nearly $1,700,000.

In this connection I feel constrained to remark that under the law and regulations requiring payment to be made by check or by currency sent by express at the risk and expense of the United States, it is not clearly defined where the responsibility of the paymaster or the Government begins and ends. It is believed to be the intention of the law that the risk assumed by the Government shall continue until the money shipped by the paymaster shall have passed all intermediaries and safely reached the hands of the soldier. It certainly could not have been the intention to interpose several other parties between the paymaster and the payee, after the funds had left the custody of the express company, and still hold the paymaster responsible should the funds disappear.

Errors are liable to occur in the accounts of all disbursing officers, however honest and faithful they may be, and if such be the case with

a corps of highly trained officers, such as constitutes the Pay Corps, how much more likely are errors to occur with officers inexperienced in the disbursement of money. It is hoped some measure may be devised, by legislation or otherwise, by which paymasters—bonded officers of a staff department which disburses nearly 60 per cent of the entire amount appropriated for the support of the Army—shall not be required to turn over to non-bonded line officers for distribution, in addition to the legitimate duties of their profession, nearly 50 per cent of the amount appropriated for the payment of enlisted men of the Army.

Collections in favor of other bureaus of the War Department.

Collections for the credit of appropriations for the pay of the Army...	$108,756.35
Collected and turned into the Treasury to the credit of the—	
Quartermaster's Department	91,700.50
Subsistence Department	424.37
Ordnance Department	1,544.99
Medical Department	13.95
Total collections	202,440.16

RETAINED PAY.

By act of March 16, 1896, the retention of pay from enlisted men authorized by the act of May 15, 1872, was prohibited, and they now receive, after service of two years, the increased pay provided for by said act, and thereafter the further sum provided for the fourth and fifth and succeeding years, for continuous service. It is believed this will prove to be wise and beneficial legislation, inuring not alone to the benefit of the soldier, but to the service at large, by removing from the mind of the soldier the fear of losing in the last year of his service, by some misdemeanor, pay which he had earned by good and faithful service in former years.

PERSONNEL.

During the past fiscal year three paymasters (one colonel and two majors) have been placed on the retired list. Maj. William M. Maynadier was retired September 26, 1895, on account of disability incident to the service. Col. C. M. Terrell, assistant paymaster-general, was retired February 24, 1896; Maj. J. B. Keefer was retired April 10, 1896; and Maj. George F. Robinson has since been retired (August 13, 1896), all having reached the age at which the law makes retirement compulsory. By the retirement of Colonel Terrell, Lieut. Col. J. P. Canby was promoted to colonel and assistant paymaster-general, and Maj. F. M. Coxe was promoted to lieutenant-colonel and deputy paymaster-general. The retirement of Major Robinson created a vacancy in the list of majors, which still exists, and the continued suspension of Maj. J. W. Wham leaves but 18 majors for duty.

NECESSITIES OF THE SERVICE.

The reduction in the number of paymasters has made it necessary to abandon as paymasters' stations some places at which it would be for the benefit of the service to have a paymaster stationed, as at Leavenworth, Kans., contiguous to two of the most important posts in the country, viz, Fort Leavenworth and Fort Riley, Kans.; but with the present force of 18 majors for duty, when all are present, and with reductions in the working strength of the corps by reason of absence with leave or on account of sickness, it would be impracticable at present to station a paymaster at that place. An increase of five in the number of majors is recommended, in order that emergencies, liable at any time to arise, may be provided for.

Very respectfully, T. H. STANTON,
Paymaster-General, United States Army.

The SECRETARY OF WAR.

Statement showing the number of pay trips made, number of days consumed in travel, posts paid, and amount of field and office disbursements made by each disbursing officer of the Pay Department, United States Army, during the fiscal year ending June 30, 1896.

Rank and name.	Number of pay trips.	Days consumed.	Number of posts paid.	Miles traveled.						Payments.			Mileage paid to paymasters.	Mileage paid to paymasters' clerks.
				Ambulance.	Stage.	Railroad.	Steamer.	Other conveyance.	Total.	In field.	In office.	Total.		
Colonels and assistant paymasters-general.														
Terrell, C. M.[1]	7	27	22	103	.....	6,580	.....	.....	6,683	$87,545.01	$238,939.34	$326,484.35	$455.64	$458.00
Glenn, Geo. E	1	10	6	4	.....	2,680	.....	.....	2,684	25,776.99	385,064.36	410,841.35	184.05	153.36
Canby, Jas. P.[2]	2	5	15	.....	.....	1,344	.....	.....	1,344	18,089.67	353,535.30	371,624.97	64.61	64.61
Lieutenant-colonels and deputy paymasters-general.														
Candee, Geo. W	6	22	50	.....	.....	3,395	.....	.....	3,395	237,110.99	687,286.60	924,397.59	228.80	227.55
Carey, A. B	15	40	140	.....	.....	1,926	736	28	2,690	65,007.11	1,873,498.74	1,938,505.85	161.09	187.00
Coxe, F. M.[3]	31	51	42	.....	.....	126	2,240	.....	2,366	171,540.68	248,310.02	419,850.70	195.18	195.18
Majors and paymasters.														
Bates, A. E	11	36	34	265	.....	1,719	14	50	2,048	122,166.81	351,204.13	473,370.94	87.48	117.72
Wilson, C. I											489,349.31	489,349.31		
Towar, A. S	12	30	19	112	.....	4,360	.....	44	4,516	151,730.39	436,071.65	587,802.04	302.42	303.50
Maynadier, Wm. M.[4]														
Arthur, William	19	42	27	.....	.....	5,702	1,536	.....	7,238	155,928.70	430,177.35	586,106.05	524.05	496.59
Keefer, J. B.[5]	3	13	11	18	.....	1,301	48	.....	1,367	40,683.49	105,387.46	146,070.95	94.42	94.42
Sniffen, C. C	12	46	74	54	.....	3,183	648	.....	3,885	219,513.75	538,833.38	758,347.13	235.52	235.44
Baird, Geo. W	12	25	48	.....	.....	4,371	932	41	5,344	156,729.34	314,203.34	470,932.68	344.65	342.56
Robinson, Geo. F.[6]	3	37	14	550	.....	5,289	.....	.....	5,839	66,206.46	112,813.87	179,020.33	417.37	364.96
Dodge, F. S	19	22	20	104	.....	1,839	.....	.....	1,943	157,420.30	384,922.97	542,343.27	118.69	120.79
McClure, Chas	12	54	65	457	20	5,340	.....	.....	5,817	280,212.42	599,896.73	880,109.15	348.25	322.45
Witcher, J. S	12	40	61	231	82	1,338	376	.....	2,027	145,436.71	257,388.71	402,825.42	141.09	143.03
Whipple, C. H	12	44	55	500	.....	5,750	.....	140	6,390	153,203.71	186,537.47	339,741.18	416.82	363.40
Comegys, W. H	8	45	40	76	520	5,210	.....	60	5,866	112,564.23	323,243.74	435,807.97	353.99	369.61
Tucker, W. F	4	25	47	162	.....	5,596	.....	28	5,786	83,320.36	231,263.75	314,584.11	390.50	332.04
Muhlenberg, J. C	12	34	60	144	.....	430	1,880	.....	2,454	176,316.89	1,637,323.17	1,813,640.06	163.56	163.56
Smith, Geo. R	12	39	66	20	.....	2,771	249	.....	3,040	239,101.19	473,599.55	712,700.74	190.99	190.99
Baker, J. P	12	41	59	1,099	.....	2,310	300	.....	3,709	101,855.01	182,474.73	284,329.74	195.70	232.22
Halford, E. W	13	45	38	553	.....	6,045	.....	.....	6,598	144,548.29	224,950.39	369,498.68	420.31	431.27
Hamner, W. H	9	04	46	1,125	.....	3,783	.....	.....	4,908	238,616.62	169,843.93	408,460.55	342.54	350.44
Kilbourne, C. E	16	45	41	200	.....	6,290	448	36	6,974	120,279.65	194,478.78	314,758.43	530.69	520.56
Wham, J. W.[7]														
Total	275	882	1,100	5,777	622	88,678	9,407	427	104,911	3,470,904.77	11,430,598.77	14,901,503.54	6,908.41	6,781.25

[1] Retired February 24, 1896. [2] Promoted colonel February 24, 1896. [3] Promoted lieutenant-colonel February 24, 1896. [4] Retired September 26, 1895.
[5] Retired April 10, 1896. [6] Retired August 13, 1896. [7] Not on duty since April 8, 1895.

Statement by appropriations of approved and suspended disbursements in paymasters' accounts during the fiscal year ending June 30, 1896, showing also balance of suspensions remaining June 30, 1895, removed during the fiscal year, and the balance remaining June 30, 1896.

Title of appropriations.	Disbursements.			Suspensions.			
	Total.	Approved.	Suspended.	Amount of suspensions on books June 30, 1895.	Total suspensions.	Amount of suspensions removed during fiscal year ending June 30, 1896.	Amount of suspensions remaining on books June 30, 1896.
Pay, etc., of the Army, 1896	$12,966,992.59	$12,964,374.96	$2,617.63		$2,617.63	$2,241.62	$376.01
Mileage to officers traveling without troops, 1896	103,790.55	103,560.67	229.88		229.88	199.01	30.87
Pay of Military Academy, 1896	244,738.46	244,738.00	.46		.46	.46	
Pay, etc., of the Army, 1895	1,033,062.13	1,032,826.49	235.64	$1,011.91	1,247.55	1,041.18	206.37
Mileage to officers traveling without troops, 1895	11,220.20	11,212.20	8.00	46.99	54.99	16.60	38.39
Pay of Military Academy, 1895	32,347.37	23,447.37	8,900.00		8,900.00	8,900.00	
Pay, etc., of the Army, 1894	3,201.10	3,201.10		580.95	580.95	30.74	550.21
Pay, etc., of the Army, 1893	10.18	10.18					
Pay, etc., of the Army, 1893 and prior				6,309.69	6,309.69	129.27	6,180.42
Bounty to Fifteenth and Sixteenth Missouri Cavalry Volunteers (indefinite)	166.66	166.66					
Extra pay to officers and men who served in the Mexican war (indefinite)	243.00	243.00					
Three months' pay proper (indefinite)	150.00	150.00					
CERTIFIED CLAIMS.							
Pay, etc., of the Army	6,545.92	6,545.92					
Pay of two and three years volunteers	1,483.79	1,483.79					
Pay of two and three years volunteers, 1893	1,549.18	1,549.18					
Pay of two and three years volunteers, 1894	1,523.71	1,523.71					
Pay of two and three years volunteers, 1895	4,677.93	4,677.93					
Pay of two and three years volunteers, 1896	314,106.07	314,106.07					
Bounty to volunteers, their widows and legal heirs	1,391.31	1,391.31					
Bounty to volunteers, their widows and legal heirs, 1893	1,911.78	1,911.78					
Bounty to volunteers, their widows and legal heirs, 1894	1,374.15	1,374.15					
Bounty to volunteers, their widows and legal heirs, 1895	5,327.81	5,327.81					
Bounty to volunteers, their widows and legal heirs, 1896	145,435.29	145,435.29					
Bounty under act of July 28, 1866	312.50	312.50					
Bounty under act of July 28, 1866, 1893	55.39	55.39					
Bounty under act of July 28, 1866, 1894	101.33	101.33					
Bounty under act of July 28, 1866, 1895	783.33	783.33					
Bounty under act of July 28, 1866, 1896	18,560.70	18,560.70					
Pay of volunteers, Mexican war	160.34	160.34					
Preventing and suppressing Indian hostilities	22.82	22.82					
Traveling expenses of California and Nevada volunteers	220.97	220.97					
Pay of Military Academy	36.98	36.98					
Total	14,901,503.54	14,889,511.93	11,991.61	7,949.54	19,941.15	12,558.88	7,382.27

Statement of the account of the Pay Department, United States Army, with the

Appropriations.	In account with the Treasury.				
	Balance in the Treasury July 1, 1895.	Amount of appropriations and transfer warrants.	Unexpended balances deposited.	Paymasters' collections deposited.	Repayments in settlement of accounts.
Pay, etc., of the Army, 1896		$13,312,423.51		$101,098.77	$35.44
Pay of Military Academy, 1896		282,796.01		.46	
Mileage to officers traveling without troops, 1896		140,000.00	$20,000.00	183.41	18.00
Pay, etc., of the Army, 1895	$36,056.03	72,751.31	93.00	6,843.04	6.27
Pay of Military Academy, 1895	6,223.78		1,090.24	32.00	3.25
Mileage to officers traveling without troops, 1895	2,033.09		561.65	26.52	
Pay, etc., of the Army, 1894	445,591.91		3,828.26	237.84	1.39
Pay of Military Academy, 1894	9,923.09				
Contingencies, headquarters military departments, 1894	47.70				
Pay, etc., of the Army, 1893, and prior years			4,199.32	130.52	85.19
Bounty to Fifteenth and Sixteenth Missouri Cavalry Volunteers (indefinite)		166.66			
Extra pay to officers and men who served in the Mexican war (indefinite)		243.00			
Three months' pay proper (indefinite)		150.00			
Relief of widow and legal representatives of Orsemus B. Boyd, private act No. 17, January 25, 1895		1,776.06			
CERTIFIED CLAIMS.					
Pay, etc., of the Army	738.95	5,818.58			
Pay of Military Academy		36.98			
Pay of two and three year volunteers	5,181.81	6,920.36			
Pay of two and three year volunteers, 1893 and prior years			2,604.18		
Pay of two and three year volunteers, 1894	231,972.35				
Pay of two and three year volunteers, 1895					
Pay of two and three year volunteers, 1896		325,000.00			
Bounty to volunteers, their widows and legal heirs	17,419.95	9,224.25			
Bounty to volunteers, their widows and legal heirs, 1893 and prior years			3,683.21		
Bounty to volunteers, their widows and legal heirs, 1894	74,010.00				
Bounty to volunteers, their widows and legal heirs, 1895					
Bounty to volunteers, their widows and legal heirs, 1896		200,000.00			
Bounty under act of July 28, 1866	2,109.95	2,266.66			
Bounty under act of July 28, 1866, 1893 and prior years			903.71		
Bounty under act of July 28, 1866, 1894	13,500.00				
Bounty under act of July 28, 1866, 1895					
Bounty under act of July 28 1866, 1896		25,000.00			
Preventing and suppressing Indian hostilities		22.82			
Pay of volunteers, Mexican war		160.34			
Traveling expenses of California and Nevada volunteers	187.21	220.97			
TRANSFER ACCOUNT.					
Pay etc., of the Army, 1893 and prior years		95.22			
Total	844,995.82	14,385,072.73	36,963.57	108,552.56	149.54

appropriations subject to its control during the fiscal year ending June 30, 1896.

In account with the Treasury.							
Total.	Amount drawn by requisition.		Amount covered into surplus fund.	Total.	Balance in the Treasury June 30, 1896.	Balance in the hands of paymasters June 30, 1896.	Total balances June 30, 1896.
	On Pay Department request.	On Treasury settlements.					
$13,413,557.72	$13,389,426.00	$48.86	.....	$13,389,474.86	$24,082.86	$842,743.16	$866,826.02
282,796.47	268,000.00	.....	.....	268,000.00	14,796.47	23,261.54	38,058.01
160,201.41	132,574.00	.....	.....	132,574.00	27,627.41	8,792.85	36,420.26
115,749.65	112,600.00	572.19	.....	113,172.19	2,577.46	4,128.94	6,706.40
7,349.27	.....	.....	.....	.....	7,349.27	.....	7,349.27
2,621.26	1,004.00	321.70	.....	1,325.70	1,295.56	.....	1,295.56
449,659.40	.....	51.38	$449,608.02	449,659.40	.....	2,573.28	2,573.28
9,923.09	.....	.....	9,923.09	9,923.09	.....	.....	.....
47.70	.....	.....	47.70	47.70	.....	.....	.....
4,415.03	.....	.....	4,415.03	4,415.03	.....	.....	.....
166.66	166.66	.....	.....	166.66	.....	.....	.....
243.00	243.00	.....	.....	243.00	.....	.....	.....
150.00	150.00	.....	.....	150.00	.....	.....	.....
1,776.06	.....	1,776.06	.....	1,776.06	.....	.....	.....
6,557.53	5,744.83	73.75	.....	5,818.58	738.95	2,578.05	3,317.00
36.98	36.98	.....	.....	36.98	.....	.....	.....
12,102.17	7,398.12	.....	.....	7,398.12	4,704.05	5,914.33	10,618.38
2,604.18	.....	.....	2,604.18	2,604.18	.....	.....	.....
231,972.35	.....	.....	231,972.35	231,972.35	.....	2,649.22	2,649.22
.....	.....	.....	.....	.....	.....	952.81	952.81
325,000.00	320,000.00	20.58	.....	320,020.58	4,979.42	5,893.93	10,873.35
20,644.20	9,831.39	.....	.....	9,831.39	16,812.81	8,440.08	25,252.89
3,683.21	.....	.....	3,683.21	3,683.21	.....	.....	.....
74,010.00	531.80	.....	73,478.20	74,010.00	.....	1,921.39	1,921.39
.....	.....	.....	.....	.....	.....	2,125.41	2,125.41
200,000.00	160,000.00	25.00	.....	160,025.00	39,975.00	14,564.71	54,539.71
4,376.61	2,279.16	.....	.....	2,279.16	2,097.45	1,966.66	4,064.11
903.71	.....	.....	903.71	903.71	.....	.....	.....
13,500.00	.....	.....	13,500.00	13,500.00	.....	896.45	896.45
.....	.....	.....	.....	.....	.....	958.17	958.17
25,000.00	25,000.00	.....	.....	25,000.00	.....	6,439.30	6,439.30
22.82	22.82	.....	.....	22.82	.....	.....	.....
160.34	160.34	.....	.....	160.34	.....	.....	.....
408.18	220.97	.....	.....	220.97	187.21	.....	187.21
95.22	.....	95.22	.....	95.22	.....	.....	.....
15,375,734.22	14,435,390.07	2,984.74	790,135.49	15,228,510.30	147,223.92	936,800.28	1,084,024.20

Statement showing the balance in the hands of each disbursing officer of the Pay Department, United States Army, on the 1st of July, 1895; the amount remitted to each from the United States Treasury, or turned over by other agents during the fiscal year ending June 30, 1896; the amounts accounted for by accounts and vouchers of expenditures, or by transfer or replacement in the Treasury, and the balance remaining in the hands of paymasters to be accounted for in the next fiscal year.

Rank and name.	Balance in hands of each paymaster on July 1, 1895.	Remitted from the Treasury in the year ending June 30, 1896.	Received from other paymasters.	Received from soldiers' deposits.	Received from paymasters' collections.	Total received and to be accounted for.	Surplus funds deposited in the Treasury.	Paymasters' collections deposited in the Treasury.	Expenditures.	Transferred to other paymasters.	Balance in hands of each paymaster on June 30, 1896.	Total accounted for.
Colonels and assistant paymasters-general.												
Terrell, C. M.[1]	$45,006.23	$520,000.00	$10,750.69	$13,297.72	$4,869.73	$593,924.37	.....	$4,869.73	$326,484.35	$262,570.29	.....	$593,924.37
Glenn, Geo. E.	.....	850,000.00	125,603.04	6,228.01	1,720.57	983,551.62	.....	1,720.57	410,841.35	514,742.66	$56,247.04	983,551.62
Canby, Jas. P.[2]	47,916.87	359,000.00	85,017.77	7,766.04	3,658.38	503,359.06	.....	3,658.38	371,624.97	93,101.22	34,974.49	503,359.06
Lieutenant-colonels and deputy paymasters-general.												
Candee, Geo. W	30,735.18	1,131,000.00	111,840.96	29,114.17	12,058.17	1,314,748.48	$169.66	12,058.17	924,397.50	346,510.76	31,612.30	1,314,748.48
Carey, A. B	134,247.28	3,613,000.00	96,713.96	16,744.95	8,230.37	3,868,936.56	1,090.24	8,230.37	1,938,505.85	1,803,134.24	117,975.86	3,868,936.56
Coxe, F. M.[3]	34,170.82	462,000.00	95,330.69	16,342.39	3,323.38	611,167.28	223.93	3,323.38	419,850.70	174,207.65	13,561.62	611,167.28
Majors and paymasters.												
Bates, A. E	13,089.56	804,000.00	54,245.29	4,983.25	5,675.37	881,993.47	282.60	5,675.37	473,370.94	345,991.09	56,673.47	881,993.47
Wilson, C. I	47,156.14	511,621.94	126,031.00	9.75	78.89	684,897.72	10,750.80	78.89	489,349.31	117,908.90	66,809.82	684,897.72
Towar, A. S	45,382.42	938,000.00	78,718.21	24,482.28	10,915.40	1,097,499.31	108.06	10,915.40	587,802.04	498,673.81	.....	1,097,499.31
Maynadier, Wm. M.[4]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arthur, W. M	55,296.46	326,000.00	228,225.41	27,123.26	8,948.14	645,593.27	.....	8,948.14	586,106.05	21,247.90	29,291.18	645,593.27
Keefer, J. B.[5]	47,694.59	.....	120,238.80	7,153.00	1,240.06	176,326.45	.....	1,240.06	146,070.95	29,015.44	.....	176,326.45
Sniffen, C. C	34,223.41	.....	730,387.60	24,761.00	13,692.93	803,064.94	.....	13,692.93	758,347.13	31,024.88	.....	803,064.94
Baird, Geo. W	24,494.45	413,000.00	147,903.81	13,729.96	9,621.61	608,749.83	.....	9,621.61	470,932.68	66,216.44	61,979.10	608,749.83
Robinson, Geo. F.[6]	23,001.00	190,000.00	55,716.48	6,927.75	3,474.01	279,119.24	.....	3,474.01	179,020.33	96,624.90	.....	279,119.24
Dodge, F. S	.....	477,000.00	209,696.77	20,331.67	9,075.23	716,103.67	464.92	9,075.23	542,343.27	129,986.92	34,233.33	716,103.67
McClure, Chas	72,736.15	721,000.00	130,091.10	22,300.95	17,067.76	963,195.96	.....	17,067.76	880,109.15	25,216.13	40,802.92	963,195.96
Witcher, J. S	20,088.08	50,000.00	343,253.28	19,755.96	4,983.48	438,080.80	.....	4,983.48	402,825.42	26,994.49	3,277.41	438,080.80
Whipple, C. H	56,815.98	170,000.00	259,319.27	17,686.87	11,622.07	515,444.19	.....	11,622.07	339,741.18	148,747.28	15,333.66	515,444.19
Comegys, W. H	34,358.36	42,000.00	489,643.01	16,021.39	9,309.98	591,332.74	.....	9,309.98	435,807.97	67,332.21	78,882.58	591,332.74
Tucker, W. F	27,180.03	.....	288,138.89	25,503.42	7,195.38	348,017.72	.....	7,195.38	314,584.11	19,719.58	6,518.65	348,017.72
Muhlenberg, J. C	70,043.32	1,931,768.13	210,172.72	13,343.83	11,507.71	2,236,835.71	20,654.65	11,507.71	1,813,640.06	295,377.72	95,655.57	2,236,835.71
Smith, Geo. R.	39,256.46	.....	743,660.00	13,954.28	10,269.58	807,140.32	.....	10,269.58	712,700.74	8,411.04	75,758.96	807,140.32

Baker, J. P.	16,060.31		256,557.88	13,529.41	8,272.95	294,420.55		8,272.95	284,329.74	1,817.86		294,420.55
Halford, E. W		348,000.00	93,439.58	23,061.85	9,733.25	474,234.68		9,733.25	369,498.68	57,014.94	37,987.81	474,234.68
Hamner, W. H.	73,022.56	353,000.00	38,097.10	26,865.99	9,343.02	500,328.67		9,343.02	408,460.55	35,137.29	47,387.81	500,328.67
Kilbourne, C. E.	24,343.08	225,000.00	174,763.02	9,319.72	6,552.74	439,978.56		6,552.74	314,758.43	86,830.69	31,836.70	439,978.56
Wham, J. W.[7]												
Total	1,016,319.74	14,435,390.07	5,303,556.33	420,338.87	202,440.16	21,378,045.17	33,744.86	202,440.16	14,901,503.54	5,303,556.33	936,800.28	21,378,045.17

[1] Retired February 24, 1896. [2] Promoted colonel February 24, 1896. [3] Promoted lieutenant-colonel February 24, 1896. [4] Retired September 26, 1895.
[5] Retired April 10, 1896. [6] Not on duty since January 24, 1896. [7] Not on duty since April 8, 1895.

REPORT OF THE CHIEF SIGNAL OFFICER.

REPORT

OF

THE CHIEF SIGNAL OFFICER.

WAR DEPARTMENT, SIGNAL OFFICE,
Washington, September 30, 1896.

SIR: I have the honor to submit the following report on the Signal Corps of the Army for the fiscal year ending June 30, 1896:

MILITARY TELEGRAPH LINES.

The permanent military telegraph lines operated by the Signal Corps, aggregating some 780 miles in length, remained during the year under the charge of Capt. Robert Craig, Signal Corps, Assistant, whose tabular statement as to the location and length of said lines is hereto annexed.

These lines, running through mountainous and desert regions, have been maintained in excellent condition during the year, through the energetic and judicious supervision of the officers in charge of the several military departments. Their efficiency has also been largely promoted by replacement by iron telegraph poles of the wooden supports, which are now wholly discarded except on a portion of the Bismarck-Fort Yates line. Notwithstanding the original high cost of the iron poles, their use is shown to be the more economical, as wooden supports rapidly deteriorate through climatic action, are destroyed by prairie fires, or stolen in treeless regions.

The several telegraph divisions have been in charge of the signal officers of the military departments, viz: Capt. Richard E. Thompson, Signal Corps, Department of Dakota; Capt. William A Glassford, Signal Corps, Department of the Colorado; First Lieut. Frank Greene, Signal Corps, Department of California, and First Lieut. Samuel Reber, Signal Corps, Department of Texas.

In the post commander is vested, under the general supervision of the Signal Officer of the Department, the administration of the following short military lines connecting posts with the commercial systems, on which lines no tolls for the transmission of messages are collected: Fort Clark to Spofford Junction, Tex.; Fort Reno to El Reno, Okla.; Fort Sill, Okla., to Rush Springs, Ind. T.; Fort Bayard to Silver City, N. Mex.; Fort Custer to Custer Railroad station, Montana; Fort Niobrara to Valentine, Nebr.; Fort Wingate to Wingate Station, N. Mex.; Fort Huachuca to Huachuca Siding, Ariz.; Fort Bliss to El Paso, Tex., and Fort Washakie to Lander, Wyo.

Owing to the abandonment of the military posts of Fort Stanton, N. Mex., and Fort Hancock, Tex., the military lines connecting them

with the commercial lines were dismantled and the material recovered used elsewhere in repairs, constructions, etc. A branch line some 45 to 50 miles in length has been reconstructed from lines thus dismantled between Cedar Springs (a point 20 miles north of Fort Grant, Ariz., on the existing Holbrook-Willcox military telegraph line) and Mammoth, Ariz. The line was difficult of construction, owing to the roughness of the country, mountains and rocky canyons predominating.

A military telegraph line 50 miles in length was projected from Bisbee, Ariz., to San Bernardino, Ariz., to aid in military operations against hostile Indians in that district. While the erection of the line has been approved by the Secretary of War, it has not been built, as it is believed that any emergency which might require its use in field operations could be more promptly met through a line of heliograph stations.

While the permanent telegraph lines under the control of the Chief Signal Officer of the Army were originally constructed purely for military purposes, yet they now largely subserve commercial interests. The extreme low tariff charge for messages, averaging about 15 cents for 10 words, necessarily limits the revenue, nevertheless the cash receipts on account of Government tolls collected during the year amounted to over 12 per cent of the appropriations for the operations of the Signal Corps. The sum of $2,245.88 was covered into the United States Treasury, an increase of about 20 per cent over the receipts for 1894–95. The commercial business has also largely increased since 1894, despite a reduction of 9 per cent in mileage. The number of messages transmitted over the Government wires, consisting of Government, State, and other business, aggregates 57,949. These figures only indicate the business transacted on lines handling paid commercial messages. The number of messages affords but a slight idea of the amount of business transacted. A message may only contain one or two words, or may contain several hundred. It is evident, however, that the tariff value of all messages handled, including free Government business on the regular as well as noncommercial lines, aggregated in the course of the year $15,000 at the lowest estimate.

Speedy and direct communication from the War Department and department headquarters to military posts in cases of emergency requires that all important posts should be connected with the commercial system either by short lines, or by loop, either telephonically or telegraphically. Where such means of communication do not exist they should be speedily constructed for emergencies, especially between Denver and Fort Logan, Colo.; Fort Warren and Boston, Mass.; Alcatraz Island and San Francisco, Cal.; Fort Slocum and New York City.

The importance of military lines is very great, whether viewed from a military or local standpoint. They increase the efficiency and subserve the economical interests of the Government and are of inestimable value to commercial interests. Thus the Willcox-Holbrook line is almost indispensable to the commercial interests of central Arizona, affording the only telegraphic outlet for the extensive Globe mining district and the less important towns in that region. The same may be said of the Fort Brown-Fort McIntosh line on the Rio Grande, it being the only means for immediate communication with the outside world for a distance of 200 miles along the Mexican frontier. As a means of speedy intercommunication they enable commanding generals of departments to keep themselves promptly informed of the conditions and prospective disturbances on the great Indian reservations and along the Mexican frontier. They are thus indispensable for economical and

efficient military operations in connection with Indian outbreaks and border troubles. The military telegraphic lines connecting Fort Du Chesne, Utah, and the San Carlos Indian reservations with the commercial systems are absolutely necessary for the proper control of the semi-hostile Indians of these agencies. The deterrent effect of these lines upon the Indians, as regards their committing acts of crime and violence, has a value which can not be overestimated, involving as it does human life and the safety of the settlers of adjacent regions. The Indians now realize that through the medium of telegraphic information outbreaks and violence are sure to be followed by speedy action of the military authorities.

Interruption to telegraph communication has been so infrequent during the year as to be practically nil. The most frequent cause of interruption has been maliciousness, through a tendency of lawless individuals to pull down poles, cut wires, or shoot off insulators. The speedy resumption of communication after such occurrence has been due, to a great extent, to the adoption of the bicycle as a means of transportation for repairmen in place of the more expensive horse and wagon. The bicycle affords the more rapid as well as more economical method of travel. Frequently breaks on a line have been repaired by the use of the bicycle in less time than would have been consumed in obtaining a horse and vehicle. At some stations in a single year the original value of the bicycle has been saved to the Government. Different types of bicycles from time to time have been selected for experimental test, with a view to the fact that they must carry heavy loads over the roughest ground at a moderate rate of speed. It is evident that no single bicycle will best fulfill all the requirements of a military wheel, imposed by differing climatic conditions and by roads varying from almost pure sand to the roughest rock. Experiments thus far indicate that a bicycle weighing from 25 to 30 pounds, with pneumatic tires, will do the best work.

The principal military lines are now equipped for about every 10 miles with testing boxes. On the Rio Grande, owing to the fact that the inhabitants were constantly tampering with the old style box, it was found necessary to substitute cast-iron, bullet-proof boxes, which has in a measure remedied this trouble.

In connection with the line receipts it is a source of great gratification for the Chief Signal Officer to state that in the collection, transmission, and accounting of these funds not a cent has been lost. It should be borne in mind that these moneys come into the hands of the sergeants in small amounts; at isolated stations the sum necessarily aggregates a considerable amount before the money can be transmitted to the officer in charge. The honesty and fidelity of the sergeants who have been charged with these onerous and trying responsibilities testify to the high moral standing of the enlisted men of the Signal Corps. It may be added that no efforts have been spared on the part of the Chief Signal Officer to recruit this corps from such noncommissioned officers of the line of the Army as by their civil-service examination, surgeons' certificates of physical fitness, and testimonials of moral character from their immediate commanding officers are found best qualified for the duty.

Stations on the military lines where paid commercial business is transacted are, as a rule, in charge of sergeants of the Signal Corps. The great demand for signal sergeants, however, and the limited number available, makes it necessary to employ civilian operators at a number of points, as is indicated in the table accompanying this report.

FLYING TELEGRAPH LINES.

As electrical communications play in modern warfare a part that emphasizes the necessity of perfecting them to the highest degree of efficiency, special attention is given by the Signal Corps to the suitable equipment of its flying telegraph trains in all phases, from the connection of Army Headquarters with the permanent lines of the country to the provision for temporary telegraphic or telephonic intercommunication between separate military commands, whether in camp or on the skirmish line.

The system of field or flying telegraphy, initiated by the United States during the war for the Union, has kept pace in its development with the astonishing advances of electrical science. Other nations have gradually adopted American methods. The Japanese army carried its flying telegraph line into Seoul the day after its capture. The late Italian campaign at Massowa, the British Ashanti expedition, and the present advance on Dongola alike exemplify the indispensability of such military lines. In the last case cablegrams intimate that the flying telegraph line stopped at the crossing of the Nile for lack of cable, which, as shown elsewhere, is considered an essential part of the flying train of the American Army.

Efforts have been continued with a view of obtaining in each flying train of the Signal Corps maxima of efficiency and of line length with minima of transportation and labor. Among pending experiments are those pertaining to insulators, wire, batteries, and naked wire telephony. The field telephone kit wherewith a moving line can be kept in communication with its commander has been developed to a very satisfactory degree of efficiency. To obviate interruptions of telegraphic communication which might otherwise result with flying trains light telegraph cable forms part of the line material of each train for use in rivers or under conditions which render ordinary aerial methods inadvisable. Continued experiments in field telephony and telegraphy have been continued by Captain Allen and Lieutenants Maxfield, Greene, and Reber of this Corps, who have been separately authorized to remodel for use in their respective military departments a flying telegraph train. Lieutenant Maxfield has had constructed under his supervision a wire wagon, a battery wagon, and a lance truck. Lieutenant Greene has had remodeled his lance truck and constructed new wire and battery wagons. In connection with this he has given much consideration to the construction of a field reel for No. 14 (or larger) wire, which it is thought will be superior to the reel heretofore used. After the correction of defects developed in trial of these trains, they will be available as models for the future.

The attachment for reeling out and recovering automatically by bicycle wire and outpost cable, as mentioned in my last annual report, works well; it is in process of improvement under the supervision of Lieutenant Reber.

The most notable advance is in the development of the combined telegraph and telephone apparatus devised by Capt. James Allen, Signal Corps. These instruments are distinctly superior to any previously constructed and admirably answer all requirements. An operator may now easily carry in his hand a combination telegraph and telephone office, and while one soldier is engaged in telegraphing a message in Morse character, another may, over the same wire, talk telephonically with another station, the distant receiving operators hearing only their

own messages. The whole outfit weighs but 16 pounds, including battery enough to work over any length of field line that the Corps would probably be called upon to operate. The instrument has been rigidly tested up to a distance of 625 miles in experiments, and is a pronounced success in its various capacities as a "buzz," Morse, telephonic, and phonoplex instrument. The importance of this means of communication is not confined to the field work of the Signal Corps, but in its many applications may well become world-wide. Its practical value on cables entirely disabled has been demonstrated on the military cable between Angel Island and Tiburon, Cal. The Signal Officer of the Department of California, Lieut. Frank Greene, Signal Corps, reported a complete interruption of communication by the grounding of each of the three conductors of the cable. This "grounding" was so complete that a telegraph instrument with battery was worked between any two conductors of either of land ends, a condition rarely if ever found except where a complete severance of the cable exists. Under these conditions, when communication by any other method was impracticable, an Allen set was connected to each end of the cable, and with but eight cells of Le Clanche battery intercommunication was effected. Under recent date, Lieutenant Greene reports that with this system the instruments have worked uninterruptedly over the disabled cable, and that their efficiency has been fully determined.

POST TELEGRAPH AND TELEPHONE LINES.

Every post in the Army desirous of utilizing through its garrison electrical communication has been supplied with telegraph instruments and materials for practice lines. Beyond the primary purpose of stimulating an active interest in military signaling these lines have inured to the benefit of many men in the line of the Army, who have thus acquired valuable telegraphic experience.

Every military post asking therefor has been furnished with telephones and wire for establishing electrical intercommunication on target ranges, thus facilitating practice and securing the safety of markers. In intervals of target practice, the military administration of many posts have been greatly facilitated by the use of Signal Corps telephones. The most important artillery ranges are equipped with the sling psychrometer, an automatic anemometric register, and either a compensated aneroid or a standard mercurial barometer.

At Fort Leavenworth, Kans., has been erected a telephonic exchange on conditions approximating those of actual field service. The entire plant is so arranged that it can be removed from the post at any time, and can be put in operation in the field. The telephonic plant uses the telephones of the Signal Corps, the magneto form, which is not as satisfactory as the carbon transmitters, yet the exchange will materially facilitate administration and familiarize student officers with modern methods of telephonic and electrical intercommunication.

MILITARY SIGNALING.

The Army Regulations require that constant instruction be maintained until at least one officer and four enlisted men of each company are proficient in the exchange of both day and night signals. The reports of the past year emphasize the fact that facilities and incentives necessary for the development of skilled signalists in the line of the Army are wanting, and, in connection with the adoption of the

joint code for the Army and Navy, it is deemed of vital importance that there should be a radical departure from methods now in vogue. The present system has been in operation since 1885, and has received the unremitting attention of the Chief Signal Officer and his assistants to make it a success. Moreover, experience has demonstrated that in extended field operations recourse is had to the Signal Corps. In 1886 the Department of the Colorado was not able to furnish competent signal men from the line, and consequently the heliograph stations, which proved of vital importance in the Geronimo campaign, were managed entirely by Signal Corps sergeants; and as there were no sergeants at department headquarters it was necessary to draw them from Washington. In the Wounded Knee campaign in 1890, it was necessary to employ the Signal Corps detachment from Fort Riley, Kans., and in this connection Lieutenant Maxfield, Signal Corps, reported that it was impossible to recruit his detachment by details from the line of instructed men. Similar conditions obtained in Chicago in 1894, both men and officers properly objecting to detached service during active campaigning. In 1893, the commanding general of the Department of Texas, finding it impossible to maintain such intercommunications as would insure efficient military operations along the disturbed Mexican border, urgently asked by telegraph the detail of a signal detachment, which promptly established and maintained an efficient system of communication. Unquestionably a fair degree of efficiency in the simplest methods of the Signal Corps is obtained in the line of the Army by a few zealous officers and men, but such efficiency is obtained by drills and labor foreign and additional to their ordinary duties—an evidence not needed to prove the devotion to duty of the American Army.

The Chief Signal Officer need not recite the story of the failure of present methods, which is written in his successive reports. Under existing orders a minimum force of 380 officers and 1,520 enlisted men of the line of the Army are required to become proficient signalists. Year after year they have been harassed by the requirements of these regulations, which impose on them an extra duty, as it does not exempt them from regular drills and other duties. Twelve years of desultory effort has resulted in no benefit to the Army, as is evidenced by the report of Capt. W. A. Glassford, Signal Corps, Signal Officer, Department of the Colorado, who states that in one of the largest garrisons in that department in May, 1896, there were neither officers nor enlisted men competent to operate the heliograph, the signal appliance generally used in that department. A single example of the workings of the present system, under officers unusually painstaking and conscientious, illustrates the inutility of further pursuing this means of developing skilled signalists. At Fort Meade, S. Dak., the entire garrison, commanded by Col. C. H. Carlton, has been practicing an hour a day for one month under the personal supervision of Maj. A. B. Wells, Eighth Cavalry, who in his final report says:

> I have never seen more interest taken in signaling than this season, yet I am of the opinion that it is doubtful if that degree of proficiency can be attained as is required by existing orders, G. O. No. 4, c. s.

The standard of proficiency, it may be remarked, has been fixed at the lowest point. These reports emphasize the experiences of our late war, when detachments from the line proved to be an ineffectual basis for a specialized service, and ultimately necessitated the organization of the Signal Corps, which remained a part of the Regular Army until 1866.

The reorganization of 1890 gave the Signal Corps sufficient officers

for a peace establishment, although the arrangement failed to insure promotion within a reasonable time. Legislation was had to remedy this defect, but unfortunately it is inoperative until the retirement of the Chief Signal Officer, which in the natural course of events will not occur until 1908. It is recommended that the existing law be amended so that the lieutenant-colonel can be appointed at once. This will give promotion to the senior captain of the Corps, who has served for over thirty years as a commissioned officer. As his place would not be filled, the increased annual pay would only amount to $1,300.

The present force of enlisted men, 10 first-class and 40 second-class sergeants, should be replaced by four companies of 50 men each. The number of first-class and second-class sergeants could be reduced and supplemented by corporals and privates.

Pending such legislation, the revocation is urgently recommended of paragraph 1544, Army Regulations, which imposes annually on 380 officers and 1,520 enlisted men of the line two months of signal practice, and that in lieu thereof there be detailed for signal duty one of the skeleton companies of infantry in each department, said company to consist of not exceeding two enlisted men in the line for each military post in the department. Such detail would relieve from extra drills the 400 officers and 2,000 enlisted men who are now annually under signal instruction, a course which it is believed will be heartily welcomed by the line of the Army, while it will greatly increase the efficiency of the service.

The adoption of a joint Army and Navy code, it may be added, renders it necessary for the line of the Army to begin instruction absolutely anew.

SIGNAL CODE.

In 1886 the joint Army and Navy signal (Myer) code was replaced at the instance of the Navy by the European Morse code. Later this was changed to the American Morse code, a system which has done so much to stimulate an interest in signaling in the Army. The Navy several years since adopted as an improved mechanical appliance the Ardois system of signaling, which permitted the use of signals of four elements at the most, and consequently the Navy was obliged to have recourse to another signal code than the American Morse, which required the display of six elements for one particular numeral. It thus finally resulted that the Army was using one signal code and the Navy another, a condition which would necessarily lead to confusion and errors in times of active cooperation between the two services. Impressed with the importance of a single code for common use in both the Army and Navy, the Chief Signal Officer of the Army recommended to the Secretary of War and the Secretary of the Navy the appointment of a joint board to consider and recommend such alterations in the signal codes and their uses as the public interests might demand.

The board, consisting of Brig. Gen. A. W. Greely, Chief Signal Officer, United States Army; Lieut. Commander Seaton Schroeder, United States Navy, and First Lieut. George L. Anderson, Fourth United States Artillery, recognizing the limitations in the Ardois system, used by the Navy, was unanimous in its recommendation that both services should return to the Myer system, modifying it only so far as was necessitated by existing limitations of the Ardois apparatus. The Myer alphabet remains unchanged, but the numerals are necessarily four elements instead of five. The recommendations of the board were approved and the Myer system goes into operation October 1, 1896, as the joint Army and Navy signal code.

FIELD OPERATIONS.

But little opportunity was afforded for signal work in the field during the year. In the Department of California First Lieut. Frank Greene, Signal Corps, was in charge of a signal detachment detailed for duty in connection with field exercises in minor operations of war. The detail earned the commendation of the commanding general of the department, and Lieutenant Greene reports that fair opportunity was afforded for signal practice with the flag, heliograph, and light field telephone and telegraph lines. Although the ranges were limited and the available men of the line were indifferently instructed, valuable experience was gained in field signaling and in the care and management of signal detachments under conditions which simulated actual campaigning. As usual, it was found that expert signalmen were always valued men in their companies, who could ill be spared, and rather than deprive their company commanders of their services, Lieutenant Greene elected in some cases to take unskilled men and briefly instruct them as well as possible.

Very commendable work with the heliograph was accomplished dur ing the year. No especially long runs were made by signal parties' although the connecting of Fort Reno and Fort Sill, Okla., with three intermediate stations is noteworthy. The longest run in this practice was 60 miles. A nine-mile range was worked by moonlight, and the signal officer at Fort Reno, Lieut. R. S. Offley, Tenth Infantry, believes signals could have been thus read with glasses at a distance of 25 to 30 miles.

Practical use of signaling was made at nearly every military post, more especially during artillery practice at Forts Adams, Alcatraz Island, Barrancas, Key West Barracks, Mason, Monroe, Preble, Presidio of San Francisco, Schuyler, St. Francis Barracks, Slocum, Spokane, Vancouver Barracks, Wadsworth, Warren, and Washington Barracks, and on practice marches by the details from Forts Assinniboine, Boise Barracks, D. A. Russell, Douglas, Keogh, Niobrara, Omaha, and Washakie, and also on rifle ranges at Forts Ethan Allen and Thomas. Fort Logan reports that practical use was made of signaling in battle exercises and field maneuvers, and San Diego Barracks held daily communication between the rifle range at Old town and the post, a distance of 4 miles. Fort Riley and Fort Leavenworth made use of it in field maneuvers, and at Fort Sherman a detachment 12 miles distant was recalled to the post by signals.

MILITARY BALLOONS.

The addition of a balloon section to the field telegraph trains for the purpose of collecting and transmitting military information brings into special importance the question of aerial navigation. Ballooning forms one of the general branches of such navigation, wherein is used, first, an apparatus lighter than air, or, second, heavier than air. The Signal Corps in equipping a balloon section for use in connection with each field telegraph train is simply amplifying the ideas of Gen. Fitz John Porter, enunciated early in the war of the rebellion. The utility and importance of balloons for obtaining military information during field operations were demonstrated by General Porter, but, with many other American ideas, such as repeating arms, etc., the military balloon proved too advanced for the time and had to await recognition and development by the military authorities of other nations. The United States, the first nation to use balloons in war, as it was the first to use the electric telegraph and signal appliances on the field of battle, has

been outstripped as these ideas have been adopted and improved by all other important military powers.

Improved methods of equipment, manipulation, and transportation have come with improved industrial and inventive methods, but to the present day there have been no experiments sufficiently satisfactory to prove the advisability of replacing the captive balloon of General Porter by free balloons, either for extended reconnoissances or as instruments of offensive warfare. The important part to be played in future wars by free dirigible balloons or by flying machines is unquestioned, and Mr. Maxim, the great experimentalist, is justified in saying:

> When the first flying machine succeeds, its first great use will be for military purposes. * * * It will at once become an engine of war not only to reconnoiter the enemy's position, as has been attempted by the so-called dirigible balloons, but also of carrying and dropping into the enemy's lines and country large bombs charged with high explosives.

As regards balloons, extensive and continued experiments have brought the use of a captive balloon to such a degree of excellence that its utility in any extended warfare is evident. The efforts to construct a dirigible balloon which can be managed so as to have its movements under satisfactory control have so far been inconclusive. There is no question that Jullien, Giffard, Tissaudier, Campbell, and other private inventors have constructed balloons which have actually been propelled in any desired direction but only at low speed and light winds.

Captain Fullerton, R. E., has pointed out that a satisfactory war balloon must carry three or four passengers, explosive shells, a machine gun or two and be able to travel about 30 miles an hour in calm weather, and that the balloon should have a lifting capacity of about 5,500 pounds, of which about 1,700 should be in passengers, instruments, explosives, and ballast. The French military dirigible balloon, known as the Challais-Meudon, was successful at low rate of speed and in calm weather only, but with a total weight of 4,400 pounds it was only able to carry 310 pounds of passengers and 470 ballast.

The experiments of such able scientists as Professor Langley in the United States, Colonel Duchemin, French engineer, and Mr. Maxim, have convinced many intelligent men of the practicability of aerial navigation by air ships heavier than air. The future success of such navigation now awaits a motor considerably lighter than those now used. The successful experiments made by Professor Langley in flights with his aeroplane during the past year, would indicate that the solution of this interesting and important problem is not far distant. Meanwhile the Chief Signal Officer has taken such action to place on an efficient footing a model captive balloon section, suitable as a part of the field train, as facilities and appropriations have permitted. This work has progressed at Fort Logan, Colo., under the supervision of Capt. W. A. Glassford, Signal Corps, who has now at that post a silk balloon of 14,000 cubic feet capacity nearly complete; a balloon wagon with cable drum, captive cables and accessories, complete; four tube wagons and accessories; one service wagon; a gas generating apparatus; a compressor for impounding gas in tubes, and 180 steel tubes in which gas is compressed to one one-hundredth or one one-hundred-and-twentieth of its volume. A balloon house, essential for economical practice, has been authorized by the War Department, and is now in process of construction, and when completed will permit of ascensions in all weathers. A special estimate of $10,000 is submitted for construction and experiments with balloons, and it is hoped it may meet the approval of the Secretary of War and of Congress.

MILITARY CABLE LINES.

The compound system of telegraph lines—land lines and submarine cables—in San Francisco Harbor has disappeared through the action of time and of accident, leaving its important fortifications unconnected electrically. The Chief Signal Officer has repeatedly called attention to the great military value of this system and to the impracticability of renewing it without special appropriation. If San Francisco is of sufficient importance to justify its defense by extensive and costly fortifications, it is equally imperative that means for electrical intercommunication should be provided, so that, when occasion requires, the entire system of defense can be controlled and directed by one master mind. Similar systems for intercommunication should be established in the harbors of New York and Boston, where, however, the commercial telegraph systems, certain to be interrupted in time of war, present much greater convenience for prompt military administration than is afforded San Francisco. Fort Warren, in Boston Harbor, and Forts Wadsworth, Hancock, Slocum, and Schuyler, in New York Harbor, have no telegraphic communication whatever. For these purposes a special estimate of $20,000 is submitted, and its approval is again urgently recommended.

SIGNAL EQUIPMENTS.

Most of the field glasses now used by this Corps are mounted in aluminum frames, and their lightness enables the observer to better use the glass free hand. If their durability and rigidity be proven, the brass frame glasses will be eventually entirely replaced.

There have been purchased for experimental use in the field a few folding binoculars in aluminum frames. These glasses have the value of little weight and small bulk. As extensive use has not been made of the glasses, and lacking report in all cases where issued for tests, further purchases are precluded until their superiority over glasses now used by this Corps has been demonstrated.

Tests of the new signal lantern are in progress, and as soon as a satisfactory model is constructed the Army will be supplied with this improved means of night signaling.

BUGLE SIGNALS.

The difficulty of oral command to troops in extended order or under conditions assimilating action has been appreciated by this Corps. A system of whistle signals has been submitted by a member of the Signal Corps, and a system of bugle signals by Col. A. S. Burt, Twenty-fifth Infantry. They are at present under consideration by the proper authority.

NATIONAL MILITIA.

At no time previously has so much interest been taken in signaling by the National Guard as during the year just closed. From nearly every State and Territory inquiries relating to the organization, equipment, and work of this Corps have been received, accompanied generally with requests for the loan or issue of signaling appliances and publications, or asking if they could not be purchased from the appropriations of the Government for the support of the militia. All possible aid has been extended in the way of information, and such publications as this office has at its disposal have been supplied. The law, unfortunately,

omits signaling appliances from the militia supplies, as has been heretofore pointed out, and I renew my recommendations that it be amended so as to permit the issue to the National Guard of signal stores and appliances under the same conditions as apply to quartermaster's and ordnance stores.

From Connecticut, New York, Ohio, and Illinois comes report of the best work during the year. These States, appreciating the value of a well-equipped, competent signal corps, have given practical aid in the instruction and development of their commands, and now have at their service really efficient corps.

PERSONNEL OF THE CORPS.

The personnel of the officers of the Signal Corps remains unchanged. Maj. H. H. C. Dunwoody, who has performed no military service with his corps since his promotion thereto, remains on detached civil duty in charge of forecast work of the Weather Bureau. At the end of the fiscal year other officers were serving as follows: Capt. Robert Craig, disbursing officer and assistant; Capts. James Allen, R. E. Thompson, W. A. Glassford, First Lieuts. J. E. Maxfield, Frank Greene, and Samuel Reber, signal officers of departments, and Capt. George P. Scriven, with the Bureau of Military Information as military attaché at Rome.

Nine sergeants were reenlisted during the year, 3 sergeants retired, and 1 died. Three vacancies were filled by the transfer from the line of meritorious noncommissioned officers carefully selected, after competitive mental and physical examination, from a long list of applicants well recommended morally.

EXAMINATION OF MONEY AND PROPERTY PAPERS.

There have been examined and passed upon 127 accounts current, with 4,639 vouchers, 423 property returns of acting signal officers, and 62 property returns of officers and sergeants of the Signal Corps, with 6,759 vouchers, making a total of 9,064 papers. At the end of the fiscal year 6 property returns were unsettled.

On the accuracy and thoroughness of this work devolves the final adjudication of the signal property accountability of officers of the Army, sergeants of the Signal Corps, and civilian employees. All money accounts, whether for funds appropriated by Congress or received as tolls for messages over military telegraph lines, have been carefully examined and any errors found therein adjusted prior to their transmission to the Auditor of the War Department. This work involves a large amount of correspondence, and only by the closest application have the money accounts and property returns received the administrative scrutiny of this Bureau within the legal limit of time.

DISBURSING DIVISION.

The report of Capt. Robert Craig as disbursing officer (Table 1) furnishes information required by law and regulations as to contracts and disbursements. Besides his duties as assistant and disbursing officer, Captain Craig has charge of the supply depot of the Signal Corps, which imposes on him much extra work. His labors have been supplemented by those of a storekeeper and assistant, who are diverted from special duties to an extent prejudicial to the public service. A money clerk is greatly needed for the disbursing officer, and there is submitted an estimate for a clerk of class 2, which it is hoped will be favorably considered by Congress.

The clerical force of this office has labored with unusual fidelity and zeal. Both of the clerks of class 1 merit increased pay, owing to the character of the work done by them, but promotion is practically impossible.

THE WAR DEPARTMENT LIBRARY.

In obedience to orders of the Secretary of War, the Chief Signal Officer has remained in supervisory charge of the War Department library during the year. An average of 48 volumes have been loaned daily for reading and consultation. In addition, there has been extensive personal research on the part of the library force for official purposes.

Exclusive of the public documents and Government publications in general and of some 400 periodicals, there have been added to the library 1,527 books and pamphlets. Of this number 1,073 were acquired by purchase, 201 by exchange, and 243 received as gifts, principally from various military and historical organizations of the country. The extension of the use of the library to officers of the Army on duty at distant army posts has continued with most gratifying results. The value of this professional privilege is exhibited by the fact that no less than 797 books were issued by registered mail during the fiscal year.

The character of the books borrowed offers undoubted evidence of the intellectual activity of the officers of the Army in properly and theoretically fitting themselves for important duties. No book has been lost in the mail and none materially damaged.

Books purchased for the library are those for professional research or for reference purposes. They cover military art and science, histories of American and foreign wars, military biographies, descriptive and geographical works, especially those pertaining to America. Special attention is given to countries engaged in warfare or where such contests are prospective, in order that officers may intelligently follow current military operations and keep pace with the march of events.

Particular efforts have been made to obtain books and pamphlets relating to American wars, especially regarding the war for the Union. A large number of pamphlets and books have been donated to the library in answer to widely distributed circular letters. Gradually the breaks and deficiencies in important military serial publications are being filled by purchase or exchange, and the library is attaining its proper professional standing among the great military libraries of the world.

The restrictive policy of the law regarding public documents has enhanced the value of the complete report of the Secretary of War, which was formerly printed in large numbers and distributed free to every applicant. Realizing the importance of this report, such copies as remain after the wants of the Army are supplied have been utilized in the way of exchange as authorized by the law of January 12, 1895. As a result this library is now receiving regularly by exchange no less than 35 military periodicals from European countries, with the prospect that such list will be doubled. The number of full reports printed has meanwhile been gradually reduced from 1,000 to 450.

The fiction of the library has received no additions for the past six years. Frequently repaired or rebound, and continually in use, the greater number of these volumes are in unfit condition for circulation and are gradually disappearing by condemnation. The only fiction that properly belongs to this library relates entirely to a soldier's profession, such as the works of Lever, Payne, and King.

The actual value of a professional library depends largely on accessi-

bility to, and knowledge of, its contents. In accordance with law the use of the library has been extended by the Secretary of War to the Columbian University—under restrictions that protect the library. The number of historical students visiting the library for study and research is steadily increasing; to such the amplest facilities for consulting works is freely accorded.

In order to render the library more useful to the officers of the Army, for whom the library was originally formed, special subject catalogues have been prepared and issued. The most important two contain lists of publications regarding Mexico, and of all professional periodical literature in the library. Two others are in process of printing or preparation, one giving a complete list of biographical and other strictly personal literature, in which the library is especially rich. The other is a list of all publications bearing on the military services and history of all State organizations. Under each State is arranged all regimental histories, military biographies, State papers, records, and reports which relate to the part played by that particular State, whether Federal or Confederate, in the war for the Union.

The library force should be placed on a permanent and satisfactory footing. The number of the clerks has been reduced from five to three, while the work has been increased by some 40 per cent. The salary of the librarian should be restored to its former rate, $1,800, and the assistant should receive $1,400. The clerk who is detailed from another bureau should be appropriated for as part of the library force.

The ability, conduct, and application of the present clerical force are of the highest character, and the removal of anyone from the library where special knowledge and skill are indispensable to the proper performance of their duties would be detrimental to the public service.

It may be added that only the unremitting application of an intelligent, capable force can properly attend to the current library work and the distribution of the public documents of the War Department.

WAR PHOTOGRAPHS.

Under instructions from the Secretary of War, all photographs and negatives were transferred to the library. By far the most important of these collections is that known as the Brady war photographs. This collection has been as thoroughly examined as has been possible with the limited library force. The negatives and proofs of the collection showed every sign of neglect and improper treatment. From the rough numerical list, the only data furnished the library, it would appear that there were 6,323 negatives in the original collection. If such is the case, 709 are missing. Of these, 627 are entirely missing or have been so broken as to be practically destroyed. About one-fourth of the proofs were wrongly numbered, and many photographs and negatives were unidentified. Negatives that may be considered priceless had been broken or otherwise injured.

All unbroken negatives have been properly wrapped, numbered, and filed, and whenever needed can now be produced without delay. The process of identifying negatives and photographs is proceeding as rapidly as possible. When this is completed a catalogue showing the number of each negative, its date, the place where made, and the name of the person and the war scene therein portrayed will be prepared.

These negatives are no longer loaned to private parties, owing to the certainty, based on past experience, that this collection would shortly be made nearly valueless by destruction or injury. In exceptional cases, where such action would be in the public interests or as a proper

concession to surviving relatives, permission is accorded for reproductions of selected photographs under rigid restrictions insuring the safety of the negatives. This collection cost the United States $25,000, and as it portrays certain physical aspects of the war for the Union, as well as the features of most of the prominent actors connected therewith, it seems neither advisable nor patriotic that these evidences of the great civil conflict should remain inaccessible to the general public. It is recommended, therefore, that Congress be asked to authorize the reproduction of the most valuable and important war photographs of this collection, not exceeding 2,000 in number, which would form supplementary volumes of the Official Records of the War of the Rebellion. Certain artistic processes lend themselves to suitable reproductions, which would thus preserve for all time, at a very moderate cost, these graphic representations of the greatest of American, if not of all, wars.

DISTRIBUTION OF PUBLIC DOCUMENTS.

Under the act of Congress approved January 12, 1895, the Chief Signal Officer of the Army was designated by the Secretary of War to supervise the distribution of such documents. This law radically changed the system of distribution and arranges for the disposal of surplus public documents under certain restrictions. It has been impossible to fully carry out all the provisions of the law, but they are being conformed to as rapidly as possible as the decisions and actions of the superintendent of documents will permit. There are at least 15,000 documents ready to be transferred as the law directs, which, through lack of room and force on the part of the superintendent of documents, remain yet in the storeroom of the library, seriously interfering with the arrangement and disposal of the unsorted documents, of which probably as many more yet remain untouched. The distribution of new documents is proceeding regularly and systematically, this additional work being performed without any increase of library force. About 80,000 publications have been handled in the way of receipt and transfer during the year.

A. W. GREELY,
Brigadier-General, Chief Signal Officer, U. S. Army.

Hon. DANIEL S. LAMONT,
Secretary of War.

TABLE 1.

The condition of the appropriations for the fiscal year ended June 30, 1896, with the expenditures thereunder, balances and probable demands on such balances, report of which is required to be rendered by the act of Congress approved May 1, 1820, is as follows:

Signal Service of the Army, 1896:	
Appropriated	$18,000.00
Expended	13,458.11
Balance	4,541.89
Probable demands	4,539.19
Military telegraph line, Fort Ringgold, Tex., to Fort McIntosh, Tex. (permanent specific appropriation):	
Appropriated	17,000.00
Expended	15,565.63
Balance	1,434.37

TABLE 2.

United States military telegraph lines, location, length, etc.

Sections and stations.	Length.	Operators.
Department of the Colorado.		
Holbrook-Willcox section:	*Miles.*	
Holbrook, Ariz	0	Sergeant, Signal Corps.
Snowflake, Ariz	32	Civilian.
Cooleys Ranch, Ariz	68	Sergeant, Signal Corps.
Fort Apache, Ariz	92	Do.
San Carlos, Ariz	163	Do.
Geronimo, Ariz	190	Civilian (railroad).
Fort Thomas, Ariz	199	Do.
Cedar Springs, Ariz	228	Sergeant, Signal Corps.
Fort Grant, Ariz	248	Do.
Willcox, Ariz	274	Do.
Cedar Springs-Mammoth branch:		
Cedar Springs, Ariz	0	Do.
Dunlaps Ranch, Ariz	19	Civilian.
Mammoth, Ariz	42	Sergeant, Signal Corps.
Fort Du Chesne-Price section:		
Fort Du Chesne, Utah	0	Do.
The Wells, Utah (telephone)	18	Keeper stage station.
Brock, Utah	34	Sergeant, Signal Corps.
Lees Ranch, Utah (telephone)	47	Keeper stage station.
Price, Utah	87	Sergeant, Signal Corps.
Fort Bayard-Silver City line:		
Fort Bayard, N. Mex	0	Detailed man.
Silver City, N. Mex	8	Sergeant, Signal Corps.
Fort Wingate line:		
Fort Wingate, N. Mex	0	Detailed man.
Wingate Station, N. Mex	3	Civilian (railroad).
Fort Huachuca line:		
Fort Huachuca, Ariz	0	Detailed man.
Huachuca Siding, Ariz	7	Civilian (railroad).
Department of Dakota.		
Fort Yates-Bismarck section:		
Bismarck, N. Dak	0	Civilian.
Cannon Ball, N. Dak	41	Do.
Fort Yates, N. Dak	65	Sergeant, Signal Corps.
Department of the Missouri.		
Fort Reno-El Reno line:		
Fort Reno, Okla	0	Sergeant, Signal Corps.
El Reno, Okla	5½	Civilian.
Fort Sill-Rush Springs line:		
Fort Sill, Okla	0	Sergeant, Signal Corps.
Rush Springs, Ind. T	28	Civilian.
Department of Texas.		
Fort Brown-Fort McIntosh section:		
Fort Brown, Tex	0	Sergeant, Signal Corps.
Santa Maria, Tex	24	Civilian.
Edinburg, Tex	51	Do.
Fort Ringgold, Tex	100	Sergeant, Signal Corps.
Roma, Tex	.....	Civilian.
Carrizo, Tex	.....	Do.
Laredo (Fort McIntosh)	200	Sergeant, Signal Corps.
Fort Clark-Spofford Junction line:		
Fort Clark, Tex	0	Detailed man.
Spofford Junction, Tex	10	Civilian.
Fort Bliss-El Paso line:		
El Paso, Tex	0	Do.
Fort Bliss, Tex	6	Sergeant, Signal Corps.
Department of the Platte.		
Fort Niobrara-Valentine line:		
Valentine, Nebr	0	Civilian.
Fort Niobrara, Nebr	4½	Sergeant, Signal Corps.
Fort Washakie-Lander line:		
Lander, Wyo	0	Civilian.
Fort Washakie, Wyo	16	Detailed man.

REPORT OF THE CHIEF OF THE RECORD AND PENSION OFFICE.

REPORT

OF THE

CHIEF OF THE RECORD AND PENSION OFFICE.

RECORD AND PENSION OFFICE, WAR DEPARTMENT,
October 1, 1896.

SIR: In the last annual report of this office attention was invited to the fact that the current business of the office is becoming more complicated and difficult as the period of service of the officers and enlisted men of the volunteer forces becomes more remote. This feature of the work has been especially marked during the past fiscal year. While the number of cases received has been less than the number received during the previous year, the percentage of those requiring administrative action has been larger than ever before. This change in the character of the work, as pointed out in a former report, is probably due to the fact that the greater part of the claims arising out of the service of volunteers in the war of the rebellion and prior wars, in which no action is required of the War Department beyond the furnishing of a statement of military service or medical history, has been settled and finally disposed of, while in a large proportion of the claims now pending in, or being presented to, other Departments technical questions are involved, requiring special administrative action on the part of this office.

The number of miscellaneous cases received during the last fiscal year is considerably in excess of the number received during the previous year, as is also the number of applications for removal of the charge of desertion under the provisions of the act of Congress approved March 2, 1889, and the acts amendatory thereof, while the number of remuster cases was largely diminished by reason of the expiration of the law under which they have heretofore been considered.

Among the miscellaneous cases, which are of great variety and enter largely into the general correspondence of the office, may be mentioned the large number of inquiries received from descendants of Revolutionary soldiers and from representatives of the various patriotic societies relative to personal service in the Revolutionary armies. The answering of these inquiries forms a prominent and interesting feature of the current work of the office, and it is expected that this class of work will soon be materially increased by the receipt of similar requests for information from the records of the war of 1812, the reproduction of which by the index-record card system is approaching completion.

Notwithstanding the increasing difficulties caused by the intricate character of the work, the current business, as heretofore since the organization of the Record and Pension Office, has been kept closely up to date, more than 94 per cent of the cases received, averaging nearly 600 per day, having been disposed of within twenty-four hours from the time of their receipt, the adjudication of those remaining longer in the office being delayed only so long as was necessary to give

them the consideration their importance required, generally not exceeding two or three days; and at the close of business hours on the last day of the fiscal year not one case remained to be disposed of.

The number of cases received and disposed of during the year is, by classification, as follows:

From the Pension Office	122,975
From the Auditor for the War Department	23,014
Remuster cases	1,124
Desertion cases	3,314
All other cases, miscellaneous	24,575
Total	175,002
On hand June 30, 1896	None.

REMOVAL OF CHARGES OF DESERTION.

The consideration of applications for removal of charges of desertion has formed an important feature of the work of the War Department since the close of the late war, especially with regard to such charges standing against the records of the large number of volunteer soldiers who left the service without a formal discharge therefrom, or who were absent from their commands without proper authority at some time during the period of their military service. Many of these men, though guilty of a technical violation of military law, were, presumably, not willful or intentional deserters, and with a view to their relief several laws have been enacted, culminating in the act of March 2, 1889, which, as modified and extended by subsequent legislation, is now the only law under which such cases can be considered. The original act contained the provision that applications for relief should be made to and filed with the Secretary of War within the period of three years from and after July 1, 1889, or be forever barred from consideration, but by the act of July 27, 1892, the time for filing applications was extended for the period of two years, and by an act approved March 2, 1895, the limitation of time within which applications might be "received and acted upon" under the provisions of the original law was removed, thus leaving without any limitation whatever the time within which applications may be filed for the relief provided by the law.

On July 8, 1889, when the Record and Pension Division (now the Record and Pension Office) of the War Department was organized, there were 1,342 applications awaiting consideration, and since that date there have been received nearly 50,000 original applications, or renewals of applications previously filed and acted upon, besides the very much larger number of cases encountered in the preparation of military histories for the Commissioner of Pensions and the accounting officers of the Treasury, in which the charge of desertion has been incidentally discovered and considered under the law. In the latter class of cases, where clearly within the provisions of the act of Congress, the charge of desertion has been removed, without the formality of an application therefor by the person or persons in interest.

During the last fiscal year 3,314 original or renewed applications for relief were received and considered, besides 7,070 of the class of cases before referred to, in which the charge of desertion was incidentally discovered in the preparation of reports to bureau officers of other Departments, making a total of 10,384 cases considered under the law during the fiscal year ended June 30, 1896.

REMUSTER.

The cases referred to under the title of "remuster" in the foregoing tabular statement are those falling under the act of Congress approved

June 3, 1884, and the acts amendatory and in extension thereof, providing for "the muster and pay of certain officers and enlisted men of the volunteer forces."

This law, which was in existence for about ten years, between 1884 and 1895, and under which many thousands of claims were passed upon by the War Department, appears to have been enacted upon the principle that persons who, without the formality of muster into the United States service, actually performed the duties of commissioned officers, under commissions regularly issued to them, or who, being so commissioned and not mustered, were prevented from performing the duties of the grades named in their commissions by reason of being held as prisoners in the hands of the enemy, or by reason of disabilities incurred in service and in the line of duty, were entitled to be recognized and paid as officers in the military service of the United States for the periods during which they performed duty as such officers, or were held as prisoners, or were disabled, provided there were vacancies for them at the time, and provided further, that after June 20, 1863, their commands were not below the minimum number required by then existing laws and regulations.

This law, under which more than 11,000 claims were filed during the fiscal year ended June 30, 1895, expired by limitation on June 3 of that year, and there is now no law in existence under which persons who were commissioned as officers of volunteer regiments, companies, troops or batteries can be paid or recognized as having been in the military service of the United States, under their commissions, for any period prior to the dates from which they were originally recognized during the war by actual muster into service, unless their claims were filed on or before June 3, 1895. As mentioned in the tabular statement before referred to, forming a part of this report, 1,124 claims were received during the last fiscal year, after the law had expired, but many of these were renewals of claims that had been filed during the life of the law, and were therefore legally entitled to be considered.

There is doubtless a considerable number of persons who, from ignorance of the existence of the old law, did not apply for the relief provided by it prior to its expiration. These persons are probably equally as deserving as the far greater number of those to whom the law has already been applied. How large their number may be it is impossible to determine with any degree of accuracy, although it must be small as compared with the much larger number whose claims have already been adjudicated.

Several bills were introduced during the last session of Congress providing for a limited extension of the time for filing claims under the old law, and one, a substitute drafted by this office and submitted by the Secretary of War to the Senate Military Committee, embodying the provisions of the old law in an amended form but omitting the clause limiting the time for filing claims, was passed by the Senate near the close of the session. A bill in the same form, also from a draft furnished by this office and submitted by the Secretary of War, was reported by the Military Committee of the House of Representatives, but, probably by reason of the early close of the session, neither it nor the Senate bill appears to have received the consideration of the House.

It is not conceived that there can be any serious objection to an extension, in any proper form, of the time for filing claims for what Congress, by legal enactment, has declared to be justly due to the class of persons for whose benefit the original law was designed; but any temporary extension of the time would probably be too limited for the accomplishment of the purpose for which the extension is intended. The question

of a renewed extension would be almost certain to arise, as it has repeatedly arisen before, and it is a question worthy of consideration at least whether or not the time limitation should not be omitted from any future legislation on the subject. Even if the law should be revived without any limitation as to its duration, the number of claims that could be allowed under its provisions must be small as compared with the great number of those that have already been allowed and finally disposed of since its enactment in 1884.

INDEX-RECORD CARD SYSTEM.

The work of reproducing the individual records of officers and enlisted men by the index-record card system adopted for that purpose has been carried on as rapidly as the current business of the office would permit. Progress has been made in carding the regimental returns of the war of the rebellion, and the work of reproducing the records of the war of 1812, which had been begun at the date of the last annual report, has been continued, with the result that the records of the States of New Hampshire, Connecticut, New York, Delaware, Maryland, Georgia, and Ohio have been "properly indexed and arranged for use" as provided by the acts of Congress directing their transfer to this Department.

It was hoped that the work of reproducing the records of the war of 1812 would have been completed by the end of the last fiscal year, but unexpected obstacles have been encountered which have operated to delay the accomplishment of the work. One cause of delay was the unexpected receipt from another Department of a large mass of records relating to various wars from the Revolutionary period down to a comparatively recent date. It was found necessary to carefully assort these records and to extract therefrom those relating to the war of 1812, in order that they might be included with other records of that war to be reproduced by the index-record card system. It was also found necessary to separate from this mass of records those pertaining to the Revolutionary war, and to incorporate them into the general system of index records.

Another cause of delay was the receipt of a large quantity of records of the Revolutionary war from the States of New Hampshire and Vermont, which were loaned to this Department by the authorities of those States for the purpose of supplementing the records of the same States previously received from other sources. In order that these records might be returned to the State authorities within a reasonable time, and to complete, as far as possible, a class of records daily consulted in the correspondence of the office, it became necessary to suspend work on the records of the war of 1812 until these additional records of a prior war could be reproduced by the index-record card system.

But the principal cause of delay in the work of reproducing the records of the war of 1812 has been the difficulty experienced in determining the correct designations of regimental organizations, in separating the records of different regiments from the same State bearing the same numerical designations, and in locating by regimental organizations the numerous companies whose rolls, by reason of the imperfect designations given, afford no direct clew to the regiments to which they were attached. An exhaustive search of miscellaneous papers and a tedious comparison of different company rolls have frequently been a necessary preliminary to the work of transcribing the records, in order that the correct designations might be shown in the completed work, and that the original records might be filed according to the proper company and regimental organizations to which they pertain.

It is anticipated that the reproduction of the records of the war of 1812 will be completed not later than the 1st of February next, if no further unexpected difficulties or interruptions are encountered.

With regard to the general subject of the reproduction of the records of the various wars by the index-record card system, it may be stated that the great mass of the records of the war of the rebellion, for whose preservation the work was originally undertaken, has been carded and placed beyond the danger of destruction, the records exclusively relating to the personnel of the Revolutionary armies have been transcribed, the reproduction of the records of the Mexican and most of the Indian wars has been completed, and the work on the records of the war of 1812 is well in hand, with the prospect of its completion at an early date.

There remains, however, much to be done to make the card-index records complete. Of the rebellion records there is a large mass of miscellaneous papers, mostly pertaining to the office of the late Provost-Marshal-General of the Army, to be arranged, classified, and compared with other records, with a view to the reproduction of such data as are not already embraced in the card-record files. Of the Revolutionary war there are also many miscellaneous papers yet to be examined for the purpose of extracting therefrom and reproducing in the index-record card form such evidence of individual military service as they contain, thus adding as much as possible, from present available sources of information, to the now incomplete records of service in that war. There are also many records of Indian wars, discovered in the files of the Treasury Department and transferred to this Department since the work on that class of records was supposed to have been completed, which are yet to be carded.

As regards the records of the Revolutionary war, the rolls of which are not complete in any one collection, it is hoped and confidently expected that the files of this Department will be largely augmented by the loan of such records as are now in the custody of the authorities of the several States and of historical societies, following the example of the officials of the States of New Hampshire and Vermont. There will then be one collection of records, and that where it should be, in the custody of the General Government, that will be as nearly complete as any such collection can be made after the long interval that has elapsed since the service was rendered. The original records loaned will of course be returned to their proper custodians after having been reproduced by the index-record card system.

One important result of the work of carding the military records is the discovery and collection in one place, where they can be readily referred to, of records relating to all wars in which the country has been engaged, containing evidence of military service which would otherwise have been inaccessible and practically lost. This result alone is one of great value, especially in connection with the adjudication of claims under the recent laws giving a pensionable status to the survivors of certain Indian wars and their descendants, the Department, by the aid of the newly discovered records, being enabled to verify or refute allegations of service the truthfulness of which could not otherwise be officially determined. The full value of the work already accomplished and in contemplation can not be overestimated.

The index-record card work for the last fiscal year included the preparation of 1,381,203 military cards and 6,159 medical cards, which, added to the number previously reported, make a total of 38,248,326 of the former and 6,959,444 of the latter class, aggregating 45,207,770 index-record cards prepared up to June 30, 1896.

TRANSCRIPTS OF MILITARY RECORDS.

Attention was invited in the last annual report to the provision of the legislative, executive, and judicial appropriation bill approved March 2, 1895, requiring that "the Secretary of War shall, upon the application of the governor of any State, furnish to such governor a transcript of the military history of any regiment or company of his State, under such regulations as the Secretary of War may prescribe, at the expense of such State." Pursuant to this enactment, regulations in execution thereof were adopted by the Secretary of War in which it is prescribed that applications for transcripts of the records shall be made by the governors of the States in interest and shall designate specifically the records of which transcripts are desired, and that upon the receipt of such an application from the governor of any State he shall be furnished with an estimate of the cost of making the transcripts, the funds to cover the cost to be deposited with the disbursing clerk of the War Department, to be by him covered into the Treasury upon the completion of the work. It is further provided in these regulations that all transcription of records under the law shall be done during office hours and by the regularly authorized employees of the War Department, under the direction of the Chief of the Record and Pension Office.

Comparatively few applications have been made under the provisions of law referred to, and in but few cases have the required deposits been made after the estimated cost of the work has been made known. In the few instances in which deposits have been made and the work ordered, the regulations adopted for carrying the law into effect have proved to be well adapted to the purpose for which they were intended. The general effect of the law seems to be to deter the State authorities from pressing their claims upon the War Department for copies of the records of organizations from their respective States, the cost of the labor and material required in the execution of the work being evidently an obstacle in the way of its accomplishment. In one instance, in which the estimated cost was less than $150, a bill was introduced in Congress to defray the expense. This bill, however, did not become a law, although it was passed by the House of Representatives. Such special legislation would of course be in direct conflict with the spirit of the general law, and would be a discrimination in favor of one State as against all other States having similar interests, while if extended to all of the States it would be in effect a complete nullification of the existing law and would involve very great expense to the General Government, which is avoided by the law now in force.

CLERICAL FORCE.

By reason of the satisfactory progress of the work of transcribing the records of the volunteer armies by the index-record card system, a reduction of 300 was made in the clerical force of this office for the fiscal year ended June 30, 1895, and a further reduction of 50 for the fiscal year ended June 30, 1896. It is believed that a still further reduction of 25 clerks can be made for the next fiscal year without detriment to the public service, making a total reduction of 375 clerks, and representing a permanent saving of $425,000 annually in the appropriations for the clerical force of the office.

Very respectfully,

F. C. AINSWORTH,
Colonel, U. S. Army, Chief of Office.

The SECRETARY OF WAR.

REPORT OF THE BOARD OF PUBLICATION OF WAR RECORDS.

REPORT

OF

BOARD OF PUBLICATION OF WAR RECORDS.

WAR DEPARTMENT, WAR RECORDS OFFICE,
Washington, June 30, 1896.

SIR: The Board of Publication of the Official Records of the Rebellion begs to submit the following report of its operations during the fiscal year ended June 30, 1896:

Eleven thousand copies each of Vols. XLVI, Parts II and III; XLVII, Parts I, II, and III, and XLVIII, Part I, have been printed and distributed during the year. These volumes cover the final campaigns of the war in Virginia, the Carolinas, and the trans-Mississippi region. Vol. XLVIII, Part II, will be issued in a few weeks.

The final part of the Atlas (No. 35) was issued during the year, which completed the work as planned; but it was found necessary to publish three additional plates for insertion in Part XXVII. These were accordingly printed and will be issued during the coming month. An index and table of contents to the Atlas has just been completed and will shortly be issued, which will greatly facilitate reference to the maps accompanying the various reports.

Work upon the general index to the first series of the War Records has been continued throughout the year, and it is now up with current issues. This index can not be completed until the last volume of Series I is published.

The examination of files and archives and the work of selecting, copying, and comparing material for the remaining volumes of the several series have been continued without interruption. The following notes of work accomplished within the year in the several departments of publication will convey some idea of the variety and amount of labor performed in connection with the preparation and publication of these records: 92,772 books have been received from the printer and 83,227 distributed; 30,968 copies of parts of the Atlas to accompany the Official Records of the Rebellion have been received and 20,189 distributed; 3,900 letters, cards, etc., have been received and 7,200 letters, cards, circulars, etc., have been mailed in response to inquiries; 103,000 labels for addresses have been printed and compared; 7 books have been indexed wholly or in part, and this involved the preparation of 87,000 reference cards; 49,000 folios of manuscript were prepared and verified and 8,250 pages of proofs in galleys and page form were verified, corrected, and prepared for publication.

The work remaining to be done consists in completing Series I, of which there will be four more books; a supplement of probably four books, and a general index of book indexes, making a total in the series that is taken up with the active operations of war of 110 books in all.

The Atlas, consisting of 178 plates, may be considered as a part of this series.

If present progress is continued through the next fiscal year the records of military operations proper, such as battles, campaigns, and other active operations, will be completed by the 30th of June next, and the general index of this series will shortly thereafter be ready to send to the printer.

The records to be embraced in the second, third, and fourth series are nearly all selected and copied; five volumes are in type and several more are about ready for the printer.

The total number of employees engaged in the compilation, publication, and distribution of the records is 59. Before the close of the next fiscal year this number will be reduced probably to 50, the principal reduction being in the force of copyists. There will then be very little work of this class remaining to be done.

The estimates submitted this year for a continuation of the work contemplate a reduction in the appropriation of $20,000 from the amount heretofore appropriated annually.

The close of the present fiscal year finds 101 volumes of the work issued and distributed to beneficiaries, with 8 more volumes in type. The Atlas of maps has also been completed, with the exception of the index, which will be issued in September. It consists of 178 lithographed plates, containing maps showing the positions and movements of troops on all the more prominent and many of the less important battle-fields of the war, and embracing much other material of great value to the historian and the student seeking knowledge of a military character. The Atlas was published in paper-covered parts or pamphlets of 5 plates each, and distributed to beneficiaries as issued.

SURPLUS VOLUMES.

The act of 1882 has been interpreted to mean that when an individual or organization is designated to receive this work, such individual or organization becomes entitled to receive from the War Department the continuous publication. In the event of the death of a recipient, the Department has, in all cases, endeavored to communicate with the legal heirs, and when proper evidence was received, proving them to be such, the distribution has been continued to the legal heirs. In many cases, however, it has been found impossible to locate the executors or administrators, and in all such cases, the remaining issues due deceased beneficiaries have been retained in this office. As the law appears to be very explicit upon this point, that the person designated becomes entitled to the entire publication, there seems to be no authority for the disposal of this accumulation, except through Congress. The act of January 12, 1895, authorizing the Secretary of War to furnish complete sets to each Senator and Member of the Fifty-third Congress, not already entitled by law to receive the same, and authorizing him (the Secretary) to use for the purpose such incomplete sets as remain on hand uncalled for by beneficiaries designated to receive them under the several acts providing for the distribution of these records, enabled the office to distribute about 15,000 volumes. The accumulation, however, is constantly increasing, and will continue to increase from year to year, unless authority is obtained from Congress for the disposition of the incomplete sets referred to. The number of volumes now stored in the War Department, including those set aside for sale, number 56,242, and 15,000 copies of the several parts of the Atlas.

The act of Congress approved August 7, 1882, provides that "the remaining copies (700) of the 11,000 to be published * * * shall be sold by the Secretary of War for cost of publication with 10 per cent

added thereto, and the proceeds of such sales shall be covered into the Treasury." Under this law more than 51,000 volumes and pamphlet copies of the several parts of the Atlas of maps accompanying the work have been sold to subscribers. The total number received, distributed, sold, etc., from 1880, when the first volume was printed, to 1896 is given in the following tabular statement:

Fiscal year.	Books received.	Parts of Atlas received.	Total received.	Distributed.	Sold.	Amount received.
1880–81	2,000	.....	2,000	2,000	(a)	(a)
1881–82	3,000	.....	3,000	3,000	(a)	(a)
1882–83	33,000	.....	33,000	26,891	1,109	$887.17
1883–84	33,000	.....	33,000	29,211	789	550.00
1884–85	55,000	.....	55,000	46,437	2,561	1,665.09
1885–86	55,000	.....	55,000	48,150	2,850	1,681.55
1886–87	44,000	.....	44,000	45,186	2,314	1,457.80
1887–88	66,000	.....	66,000	55,108	2,892	1,880.10
1888–89	44,000	.....	44,000	47,061	1,939	1,279.85
1889–90	110,000	.....	110,000	107,461	3,539	2,335.70
1890–91	198,000	.....	198,000	163,895	6,317	3,916.84
1891–92	121,000	44,000	165,000	172,936	7,188	4,025.39
1892–93	103,500	132,000	235,500	186,642	5,949	2,974.53
1893–94	120,252	110,000	230,252	207,168	7,637	4,276.84
1894–95	19,179	89,500	108,679	108,780	2,955	1,329.64
1895–96	66,000	22,000	88,000	98,069	3,158	1,893.80
Total	1,072,931	397,500	1,470,431	1,347,995	51,194	30,154.30

a Sold by the Public Printer.

It will be observed that 1,470,431 copies of the records have been received and 1,347,995 distributed to libraries, organizations, and individuals under regulations prescribed by the act of August 7, 1882, leaving on hand, for future distribution and sale, 56,242 volumes and 15,000 parts of the Atlas.

In addition to the above, a provision in the "Act making appropriations for the sundry civil expenses of the Government," approved August 5, 1892, provides for the printing and binding of 500 copies of the records for the use of Senators, Members, and Delegates of the Fifty-second Congress, to be printed and bound under the direction of the Joint Committee on Printing. These books have been distributed through the folding rooms of the Senate and House of Representatives. This raises the total number of volumes that have been distributed and sold to 1,467,689. The cost of this Congressional edition, from Vol. I to Vol. XLVIII, Part I, both inclusive, and the Atlas, amounted to $81,988.48, which has been paid for by this office out of the annual appropriations for the publication of the records.

The proceeds of the sales, aggregating $30,154.30, have been covered into the Treasury, as directed by law.

The appropriations made by Congress for the preparation, publication, and distribution of this work, from 1874 to the close of the fiscal year ending June 30, 1896, are as follows:

1875	$65,000.00	1888	$63,380.00
1877	40,000.00	1889	63,380.00
1878	20,000.00	1890	127,380.00
1879	40,000.00	1891	266,659.46
1880	40,490.00	1892	266,780.00
1881	80,490.00	1893	266,780.00
1882	80,490.00	1894	206,780.00
1883	83,197.86	1895	188,780.00
1884	73,880.00	1896	160,380.00
1885	68,405.02		
1886	68,280.00	Total	2,334,328.50
1887	63,796.16		

Of the total amount appropriated, the sum of $1,184,291.02 was expended for printing and binding, and $1,134,447.50 was paid out for salaries, contingent or miscellaneous expenses, including rent, stationery, the purchase of records, etc., and $15,589.98 unexpended balances were turned into the Treasury. The average annual expenditures for the twenty-two years have been $105,398.20.

As the first volume of these records was issued in 1880, sixteen years have been devoted to the issue and distribution of the 101 volumes already published, showing an average of about six books for each year. The progress of the work during the last year was kept up to the average, with a somewhat reduced force of employees.

The 6 books issued during the year were as follows:

	Pages.
Vol. XLVI, Part II, serial No. 96	1,493
Vol. XLVI, Part III, serial No. 97	1,549
Vol. XLVII, Part I, serial No. 98	1,252
Vol. XLVII, Part II, serial No. 99	1,587
Vol. XLVII, Part III, serial No. 100	974
Vol. XLVIII, Part I, serial No. 101	1,674
Total	8,529

Vols. XLVIII, Part II; XLIX, Parts I and II, and L, Parts I and II, will be published during the coming year. They will be followed by supplementary volumes, numbering probably not more than four, and containing important official documents not accessible to the compilers at the date of issuing the regularly numbered volumes of Series I.

This office has frequent inquiries from beneficiaries and others as to the number of parts contained in the several volumes. To supply this want, a list of the books comprising the first series is given in an appendix to this report. This list will enable all concerned to properly arrange the work in their libraries and readily determine whether or not all the parts have been received. The list also contains a brief indication of the subject treated and the particular maps that illustrate the theater of operations and the battle-fields.

GEO. W. DAVIS,
Major Eleventh Infantry.
LESLIE J. PERRY,
Civilian Expert.
JOSEPH W. KIRKLEY,
Civilian Expert.
Board of Publication.

The SECRETARY OF WAR.

APPENDIX.

List of volumes and parts thereof, with serial number and cost price; also synopsis of contents, etc., in Series I, Official Records War of the Rebellion.

Volume.	Part.	Serial number.	Price.	More important events referred to in volumes.		Plates to be consulted in connection with volumes.	Dates covered.
				Battles, campaigns, etc.	Operations in—		
1	.....	1	$0.50	Secession of States, seizure of forts, arsenals, etc	Florida, Texas, New Mexico, Indian Territory, Missouri, Georgia, Alabama, Louisiana, Mississippi, North Carolina.	1, 2, 5, 121, 122	Dec. 20, 1860, to Aug. 31, 1861.
2	.....	2	.70	First Bull Run, Bethel, Falling Waters, Rich Mountain	Maryland, Pennsylvania, Virginia, West Virginia.	2, 3, 5, 61	Apr. 16 to July 31, 1861.
3	.....	3	.55	Camp Jackson, Carthage, Wilson's Creek, Lexington, Fredericktown, Springfield, Belmont, etc.	Missouri, Arkansas, Kansas, Indian Territory.	4, 5, 33, 133, 135	May 10 to Nov. 19, 1861.
4	.....	4	.55	San Augustine Springs, Columbus, Paducah, Wild Cat, Ivy Mountain, Hatteras, etc.	Texas, New Mexico, Arizona, Kentucky, Tennessee, North Carolina, Southeastern Virginia.	6	June 11, 1861, to Feb. 1, 1862.
5	.....	5	.75	Carnifix Ferry, Greenbrier, Kanawha, Ball's Bluff, Hancock, Alleghany, Dranesville, etc.	Maryland, Northern Virginia, West Virginia.	5, 6, 9, 10, 13, 41	Aug. 1, 1861, to Mar. 17, 1862.
6	.....	6	.80	Port Royal, Jacksonville, Fort Pulaski, Pensacola, New Orleans, etc.	Coasts of South Carolina, Georgia, Middle, East, and West Florida, Southern Alabama, Southern Mississippi, and Louisana.	5, 135B	Aug. 21, 1861, to May 12, 1862.
7	.....	7	.85	Prestonburg, Mill Springs, Fort Henry, Fort Donelson, Nashville, Columbus, etc.	Kentucky, Tennessee, North Alabama, Southwestern Virginia.	5, 6, 9, 11	Nov. 19, 1861, to Mar. 4, 1862.
8	.....	8	.75	New Madrid, Island No. 10, Pea Ridge, etc	Missouri, Arkansas, Kansas, Indian Territory.	10, 79	Nov. 19, 1861, to Apr. 10, 1862.
9	.....	9	.70	Monitor and Merrimac, Roanoke Island, New Berne, Fort Macon, South Mills, Valverde, Glorieta, etc.	Southeastern Virginia, North Carolina, Texas, New Mexico, Arizona.	12, 40	Jan. 11, to Sept. 20, 1862.
10	1	10	.80	Cumberland Gap, Shiloh, Corinth, Fort Pillow, Memphis.	Kentucky, Tennessee, North Mississippi, North Alabama, Southwestern Virginia.	10, 12, 13, 14, 78, 98, 118	Mar. 4, to June 10, 1862.
10	2	11	.60				
11	1	12	.75	Yorktown, Williamsburg, West Point, Hanover Court-House, Fair Oaks or Seven Pines, Seven Days' Battles, etc.	Peninsula of Virginia	13–15, 17–22, 42, 63, 64, 66, 77, 86, 90.	Mar. 17, to Sept. 2, 1862.
11	2	13	.70				
11	3	14	.55				
12	1	15	.60	Kernstown, McDowell, Front Royal, Middletown, Winchester, Cross Keys, Port Republic, Cedar Mountain, Second Bull Run, Chantilly, etc.	Northern Virginia, West Virginia, Maryland.	5, 7, 8, 21–23, 42, 85, 105, 111, 116, 135.	Do.
12	2	16	.60				
12	3	18	.65				
12	2	17	.35	Proceedings of court-martial of Gen. Fitz John Porter, U. S. A.			
13	.....	19	.65	Newtonia, St. Charles, Galloway's farm, etc	Missouri, Arkansas, Kansas, Indian Territory, Department of the Northwest.		Apr. 10 to Nov. 20, 1862.
14	.....	20	.65	Secessionville, Simmons' Bluff, Charleston Harbor, etc.	Coasts of South Carolina, Georgia, and Middle and East Florida.	23, 133	Apr. 12, 1862, to May 14, 1863.

* Supplement.

List of volumes and parts thereof, with serial number and cost price; also synopsis of contents, etc.—Continued.

Volume.	Part.	Serial number.	Price.	More important events referred to in volumes.		Plates to be consulted in connection with volumes.	Dates covered.
				Battles, campaigns, etc.	Operations in—		
15	.....	21	$0.75	Baton Rouge, Sabine Pass, Galveston, Georgia Landing, Bisland, Irish Bend, operations against Vicksburg.	West Florida, Southern Alabama, Southern Mississippi, Louisiana, Texas, New Mexico, Arizona.	23, 24, 90	May 12, 1862, to May 14, 1863.
16	1	22	.75	Cumberland Gap, Richmond, Munfordville, Perryville, etc.	Kentucky, Middle and East Tennessee, North Alabama, and Southwestern Virginia.	24	June 10 to Oct. 31, 1862.
16	2	23	.65				
17	1	24	.55	Iuka, Corinth, Coffeeville, Holly Springs, Parker's Cross Roads, Chickasaw Bluffs, Arkansas Post, etc.	West Tennessee and Northern Mississippi.	23, 25, 27	June 10, 1862, to Jan. 20, 1863.
17	2	25	.60				
18	.....	26	.70	Deserted House, Plymouth, Kinston, White Hall, Goldsborough, Washington, Suffolk, etc.	North Carolina and Southeastern Virginia.	24–26, 28, 91	Aug. 20, 1862, to June 3, 1863.
19	1	27	.75	South Mountain, Crampton's Pass, Harper's Ferry, Antietam, Kanawha Valley, Stuart's raid, etc.	Northern Virginia, West Virginia, Maryland, Pennsylvania.	25, 27–29	Sept. 3 to Nov. 14, 1862.
19	2	28	.55				
20	1	29	.70	Hartsville, Carter's raid, Stone's River, Wheeler's raid, etc.	Kentucky, Middle and East Tennessee, North Alabama, and Southwest Virginia.	30–32	Nov. 1, 1862, to Jan. 20, 1863.
20	2	30	.45				
21	.....	31	.75	Fredericksburg, Dumfries, "The Mud March," etc.	Northern Virginia, West Virginia, Maryland, Pennsylvania.	25, 30–33, 63	Nov. 15, 1862, to Jan. 25, 1863.
22	1	32	.65	Cane Hill, Prairie Grove, Springfield, Big Mound, Dead Buffalo Lake, Pine Bluff, etc.	Missouri, Arkansas, Kansas, Indian Territory, and Department of the Northwest.	25, 32, 33, 38	Nov. 20, 1862, to Dec. 31, 1863.
22	2	33	.75				
23	1	34	.60	Thompson's Station, Vaught's Hill, Pegram's raid, Brentwood, Wheeler's railroad raid, Franklin, Streight's raid, Everett's raid, Sanders' raid, Hines' raid, Tullahoma campaign, Morgan's Ohio raid.	Kentucky, Middle and East Tennessee, North Alabama, and Southwestern Virginia.	28, 31, 32, 34, 35, 80, 94	Jan. 21 to Aug. 10, 1863.
23	2	35	.65				
24	1	36	.55	Yazoo Pass, Steele's Bayou, Grierson's raid, Grand Gulf, Port Gibson, Raymond, Jackson, Champion's Hill, Vicksburg, Goodrich's Landing, etc.	Mississippi and West Tennessee, embracing those in Arkansas and Louisiana connected.	31, 32, 35–37, 39, 67, 132, 135C.	Jan. 20 to Aug. 10, 1863.
24	2	37	.55				
24	3	38	.75				
25	1	39	.80	Kelly's Ford, Imboden's raid, Jones' raid, Marye's and Salem Heights, Chancellorsville, Stoneman's raid, etc.	Northern Virginia, West Virginia, Maryland, Pennsylvania.	39, 41, 91, 93, 135	Jan. 26 to June 3, 1863.
25	2	40	.60				
26	1	41	.65	Plains Store, Port Hudson, La Fourche, Sabine Pass, Stirling's Plantation, Teche, Rio Grande, etc.	West Florida, South Alabama, South Mississippi, Louisiana, Texas, New Mexico.	26, 38, 43	May 14 to Dec. 31, 1863.
26	2	42	.50				
27	1	43	.75	Brandy Station or Fleetwood, Winchester, Upperville, Hanover, Gettysburg, Williamsport, Boonsborough, Falling Waters, Shepherdstown, Wapping Heights, New York Draft Riots, etc.	North Carolina, Virginia, West Virginia, Maryland, Pennsylvania, and Department of the East.	28, 30, 39, 40, 42, 43, 45, 73, 95, 116.	June 3 to Aug. 3, , 1863.
27	2	44	.70				
27	3	45	.80				
28	1	46	.55	Grimball's Landing, Battery Wagner, Charleston, Fort Brooke, etc.	Coasts of South Carolina and Georgia, and in Middle and East Florida.	4, 26, 38, 44, 122, 131	June 12 to Dec. 31, 1863.
28	2	47	.45				
29	1	48	.70	Averell's raid, Bristoe Station, Droop Mountain, Rappahannock Station, Kelley's Ford, Mine Run, etc.	North Carolina, Virginia, West Virginia, Maryland, Pennsylvania.	44, 45, 47, 87, 135B, 135C.	Aug. 4 to Dec. 31, 1863.
29	2	49	.65				

30	1	50	.70	Chickamauga, East Tennessee Campaign, Wheeler and Roddey's raid, Chalmers' raid, etc.	Kentucky, Southwestern Virginia, Tennessee, Mississippi, North Alabama, Georgia.	30, 46–48, 71, 96–98, 101, 111.	Aug. 11 to Oct. 19, 1863.
30	2	51	.60				
30	3	52	.70				
30	4	53	.55				
31	1	54	.60	Wauhatchie, Collierville, Campbell's Station, Knoxville, Lookout Mountain, Missionary Ridge, Ringgold Gap, Bean's Station, Mossy Creek, etc.	Kentucky, Southwestern Virginia, Tennessee, Mississippi, North Alabama, and North Georgia.	45, 47, 48, 49, 50, 97, 130	Oct. 20 to Dec. 31, 1863.
31	2	55	.55				
31	3	56	.65				
32	1	57	.55	Meridian expedition, etc	Kentucky, Southwestern Virginia, Tennessee, Mississippi, Alabama, and North Georgia.	33, 51	Jan. 1 to Apr. 30, 1864.
32	2	58	.60				
32	3	59	.65				
33	.....	60	.85	New Berne, Morton's Ford, Kilpatrick's raid, etc	North Carolina, Virginia, West Virginia, Maryland, Pennsylvania.	51, 87	Do.
34	1	61	.75	Red River campaign, Camden expedition, etc	Louisiana and the Trans-Mississippi States, etc. (Arizona, Arkansas, Colorado, Indian Territory, Kansas, Missouri, Nebraska, New Mexico, Texas, Dakota, Iowa, Minnesota, Wisconsin).	50, 52, 53, 54, 135A	Jan. 1 to June 30, 1864.
34	2	62	.75				
34	3	63	.60				
34	4	64	.55				
35	1	65	.50	Charleston, Olustee, etc	South Carolina, Florida, and on the Georgia coast.	53, 122, 131	Jan. 1 to Nov. 13, 1864.
35	2	66	.50				
36	1	67	.75	Wilderness, Spotsylvania, North Anna, Totopotomoy, Yellow Tavern, Old Church, Cold Harbor, Bethesda Church, Kautz's raid, Swift Creek, Drewry's Bluff, Bermuda Hundred, Trevilian Station, etc.	Southeastern Virginia and North Carolina.	55; 56, 77, 81, 83, 91, 92, 94, 96, 97, 135, 135A.	May 1 to June 12, 1864.
36	2	68	.70				
36	3	69	.65				
37	1	70	.55	Cloyd's Mountain, New Market, Piedmont, Lynchburg, Monocacy, Fort Stevens, Snicker's Gap, Winchester, etc.	Northern Virginia, West Virginia, Maryland, Pennsylvania.	54, 81–84, 94, 135A	May 1 to Aug. 3, 1864.
37	2	71	.50				
38	1	72	.65	Resaca, Peachtree Creek, Atlanta, Jonesborough, Kenesaw Mountain, etc.	The Atlanta (Georgia) campaign	40, 43, 45, 47–49, 55–63 65, 71, 87, 88, 90, 96, 101, 126–129, 131, 135A.	May 1 to Sept. 8, 1864.
38	2	73	.65				
38	3	74	.70				
38	4	75	.55				
38	5	76	.70				
39	1	77	.70	Tupelo, Allatoona, Mobile Bay, etc	Kentucky, Southwestern Virginia, Tennessee, Mississippi, Alabama, and North Georgia. (Atlanta campaign excepted.)	46, 63, 102, 103, 135A	May 1 to Nov. 13, 1864.
39	2	78	.65				
39	3	79	.65				
40	1	80	.60	Richmond, Petersburg, etc	Southeastern Virginia and North Carolina.	64, 65, 67, 78, 89, 104, 105, 107, 124, 125, 135.	June 13 to July 31, 1864.
40	2	81	.55				
40	3	82	.60				
41	1	83	.70	Price's Missouri expedition, etc	Louisiana and the Trans-Mississippi States.	47, 65, 66	July 1 to Dec. 31, 1864.
41	2	84	.75				
41	3	85	.70				
41	4	86	.80				
42	1	87	.70	Richmond, Petersburg, etc	Southeastern Virginia and North Carolina.	65, 67, 68, 76, 77, 93, 124, 125, 135.	Aug. 1 to Dec. 31, 1864.
42	2	88	.80				
42	3	89	.85				
43	1	90	.70	Opequon, Fisher's Hill, Cedar Creek, etc	Northern Virginia, West Virginia, Maryland, Pennsylvania.	54, 69, 81–85, 99	Aug. 4 to Dec. 31, 1864.
43	2	91	.65				
44	.....	92	.70	The Savannah campaign, etc	South Carolina, Georgia, Florida	69–71, 90, 91, 101, 132, 135	Nov. 14 to Dec. 31, 1864.

List of volumes and parts thereof, with serial number and cost price; also synopsis of contents, etc.—Continued.

Volume.	Part.	Serial number.	Price.	More important events referred to in volumes.		Plates to be consulted in connection with volumes.	Dates covered.
				Battles, campaigns, etc.	Operations in—		
45	1	93	$0.80	Franklin, Nashville, etc.	Kentucky, Southwestern Virginia, Tennessee, Mississippi, Alabama.	72, 73, 105, 135b, 135C.	Nov. 15, 1864, to Jan. 23, 1865.
45	2	94	.60				
46	1	95	.85	Fort Fisher, Hatcher's Run, Fort Stedman, White Oak Road, Five Forks, Petersburg, Richmond, Sailor's Creek, Appomattox Court-House, etc.	Southeastern Virginia and North Carolina (except Sherman's column).	66, 68, 72, 74–79, 84, 89, 94, 100, 116, 118, 129, 132.	Jan. 1, 1865, to end of war.
46	2	96	.85				
46	3	97	.85				
47	1	98	.75	Averasborough, Bentonville, Durham Station, etc.	Campaign of the Carolinas.	68, 76, 79, 80, 86, 105, 120, 133, 135B.	Do.
47	2	99	.90				
47	3	100	.60				
48	1	101	.90	Rio Grande Border, Powder River expedition, etc.	Louisiana and the Trans-Mississippi States and Territories.	98.	Do.
48	2	102	.85				
49	1	103	.....	Wilson's and Stoneman's raids, Mobile, etc.	Kentucky, Southwest Virginia, Tennessee, Georgia, Mississippi, and Alabama.	61, 68, 70–72, 74, 76, 79, 90, 91, 102, 105, 107–109, 111–115, 123, 124.	Jan. 15, 1865, to end of war.
49	2	104	.....				
50	1	105	.....		Pacific Coast.	134.	1861 to 1865.
50	2	106	.....				
51	1	107	.....	(Supplementary volume)	Maryland, Eastern North Carolina, Pennsylvania, Virginia (except Southwestern Virginia) and West Virginia.		Jan. 1, 1861, to June 30, 1865.
51	2	108	.....				
52	.....	109	.....	do	Southwestern Virginia, Kentucky, Tennessee, Mississippi, Alabama, West Florida, and Northern Georgia.		Do.
53	.....	110	.....	do	South Carolina, Southern Georgia, Middle and East Florida, Western North Carolina, Louisiana, and transmississippi States and Territories, and Department of the Northwest.		Do.
54	1	111	.....	General index to whole series and Atlas			
54	2	112	.....				

THE ATLAS.

The Atlas contains 178 plates, consisting of a collection of several hundred maps of important battle-fields of the war, routes of march of the armies, plans of forts, etc., and a number of photographic views of prominent scenes, places, and objects. Plates which do not relate to specific operations, mentioned in the volumes in the above table, are given below with the subjects:

Plate 117.—Marches of Sherman's army, 1863-1865.
Plate 119.—Kansas and portions of Territories.
Plates 136–161.—Maps of the whole theater of the war in current use, 1861–1865.
Plates 162–171.—Union and Confederate military divisions and departments, 1861–1865.
Plate 172.—Uniforms, Union and Confederate.
Plate 173.—Ordnance, ordnance stores, etc.
Plate 174.—Appliances for care and transportation of sick or wounded.
Plate 175.—Union and Confederate flags, and Union corps flags, badges, etc.

The Atlas is sold to the public as follows:

Index, Table of Contents, etc., in paper cover, 25 cents.
Parts 1 to 35, in paper covers, 40 cents each.
Plates 135A, 135B, 135C, in paper covers, 25 cents.
Plates, single, 10 cents each.
Atlas, complete, unbound, each part and index in separate cover, $14.50.
Atlas, complete, bound in two parts, in half-turkey leather, $22.50.
Atlas, complete, bound in three parts, half-turkey leather, $26.50.

REPORT OF THE BOARD OF COMMISSIONERS OF THE SOLDIERS' HOME.

REPORT

OF THE

BOARD OF COMMISSIONERS OF THE SOLDIERS' HOME.

THE SOLDIERS' HOME,
OFFICE OF THE BOARD OF COMMISSIONERS,
Washington, D. C., October 17, 1896.

SIR: In accordance with the requirements of section 1 of the act of Congress approved March 3, 1883, prescribing regulations for the Soldiers' Home in the District of Columbia, I have the honor to submit the following report of the Board of Commissioners of the Soldiers' Home for the year ended September 30, 1896.

The changes in the number of beneficiaries during the year are shown in the following table:

	Regular.	Temporary.	Total.
On the rolls September 30, 1895	945	57	1,002
Admitted since	188	241	429
Readmitted since	104	.....	104
Total	1,237	298	1,535
Withdrawn from the Home	115	.....	115
Dropped, dismissed, etc	47	135	182
Died	58	9	67
Transferred to permanent roll	.....	73	73
Total	220	217	437
Leaving on the rolls September 30, 1896	1,017	81	1,098

This shows an increase of 96 beneficiaries since the last annual report.

The number (1,098) on the rolls September 30, 1896, is accounted for as follows:

Present at the Home, 687, an increase of 65 over the preceding year; on outdoor relief, 326, an increase of 14; in the Government Hospital for the Insane, 18; on furlough, 62, and 5 suspended.

The daily average number of inmates during the year was 685. Last year the average was 678.

The total number of deaths that occurred was 67, an increase of 12 over last year. Of these 46 died at the Home, 15 on outdoor relief, 2 on furlough, 3 near the Home, and 1 in the Government Hospital for the Insane.

During the year temporary relief was granted to destitute discharged soldiers who were not entitled to admission to the extent of 11,276 meals, and 243 were provided with lodgings for a few nights each.

The following statement shows the amounts received and expended during the year, and the amount of the permanent fund of the Home deposited in the United States Treasury:

PERMANENT FUND.

Balance in the United States Treasury October 1, 1895		$2,690,042.83
Settlements by Treasury Department for the current year	$145,700.49	
Amount withdrawn for current expenses	124,618.80	
		21,081.69
Balance in the United States Treasury September 30, 1896		2,711,124.52

ACCOUNT OF THE TREASURER OF THE HOME.

Remaining on hand October 1, 1895		$5,680.74
Received during the year:		
From the permanent fund		124,600.00
Interest on the permanent fund		80,949.90
Effects of deceased inmates		321.11
Miscellaneous receipts		6,076.14
Total receipts		217,627.89
Disbursements:		
Current expenses	$155,265.37	
Permanent improvements	54,437.27	
		209,702.64
Balance on hand September 30, 1896		7,925.25

The foregoing statement of the permanent fund shows that the revenue of the Home from settlements made by the Treasury Department on account of forfeitures of deserters and dishonorably discharged men and court-martial fines decreased by $42,305.55 during the year. A part of this decrease in the income is due to the full payment monthly of all pay due to the soldier, which leaves very little retained pay subject to forfeiture by deserters and dishonorably discharged men.

The current expenses of the Home, as shown by the treasurer's statement, were $3,809.21 less than last year, and the amount expended for permanent improvements amounted to $54,437.27, of which $53,797.58 was expended in the construction of the new amusement hall and increasing the boiler plant.

Some of the principal items of the current expenses were:

Subsistence	$33,530.49
Expense of hospital	18,043.16
Clothing for inmates	10,374.25
Farm, garden, and ornamentation of grounds	15,416.73
Extra-duty pay and monthly allowance to nonpensioners	19,553.50
Commutation to members residing outside of the Home	26,471.06

The treasurer's account of funds received for the inmate pensioners shows that he had on hand September 30, 1895, $46,626.04; that he received during the year $80,924.26, and paid to pensioners and legal heirs of deceased inmates $80,705.32, leaving on hand, deposited in the United States Treasury as required by law, $46,844.98.

The report of the governor of the Home shows that of the 687 resident inmates 563 are receiving pensions, as follows: 185 receive from $6 to $8 per month; 296 from $10 to $16; 59 from $17 to $20; 21 from $22 to $30; 1 $50, and 1 $70 per month.

There are 179 beneficiaries of the Home who served in the war with

Mexico, 142 of whom are drawing outdoor relief; and there are 455 who served in the war of the rebellion, of whom 116 are on outdoor relief, a total of 634 members who had war service, leaving from the aggregate number (1,098) on the rolls of the Home 464 whose service in the Army has been since the war.

The attending surgeon reports that 422 patients were treated in hospital; that the daily average was 77.18, and the average age of patients admitted was 53.03; that 2,353 were treated at sick call, and the proportion of deaths to 100 inmates per annum was 6.10, an increase of 2.19 over last year. The attending surgeon also reports that 10 patients from the Army, not members of the Home, were temporarily admitted to the hospital for treatment for inguinal hernia.

The sanitary condition of the Home and grounds has been excellent throughout the year, and there has been no prevalent nor epidemic disease among the inmates.

The act of Congress approved January 16, 1891, requiring the treasurer to keep the current funds on deposit in the United States Treasury has been complied with, and all supplies for the Home which could be conveniently purchased by contract were so purchased.

The library of the Home contains 6,056 volumes, and 12,964 books were issued during the year. Nine daily and 16 weekly papers and 22 monthly magazines are provided for the inmates.

The Home has been well supplied with good food and clothing and every practicable provision has been made for the comfortable maintenance of the inmates. The greatest difficulty, however, has been found to so administer the affairs of the Home as to produce contentment and harmony among its inmates. To break the monotony of a life which almost irresistibly leads to restlessness and discontent, and to temptations for overindulgencies and infractions of discipline, is a difficult problem to solve.

It is therefore hoped that the new amusement hall, which is now nearly completed, will afford (in addition to the library, billiard and pool tables, and tables for various kinds of games, already provided) such facilities for rational amusement as will materially add to the contentment and welfare of the inmates. To further this purpose an additional allowance of funds will be made by the Board of Commissioners.

The beautiful grounds of the Home suffered very severely by the storm of September 29 last. Four hundred and fifty trees were uprooted or broken off, and considerable damage was done to the roofs of the hospital, the Sherman, Scott, Sheridan, Anderson, and King buildings. The governor reports that 2,000 young trees will be planted this fall, most of which are on hand.

Regular meetings have been held by the Board for the transaction of the business pertaining to the Home, and the regular monthly inspections have been made as required by law.

Brig. Gen. Richard N. Batchelder, Quartermaster-General, a member of the Board, retired from active service July 27, 1896, and was succeeded by Brig. Gen. Charles G. Sawtelle, appointed Quartermaster-General August 19, 1896.

The accompanying papers are reports by the governor, the attending surgeon, and the treasurer of the Home; a statement of receipts and expenditures; statements of the permanent fund and of the interest account; statements of accounts of the pension money of inmate pensioners and their rates of pension; the debit and credit accounts with the farm and garden, and report of members on outdoor relief, all of which are required to be published for distribution to the Army, as

directed by the section and act mentioned in the first paragraph of this report.

Very respectfully,

NELSON A. MILES,
Major-General Commanding the Army,
President Board of Commissioners.

The SECRETARY OF WAR.

REPORT OF THE GOVERNOR OF THE SOLDIERS' HOME.

GOVERNOR'S OFFICE, UNITED STATES SOLDIERS' HOME,
Washington, D. C., September 30, 1896.

GENTLEMEN: I have the honor to submit the following tables and my report upon the Soldiers' Home for the year ended September 30, 1896:

Number of pensioners present at the Home and rates of pension.

Rate per month.	Number.	Rate per month.	Number.	Rate per month.	Number.
$6	86	$15	2	$30	10
$8	99	$16	25	$50	1
$10	46	$17	56	$72	1
$12	188	$18	1		
$12.50	1	$20	2	Total	563
$13	1	$22	1		
$14	33	$24	10		

Present, 1895		510
Present, 1894		582
Applying for readmission during the year		159
Readmitted		104
Temporarily readmitted for medical treatment		36
Denied readmission		19
Applying for outdoor relief		138
Granted outdoor relief		64
Denied outdoor relief		74
Inmates present having service in Mexico	37	
Inmates on outdoor relief having service in Mexico	142	
Total inmates having service in Mexico		179
Inmates present having service in the war of the rebellion	339	
Inmates on outdoor relief having service in the war of the rebellion	116	
Total inmates having service in the war of the rebellion		455

Nativity of inmates present and absent.

United States	381	Ireland	329
Scotland	15	Austria	4
Germany	183	Canada	15
Belgium	2	Denmark	7
Cuba	1	Holland	2
France	10	Russia	6
Italy	3	Switzerland	9
Portugal	1	Sweden	5
England	44		

The alterations since last annual report, dated September 30, 1895, are as follows:

Schedule of admissions to the Home.

Permanent beneficiaries September 30, 1895	945
Admitted during the year	188
Readmitted during the year	104
Total	1,237

Dropped:		
By withdrawal	115	
For absence without leave	14	
Dismissed	11	
Abandoned the Home	2	
Dropped by order	18	
Died	58	
From outdoor relief	2	
		220
Permanent beneficiaries September 30, 1896		1,017
Temporary inmates:		
Present September 30, 1895	57	
Admitted during the year	241	
Total temporary beneficiaries		298
Transferred to permanent rolls	73	
Dropped	127	
Dismissed	8	
Died	9	
		217
Remaining temporary inmates, including 4 in insane asylum		81
Total beneficiaries		1,098

Of whom 610 are inmates of the Home, 326 receive outdoor relief, 14 in insane asylum, 62 on furlough, and 5 are suspended. Increase in the number of temporary inmates for the year, 24; increase in the number of regular inmates for the year, 72. The aggregate is 96 more than was shown in last report. Of the 67 deaths reported, 2 died on furlough, 1 in insane asylum, 15 on outdoor relief, 42 in Home hospital, 1 in Home grounds, 3 near the Home, 1 in his quarters, and 2 committed suicide. Daily average number of inmates present during the year, 684⅜. Last year the average was 678¼, and the preceding year 734.

Transients.—During the year 11,276 meals have been furnished to destitute discharged soldiers, and 243 have been provided with lodgings for a few nights each.

Home library.—Number of volumes on hand, 6,056; number of volumes added during the year, 16. Periodicals in reading room: Daily papers, 9; weekly papers, 16. Magazines, monthly, 22. Number of books issued during the year, 12,964; average daily issue of books, 36; daily average of inmates visiting the library and reading rooms, 220. The most noticeable thing in these tables is the increase of regular members of the Home by 72, and the temporary members by 24. As these men have all been submitted to the same scrutiny observed in former years the increase is owing, doubtless, to the difficulty in finding employment during the past year. The coming winter will probably increase our present number of inmates by, at least, 150.

The Home has been well supplied with food and clothing during the year, and with all practicable economy. The season has been favorable and the potato and root crops have been fine.

The forest suffered great damage in the storm of the 29th of September, 450 trees having been uprooted or tops broken off. This disaster is more unfortunate on account of the many beautiful exotic trees destroyed, some of which it took half a century to grow. I hope to plant 2,000 trees this fall, most of which we have on hand or have engaged.

The amusement hall, contracted for a year ago, is nearly completed. The contract required the building to be completed in May. The time has been extended until the 1st day of November. This unusual indulgence to the contractor I recommended from the consideration that he had been laid up with sickness and had experienced much embarrassment in filling his contract, and, further, that during the hot months we had no pressing need of the amusement hall. The building is well constructed. It fills a long-needed purpose. The amusement of the inmates is a necessity in all the homes provided for veteran soldiers, and it is a difficult thing to meet. The tendency of the life is toward listlessness and melancholy, and the purpose of this handsome hall is to remedy this feeling as much as possible. The amount of money heretofore allowed for this purpose is $300 a year. I recommend that this amount be doubled. At several of the National Homes as much as $400 is frequently paid for one night's play.

The system of limiting the members of the Home to $8 per month of their pensions while in the Home, and fixing their maintenance to $1 a day when they withdraw from the Home and at $1.50 when they go on furlough, has worked well but a few cases have occurred where men have pretended to go on furlough and fraudulently taken out their money. As this can be done only by deceit and falsehood, anyone detected in this has been either dismissed or suspended.

The surgeon in charge of the hospital states that the milk furnished by contract is often unsuitable for the diet of the delicate sick, on account of deterioration from transportation. In order that the patients in the hospital may always have the best fresh milk, I recommend that 12 milch cows be purchased for this purpose, 6 as soon as practicable, the remainder next March or April.

The discipline is good, and the condition of the barracks is neat and clean. Intemperance is the endless evil, but there is not much of it, and what there is crops out on pay days. We can not dismiss old men for it, and they can not be cured; the only thing we can do is to lock up the offender until he recovers his right mind.

I have been well and cheerfully supported by the officers of the Home during the year that has passed.

Respectfully submitted.

D. S. STANLEY, *Brigadier-General, Governor.*

The BOARD OF COMMISSIONERS UNITED STATES SOLDIER'S HOME.

REPORT OF THE ATTENDING SURGEON OF THE SOLDIERS' HOME.

UNITED STATES SOLDIERS' HOME,
Washington, D. C., September 30, 1896.

SIR: I have the honor to submit the following report of the medical department of the Home for the past year, ended September 30, 1896:

	1896.	1895.	1894.	1893.
Patients remaining in hospital from last report	81	78	85	86
Patients admitted to hospital during the year	341	348	310	316
Total treated in hospital	422	426	395	402
Returned to the Home, recovered, mostly acute cases	137	139	146	156
Returned to the Home, improved, mostly chronic cases	94	94	84	102
Returned to the Home, unimproved, incurable	66	79	43	16
Sent to the United States Hospital for the Insane	2	3	3	5
Died in hospital	42	29	35	35
Dead when brought to hospital	5	1	6	3
Remaining in hospital at present date	76	81	78	85
Total	422	426	395	402

Ages and number of patients admitted.

	1896.	1895.	1894.	1893.
From 20 to 29 years	24	19	35	32
From 30 to 39 years	36	40	31	44
From 40 to 49 years	76	79	63	77
From 50 to 59 years	86	90	81	68
From 60 to 69 years	72	73	66	60
From 70 to 79 years	36	42	32	33
From 80 to 89 years	11	5	2	2
Age of the youngest.....years..	20	23	22	22
Age of the oldest.....do....	84	85	81	88
Average age of patients admitted.....do....	53.03	52.85	51.75	50.22
Greatest number of patients at one time	86	86	86	88
Least number of patients at one time	67	62	64	72
Daily average of patients in hospital	77.18	76.34	76.45	81.42

Diseases for which patients were admitted.

Disease.	Patients.	Disease.	Patients.
Abscesses	7	Insanity	6
Alcoholism	43	Keratitis	1
Amputation of both legs, old	1	Kidney, abscess of	1
Aneurism of aorta	2	Knee, old injury of	1
Arthritis deformans	1	Liver, cirrhosis of	3
Asthma	11	Locomotor ataxia	8
Balanitis	1	Lumbago	2
Bladder:		Lung, abscess of	1
Irritability of	3	Malarial fever	14
Stone in	1	Mania a potu	1
Bronchial catarrh:		Measles	1
Acute	3	Melancholia	2
Chronic	7	Meniere's disease	1
Bronchitis, chronic	7	Meningitis, cerebral	1
Cancer:		Mental depression	1
Face	1	Monoplegia	1
Lip	1	Morphinism	1
Liver	2	Multiple sclerosis	4
Rectum	1	Nephritis, chronic	6
Stomach	1	Neuralgia	2
Cellulitis	2	Obesity	1
Cerebral hemorrhage	1	Ophthalmia, chronic	1
Cerebro-spinal irritation	1	Orchitis	1
Cervical glands, suppuration of	2	Osteitis deformans	1
Cholera morbus	6	Osteomyelitis:	
Conjunctivitis	2	Lower jaw	1
Constipation	4	Tibia, chronic	1
Contusion of shoulder and hip	1	Pain in side	3
Cut throat, suicidal	1	Paralysis agitans	1
Cystitis, chronic	4	Paralysis, general, from injury to spinal column	1
Delirium tremens	1	Partial loss of use of both ankles and right knee	1
Dementia	3	Pharyngitis, acute	1
Diabetes:		Pleurisy, subacute	1
Insipidus	1	Pleuro-pneumonia	1
Mellitus	4	Pneumonia:	
Diarrhea	6	Acute	3
Dislocation of shoulder	1	Subacute	1
Dysentery, chronic	1	Chronic	8
Eczema	2	Psoriasis	1
Empyema	2	Rectum, stricture of	1
Endocarditis, chronic septic	1	Rheumatism:	
Epilepsy	14	Acute	4
Epistaxis	2	Subacute	2
Epithelioma	1	Chronic	20
Erysipelas	1	Rhus toxicodendron poisoning	1
Eyes, injury to	1	Senile debility	24
Facial paralysis	1	Senile gangrene	1
Fistula in ano	1	Sprain of ankle	4
Fractures:		Staphyloma	1
Femur	2	Synovitis of knee joint, chronic	1
Jaw	1	Syphilis:	
Rib	1	Primary	3
Skull	2	Tertiary	2
Tibia and fibula	1	Thermic fever	1
Ulna	1	Tuberculosis:	
Gall bladder, perforation of, with peritonitis	1	General	3
Gangrene of amputation wound	1	Naso-pharyngeal	2
Gastric disease	1	Pulmonary	26
Gastritis, chronic	5	Testicle	1
Gonorrhea	3	Typhoid fever	2
Gout	1	Ulcers of leg	4
Headache	1	Urethra, stricture of	3
Heart disease	11	Urethritis	1
Hemiplegia	7	Urine, incontinence of	1
Hemorrhoids	1	Varicose veins of legs	1
Hernia	5	Wounds	3
Herpes zoster	1	No disease	1
Hydrocele	1	Left hospital before diagnosis was made	1
Indigestion	2	Awaiting diagnosis	1
Influenza	12		

This list exhibits only the diseases complained of by the patients at the time of admission to the hospital and does not include the numerous complications, operations, nor secondary affections arising during the course of treatment. The principal troubles are tuberculosis, chronic rheumatism, heart disease, hernia, catarrh, epilepsy, dyspepsia, and constipation. Many of the men are affected with two or

more of these diseases at the same time, and yet may be admitted to hospital for some minor complaint not connected with either.

The 2,353 cases treated at sick call are not included in the above list of diseases.

The following patients not members of the Home were temporarily admitted to hospital for treatment during the year:

Name.	Service.	Disease.
Haag, Herman	Private, Company M, Third Artillery	Inguinal hernia.
Zirkle, R. L	Private, Company K, Third Artillery	Do.
Schell, Louis	Corporal, Company F, Sixth Infantry	Do.
Berger, Louis	Private, Company C, Fourth Artillery	Do.
Spokes, John	Private, Company G, Fifth Artillery	Do.
Langfelder, D	Private, Company G, Seventeenth Infantry	Do.
Mueller, A. H	Cadet, United States Military Academy, appointed	Do.
Christian, J. B	Second lieutenant, Second Cavalry	Do.
Miller, D. B	Hospital steward, United States Army	Appendicitis.
Klein, Adolphus	Corporal, Company G, Third Artillery	Inguinal hernia.

Necrology.

Name.	Age.	Nativity.	Company and regiment last served in.	Died.	Cause of death.
				1895.	
Long, Charles	71	Germany	K, 5th Inf	Oct. 2	Sarcoma of face.
Rivers, Philip	80	United States.	K, 1st Cav	Oct. 20	Heart disease.
Coon, James	47	do	H, 10th Inf	Oct. 26	Consumption.
McKernan, John	75	Ireland	Ordnance	Oct. 27	Congestion of brain.
Scotland, T. D	55	England	G, 10th Inf	Nov. 10	Abscess of lung.
Keefer, Samuel	85	United States.	G, 5th Inf	Nov. 11	Cancer of liver.
O'Brien, William S	46	do	A, 5th Art	Nov. 17	Cerebral hemorrhage.
Brereton, Edward	65	Ireland	H, 22d Inf	Nov. 25	Abscess of lung.
Bunton, Peter	47	United States.	Hosp. Corps	Dec. 8	Heart disease.
Langenburg, William*	72	Germany	H, 22d Inf	Dec. 9	Suicide.
Byrnes, James	52	Ireland	L, 3d Art	Dec. 19	Pleuro pneumonia.
				1896.	
Clemens, Eugene	53	Germany	M, 4th Art	Jan. 1	Consumption.
Hartwick, John V	80	United States.	F, 11th Inf	Jan. 11	Diabetes mellitus.
Splaine, Edward	41	do	C, 20th Inf	Jan. 30	Consumption.
Grigsby, Lewis S	64	do	E, 3d Cav	Feb. 10	Perforation of gall bladder and peritonitis.
Hockman, Jeremiah	67	do	B, 18th Inf	Feb. 14	Cirrhosis of liver.
Cunningham, Michael	51	Ireland	F, 2d Inf	Feb. 14	Renal abscess.
Johns, Henry D	68	United States.	Ordnance	Feb. 14	Erysipelas.
Lyle, William R. *	46	Scotland	M, 4th Art	Feb. 23	Suicide.
Shook, David	80	United States.	Ordnance	Feb. 27	Inflammation of bowels.
Hagens, James *	70	Ireland	G, 1st Inf	Feb. 27	Paralysis, apoplectic.
McNulty, Patrick	55	do	E, 18th Inf	Feb. 28	Pneumonia.
Bankard, Edgar W	78	United States.	I, 6th Inf	Mar. 1	Old age.
Sommerville, Edward	51	do	F, 25th Inf	Mar. 25	Heart disease.
Thunhauser, Gabriel	83	Germany	B, 8th Inf	Mar. 29	Old age.
Bentz, Charles	73	do	G, 1st Inf	Apr. 1	Cancer of liver.
Enz, Charles	59	do	F, 7th Cav	Apr. 5	Heart disease.
Karl, Johnson	66	Austria	M, 1st Art	Apr. 8	Aneurism of aorta.
Fagan, Martin	56	Ireland	A, 3d Art	Apr. 12	Cirrhosis of liver.
Madden, John *	59	do	H, 3d Cav	Apr. 13	Sudden cardiac paralysis.
Finley, James	48	do	G, 14th Inf	Apr. 17	Hemophilia.
Konkel, Henry	43	United States.	B, 22d Inf	Apr. 18	Aneurism of aorta.
Coulter, Edward C	66	do	Ordnance	Apr. 19	Heast disease.
Kingston, Augustus	80	Sweden	E, 16th Inf	Apr. 21	Old age.
Boyne, Thomas	50	United States.	H, 25th Inf	Apr. 21	Consumption.
Rehm, Roderick	58	Germany	H, 13th Inf	May 10	Heart disease.
Williams, Thomas	72	Sweden	C, 3d Inf	May 31	Senile gangrene.
McBride, Roger A	70	Ireland	D, 19th Inf	June 4	Cancer of stomach.
Monshart, Maximillian	68	Germany	I, 14th Inf	June 9	Fracture of skull.
Holmes, George F	42	United States.	Gen. service	July 1	Consumption.
Tillett, Charles H	58	do	G, 16th Inf	July 9	Bright's disease.
Gordon, John	69	Ireland	Ord. sergt	July 14	Inflammation of bladder.
Sims, Robert	36	United States.	H, 9th Cav	July 16	Consumption.
Heine, William R	54	Germany	C, 2d Inf	July 18	Heart disease.
Darby, Gideon	84	Ireland	Hosp. steward	Aug. 9	Cancer of lip and face.
Seward, John*	69	do	D, 4th Inf	Sept. 6	Heart disease.
Williams, Joseph W	51	United States.	H, 10th Cav	Sept. 26	Consumption.

*Dead when brought to hospital.

The daily average of inmates present at the Home was: For 1892, 745; for 1893, 751; for 1894, 734; for 1895, 676; for 1896, 688.

Proportion of deaths to 100 inmates per annum.

Year.	Per cent.	Year.	Per cent.	Year.	Per cent.
1896	6.10	1894	4.77	1892	5.10
1895	4.29	1893	4.66	1891	5.15

Number of prescriptions compounded during the year	6,736
Applications for treatment at sick call	2,353
Number of out-patients connected with the Home treated	312

Annual statement of expenses from treasurer's records.

	1896.	1895.	1894.	1893.
Average number of men, including attendants	109	108	108	112.42
Subsistence	$7,893.04	$7,837.93	$8,387.95	$9,187.47
Subsistence, inmates Government Insane Asylum	3,539.29	3,379.28	3,740.62	2,985.00
Cost of medicines	1,388.75	1,166.41	940.27	1,303.94
Attendants	6,417.76	6,435.29	6,369.36	6,330.62
Ice	437.33	441.11	524.41	350.10
Fuel	1,073.91	733.97	1,646.28	1,384.89
Gas	1,062.40	959.00	1,012.00	923.13
Laundry	91.00	218.24	283.52	252.81
Stationery	53.90	48.60	94.89	112.11
Spectacles	31.50	39.75	82.00	29.51
Trusses	11.00	9.00	7.00	4.75
Coffins	339.86	259.02	378.51	334.96
Bedding	210.21	151.13	622.50	263.15
Repairs	629.66	520.80	571.92	1,915.54
Forage for ambulance horses	206.98	204.67	273.05	201.24
Instruments and appliances	158.67	152.55	63.73	133.81
Books	96.13	103.55	139.94	43.12
Furniture	238.02	61.00	103.60	414.42
Miscellaneous	39.74	75.98	36.75	39.71
Total	23,919.15	22,797.28	25,278.30	26,210.28
Cost per man per day.....cents..	59.96	57.83	66.10	63.87

Monthly statement of expenses of hospital from October 1, 1895, to September 30, 1896, furnished by the treasurer.

Articles, etc.	Amount.
October, 1895.	
Subsistence	$734.71
Gas	71.00
Ice	30.33
Pay, clinical assistant	100.00
Pay, ambulance driver	20.00
Extra washing	7.00
Forage and hay	18.95
Horseshoeing	3.00
Cooking utensils, tableware, etc	30.57
Coal	385.67
Articles for police purposes	14.56
Materials, repairs to range	23.10
Plumbing material	1.00
Brushes, $1.08; freight, 55 cents	1.63
Stationery and printing	3.40
Medical and hospital supplies	422.55
Instruments	10.00
Spectacles	3.00
Lumber for coffins	37.02
Pay roll, extra duty	419.00
Total	2,336.49
November, 1895.	
Subsistence	675.15
Gas	99.25
Ice	18.00
Pay, clinical assistant	100.00
Pay, ambulance driver	20.00
Extra washing	5.56
Forage and hay	18.95
Horseshoeing	3.00

Articles, etc.	Amount.
November, 1895—Continued.	
Coal	$207.62
Articles for police purposes	7.43
Towels, sheets, napkins, etc	98.11
Material for chairs	3.55
Material for refrigerator	7.13
Freight	.55
Stationery and printing	9.81
Medical and hospital supplies	44.01
Instruments	1.55
Medical books	16.65
Material for coffins	29.20
Pay roll, extra duty	411.40
Total	1,774.92
December, 1895.	
Subsistence	700.18
Gas	141.50
Ice	16.61
Pay, clinical assistant	100.00
Pay, ambulance driver	20.00
Extra washing	6.63
Forage and hay	18.95
Horseshoeing	3.00
Articles for police purposes	7.26
Chairs, Holland shades	119.99
Paints and oil	12.25
Plumbing material	2.40
Radiator, duck, grindstone	11.00
Steel tapes, hooks, files	3.34
Stationery and printing	4.65
Medical books	11.30

Monthly statement of expenses of hospital from October 1, 1895, to September 30, 1896, furnished by the treasurer—Continued.

Articles, etc.	Amount.
December, 1895—Continued.	
Instruments and appliances	$80.50
Coffin trimmings	26.40
Pay roll, extra duty	405.65
Government Asylum for Insane	849.29
Total	2,540.90
January, 1896.	
Subsistence	673.86
Gas	172.25
Ice	15.92
Pay, clinical assistant	100.00
Pay, ambulance driver	20.00
Extra washing	8.16
Forage and hay	16.33
Horseshoeing	3.00
70 pairs slippers	66.50
Refrigerator	42.00
Covering for water pipes	21.00
Hinges, springs, hooks	7.55
Curtains, sheeting, tape	6.03
Grate and repairs to furnace	18.05
Ornamental glass, front door	9.00
Kitchen utensils, etc	43.22
Plumbing material	2.54
Articles for police purposes	11.32
Express charges	.50
Medical and hospital supplies	72.94
Lumber for coffins	38.34
Pay roll, extra duty	412.52
Total	1,761.03
February, 1896.	
Subsistence	627.46
Gas	147.75
Ice	13.85
Pay, clinical assistant	100.00
Pay, ambulance driver	20.00
Extra washing	6.87
Forage and hay	16.33
Horseshoeing	3.00
Coal	191.50
Articles for police purposes	9.17
Freight	.25
Paints and oils	19.87
Steel ornamental ceiling	52.00
Stationery and printing	12.35
Medical and hospital supplies	138.56
Medical books	11.10
Instruments	27.79
Spectacles	6.00
Pay roll, extra duty	419.00
Total	1,822.85
March, 1896.	
Subsistence	660.61
Gas	135.50
Ice	10.42
Pay, clinical assistant	100.00
Pay, ambulance driver	20.00
Extra washing	7.48
Horseshoeing	3.00
Coal	208.10
Articles for police	12.72
Plumbing material	1.40
Freight	.69
Hot-water boiler	29.71
Stationery and printing	5.15
Medical and hospital supplies	24.41
Coffin material	66.46
Pay roll, extra duty	410.13
Government Asylum for Insane	860.00
Forage and hay	16.34
Total	2,572.12
April, 1896.	
Subsistence	665.36
Gas	95.00
Ice	23.78
Pay, clinical assistant	100.00

Articles, etc.	Amount.
April, 1896—Continued.	
Pay, ambulance driver	$20.00
Extra washing	10.13
Forage and hay	16.34
Horseshoeing	3.00
Coal	24.90
Repairs, miscellaneous	7.48
Kitchen utensils and tableware	44.83
Articles for police purposes	4.13
Plumbing material	3.10
Casters for ice chest	.34
Repairs to furnace and range	14.21
Medical and hospital supplies	4.25
Instruments	7.30
Trusses	7.00
Coffin materials	69.54
Pay roll, extra duty	413.50
Total	1,534.19
May, 1896.	
Subsistence	613.03
Gas	54.25
Ice	45.67
Pay, clinical assistant	100.00
Pay, abulance driver	20.00
Extra washing	7.31
Forage and hay	16.34
Horseshoeing	3.00
Hinges and sash cord	2.00
Repairs to range	1.43
Articles for police purposes	12.60
Stationery and printing	5.20
Medical and hospital supplies	489.82
Medical books	19.03
Instruments	4.50
Spectacles	7.50
Pay roll, extra duty	415.00
Total	1,816.68
June, 1896.	
Subsistence	639.59
Gas	49.50
Ice	42.71
Pay, clinical assistant	100.00
Pay, ambulance driver	20.00
Extra washing	6.91
Forage and hay	16.34
Horseshoeing	3.00
Coal	27.07
Repairs to range	1.50
Articles for police purposes	14.87
Repairs for fan house	1.97
Repairs to elevator	2.55
Hand screws and tacks	.90
Renovating hair mattresses	7.50
Medical and hospital supplies	42.80
Medical books	4.50
Spectacles	4.50
Instruments	10.50
Trusses	4.00
Pay roll, extra duty	421.79
Government Asylum for Insane	910.00
Total	2,332.50
July, 1896.	
Subsistence	653.50
Gas	32.20
Ice	80.11
Pay, clinical assistant	100.00
Pay, ambulance driver	20.00
Extra washing	10.25
Forage and hay	17.37
Horseshoeing	3.00
Towels and pillowcases	45.60
Milk cans and baking pans	11.00
Brushes and tableware	12.91
Articles for police	6.93
Wire screen cloth	3.00
Material for plumbing	3.70
Repairs to range	5.20
Medical and hospital supplies	100.85

Monthly statement of expenses of hospital from October 1, 1895, to September 30, 1896, furnished by the treasurer—Continued.

Articles, etc.	Amount.	Articles, etc.	Amount.
July, 1896—Continued.		*September, 1896.*	
Medical books	$8.00	Subsistence	$609.24
Instruments	5.00	Gas	36.60
Coffin materials	72.90	Ice	60.87
Pay roll, extra duty	415.70	Pay, clinical assistant	100.00
Total	1,607.22	Pay, ambulance driver	20.00
August, 1896.		Extra washing	6.36
Subsistence	642.35	Forage and hay	17.37
Gas	27.60	Horseshoeing	3.00
Ice	79.06	Zinc and binding posts	1.60
Pay, clinical assistant	100.00	Coal	8.30
Pay, ambulance driver	20.00	Operating table	70.00
Extra washing	8.34	Kerosene oil	4.50
Forage and hay	17.37	Material, repairs to range	13.70
Horseshoeing	3.00	Material, repairs to ice box	19.00
Coal	20.75	Articles for police	9.24
Material, repairs to elevator	24.42	Register, basin clamps	4.60
Material for cold-air duct	16.38	Chair bottoms, $2.50; express 75 cents	3.25
Express charges	.45	Medical and hospital supplies	38.28
Articles for police purposes	9.35	Medical books	25.55
Stationery and printing	7.34	Instruments	11.53
Medical and hospital supplies	10.28	Printing and stationery	6.00
Spectacles	4.50	Spectacles	6.00
Pay roll, extra duty	419.00	Government Asylum for Insane	920.00
Total	1,410.19	Pay roll, extra duty	415.07
		Total	2,410.06

The general sanitary condition of the Home and grounds has been excellent throughout the year. The water supply and drainage are satisfactory. There has been no prevalent or epidemic disease among the inmates.

Cases of malarial fever treated in hospital during the past fourteen years have been as follows:

Year.	Cases.	Year.	Cases.	Year.	Cases.
1883	8	1888	5	1893	8
1884	2	1889	8	1894	0
1885	8	1890	4	1895	10
1886	4	1891	7	1896	14
1887	7	1892	9		

Making an average of 6⅞ per year. The infection in nearly all of these cases was received outside. Cases of malaria originating within the limits of the Home are very rare.

Very respectfully, your obedient servant,

W. H. FORWOOD,
Surgeon, United States Army, in charge.

The GOVERNOR OF THE HOME.

REPORT OF THE SECRETARY AND TREASURER OF THE SOLDIERS' HOME.

TREASURER'S OFFICE, UNITED STATES SOLDIERS' HOME,
Washington, D. C., October 10, 1896.

GENERAL: I have the honor to transmit herewith my annual reports for the year ended September 30, 1896, as follows:

Statement of receipts and expenditures of the Home fund, with recapitulation and comparative statement for the previous year.

Statement of the permanent fund and interest account, as shown by the Warrant Division, Treasury Department.

Statement of treasurer's account with the inmate pensioners.

Statement of pensioners in the Home, rates of pensions, etc.

Statement in regard to members receiving outdoor relief, rates of relief, pensions, etc.

Statement of receipts and expenditures on account of the farm and garden.

Very respectfully,

RICHD. C. PARKER,
Secretary and Treasurer.

Gen. D. S. STANLEY, U. S. A.,
Governor of the Home.

Annual report of receipts and expenditures on account of the United States Soldiers' Home, District of Columbia, from October 1, 1895, to September 30, 1896, by Bvt. Maj. Richard C. Parker, United States Army, secretary and treasurer.

Receipts and expenditures.	1895.			1896.									Total.
	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	
RECEIPTS.													
From the United States Treasurer upon resolutions of the Board of Commissioners approved by Secretary of War	.....	$14,000.00	$20,600.00	.....	$12,000.00	$23,000.00	.....	$12,000.00	$18,000.00	.....	$10,000.00	$15,000.00	$124,600.00
From interest on permanent fund	$20,095.33	.....	.....	$20,270.98	.....	.....	$20,282.02	.....	.....	$20,301.57	.....	.....	80,949.90
From effects of deceased inmates subject to demand of legal heirs	9.20	.10	.62	41.50	7.78	37.62	55.40	.03	3.06	163.55	.....	2.25	321.11
From miscellaneous sources	387.00	165.11	529.28	159.74	36.33	383.57	67.09	49.10	264.22	98.04	191.39	3,745.27	6,076.14
Total	20,491.53	14,165.21	21,129.90	20,472.22	12,044.11	23,421.19	20,404.51	12,049.13	18,267.28	20,563.16	10,191.39	18,747.52	211,947.15
EXPENDITURES.													
Repairs to officers' quarters	.....	1.50	1.75	6.34	23.30	24.33	38.08	4.99	32.01	36.70	19.88	13.64	202.52
Compensation of the governor, deputy governor, treasurer, and clerk to the Board of Commissioners	348.74	348.74	348.74	348.74	348.74	348.74	348.74	348.74	234.16	463.32	348.74	348.74	4,184.88
Transportation furnished to discharged soldiers en route to the Home, to be refunded to the Quartermaster's Department	18.15	74.22	.....	122.20	36.43	54.65	102.69	100.50	121.76	65.44	.....	140.10	836.14
Fuel for the Home	1,146.33	2,512.17	136.95	.....	1,354.47	351.10	103.75	748.96	111.02	.....	102.95	33.20	6,600.90
Expenses of the hospital for medicines, medical stores, spectacles, false teeth, materials for coffins, etc.	472.57	92.01	118.25	111.28	179.25	93.87	88.09	520.85	66.50	186.75	14.78	151.36	2,095.56
Expenses of the hospital for mess and kitchen purposes and all running expenses, including compensation to inmates on duty and pay of civilian employees	1,665.27	1,504.91	1,401.58	1,462.08	1,416.19	1,408.13	1,269.67	1,113.70	1,177.72	1,228.02	1,136.61	1,163.72	15,947.60
Refunded to claimants as heirs of deceased soldiers	.....	.....	.....	68.28	113.24	100.02	2.49	.....	539.45	102.21	287.73	121.14	1,334.56
Refunded to claimants as heirs of deceased inmates	680.10	.....	64.34	.35	.....	2.95	.....	37.87	2,025.06	.....	.....	8.89	2,819.56
Clothing for inmates	6,726.42	30.15	.....	.....	.....	.....	2,501.72	1,115.96	.....	.....	.....	.....	10,374.25
Subsistence stores and ice, including special diet and stimulants for the sick	2,722.24	2,827.74	2,760.06	2,985.83	2,695.78	2,634.43	3,019.97	2,828.36	2,839.26	2,804.73	2,792.68	2,619.41	33,530.49
Expenses of the Home bakery for repairs	.....	.....	.....	.....	13.68	3.20	.....	.....	.....	10.85	26.00	.....	53.73

Bedding for inmates, bedsteads, blankets, upholsterers' materials, etc.	.....	.....	19.43	11.10	21.60	.....	15.75	10.50	.....	19.80	.....	17.92	116.10
Farm, garden, and dairy utensils, seeds, guano, manure, cultivation of garden, ornamentation of grounds, pay of farm, garden, dairy and other employees	1,293.79	1,234.53	1,050.55	1,131.50	1,077.69	1,088.52	1,585.96	1,279.93	1,552.17	1,415.26	1,270.62	1,436.21	15,416.73
Mess and kitchen utensils and all other articles, except bedding for the Home	196.24	46.05	93.80	69.32	115.77	18.75	120.04	96.80	8.00	100.32	50.18	24.80	940.07
Material for general repairs to buildings, repair of roads and fences, purchase and repair to harness, and purchase of mechanical tools	106.63	230.47	143.79	211.48	73.19	70.53	126.69	193.28	206.34	243.34	101.07	63.15	1,769.66
Forage and medicines for Home animals, articles used in stables	94.19	90.79	93.89	71.42	62.60	66.37	71.16	63.74	61.41	70.30	62.98	57.14	866.59
Expenses of the library, governor's and treasurer's offices, postage, post-office box rent, stationery, etc., for Commissioners' office, freight, telegrams, and amusements	72.70	163.01	14.00	535.42	114.36	97.35	97.01	123.03	11.38	11.32	97.57	40.11	1,377.86
Incidental expenses, rental of telephone, hack hire, advertising, traveling expenses, professional services, and expenses of Home chapel	21.85	.....	68.40	.....	.....	69.00	42.42	7.34	109.75	.....	14.00	60.27	393.03
Religious services	165.00	165.00	165.00	165.00	165.00	165.00	165.00	165.00	165.00	165.00	165.00	165.00	1,980.00
Laundry work for the Home	111.19	121.00	119.60	126.04	134.17	128.06	127.35	132.40	124.95	124.07	135.57	129.54	1,513.84
Compensation and monthly allowances to inmates, nonpensioners, on duty at the Home, except compensation to inmates on duty at Barnes Hospital	1,685.86	1,611.72	1,580.74	1,625.76	1,615.95	1,586.74	1,601.76	1,618.48	1,630.39	1,646.67	1,675.82	1,673.61	19,553.50
Commutation to members of the Home residing outside	325.00	332.80	5,827.07	358.00	320.00	5,822.00	416.13	352.26	5,913.33	387.00	296.00	6,121.47	26,471.06
Gas for the Home, including rental of Amick's improved gas regulators	251.50	286.75	346.50	434.00	393.00	309.75	252.50	192.00	169.25	120.80	117.50	153.90	3,027.45
Board and medical treatment of members of the Home in Government Hospital for the Insane	.....	.....	849.29	.....	.....	860.00	.....	.....	910.00	.....	.....	920.00	3,539.29
Funeral expenses of members of the Home residing outside	50.00	50.00	.....	.....	.....	50.00	.....	20.00	25.00	25.00	50.00	50.00	320.00
New buildings, cost of erecting new amusement hall, heating and ventilating same, and increasing boiler plant	100.00	5,300.00	9,700.00	5,300.00	4,100.00	5,100.00	5,735.70	3,963.58	600.00	5,100.00	2,703.30	6,095.00	53,797.58
Permanent improvements, new fences, wells, repairs to bridges, lamp-posts, gas lamps, paving, sewerage, etc.	6.00	.....	.....	113.85	52.00	74.00	.....	.....	393.84	.....	.....	.....	639.69
Total	18,259.67	17,023.56	24,903.73	15,257.99	14,426.41	20,527.49	17,832.67	15,038.27	19,027.75	14,327.80	11,468.98	21,608.32	209,702.64

RECAPITULATION.

RECEIPTS.

Balance on hand September 30, 1895	$5,680.74
From the United States Treasurer upon resolutions of the Board of Commissioners, approved by the Secretary of War	124,600.00
From interest on permanent fund	80,949.90
From effects of deceased inmates subject to the demand of legal heirs	321.11
From miscellaneous sources	6,076.14
Total	217,627.89

EXPENDITURES.

Repairs to officers' quarters	$202.52
Compensation of the governor, deputy governor, treasurer, and clerk to the Board of Commissioners	4,184.88
Transportation furnished to discharged soldiers en route to the Home and refunded to Quartermaster's Department	836.14
Fuel for the Home	6,600.90
Expenses of the hospital for medicines, medical stores, spectacles, false teeth, materials for coffins, etc	2,095.56
Expenses of the hospital for mess and kitchen purposes and all running expenses, including compensation to inmates on duty and pay of civilian employees	15,947.60
Refunded to claimants as heirs of deceased soldiers	1,334.56
Refunded to claimants as heirs of deceased inmates	2,819.56
Clothing for inmates	10,374.25
Subsistence stores and ice, including special diet and stimulants for the sick	33,530.49
Expenses of the Home bakery	53.73
Bedding for inmates, bedsteads, blankets, upholsterer's materials, etc	116.10
Farm, garden, and dairy utensils, seeds, guano, manure, cultivation of garden, ornamentation of grounds, pay of farm, garden, dairy, and other employees	15,416.73
Mess and kitchen utensils and all other articles except bedding for the Home	940.07
Materials for general repairs to buildings, repair of roads and fences, purchase and repairs to harness, vehicles, etc., purchase of mechanical tools	1,769.66
Forage and medicines for Home animals, articles used in stables	866.59
Expenses of the library, governor's and treasurer's offices, post-office box rent, stationery, etc., for office Board of Commissioners, freight, telegrams, and amusements	1,377.86
Incidental expenses, rental of telephone, hack hire, traveling expenses, professional services, and expenses Home chapel	393.03
Religious services	1,980.00
Laundry work	1,513.84
Compensation and monthly allowances to inmates, nonpensioners, on duty at the Home, except compensation to inmates on duty at Barnes Hospital	19,553.50
Commutation to members of the Home residing outside	26,471.06
Gas for the Home, including rental of Amick's gas regulators	3,027.45
Board and medical treatment of members of the Home in Government Hospital for the Insane	3,539.29
Funeral expenses of members of the Home residing outside	320.00
New buildings: Constructing new amusement hall, heating and ventilating same, and increasing boiler plant	53,797.58
Permanent improvements: New fences, wells, repairs to bridges, lamp-posts, gas lamps, paving, sewerage, etc	639.69
Balance on hand September 30, 1896	7,925.25
Total	217,627.89

Comparative statement of money received and disbursed on account of the United States Soldiers' Home for two years—October 1, 1894, to September 30, 1896.

Received from October 1, 1894, to September 30, 1895	$166,720.68
Expended from October 1, 1894, to September 30, 1895	161,039.94
Balance on hand September 30, 1895	5,680.74
Received from October 1, 1895, to September 30, 1896	217,627.89
Expended from October 1, 1895, to September 30, 1896	209,702.64
Balance on hand September 30, 1896	7,925.25
Expenditures during the year ending September 30, 1895, for new buildings and permanent improvements	1,965.36
Running expenses for the year	159,074.58
Expenditures during the year ending September 30, 1896, for new buildings and permanent improvements	54,437.27
Running expenses for the year	155,265.37
Average cost per man, per year	$175.10
Average cost per man, per month	$14.59
Average number of inmates for the year ending September 30, 1896	685
Average cost of ration per man per month, including vegetables and fruit raised on Home grounds	$4.94
Average cost of ration per day	$0.16¼

I certify that the foregoing statement is correct:

RICH. C. PARKER,
Brevet Major, United States Army, Secretary and Treasurer.

Statement of the Soldiers' Home permanent fund account, from October 1, 1895, to September 30, 1896.

Date.		Partial amounts.	Dr.	Cr.
1895.				
Oct. 1	Balance			$2,690,042.83
Oct. 11	Amount of deposits	$16,390.15		
Nov. 27	.....do	25,485.27		
1896.				
Jan. 28	Amount of deposits	25,392.74		
Apr. 29	.....do	40,438.76		
Aug. 28	.....do	26,296.58		
Sept. 26	.....do	11,696.99		
1895.				145,700.49
Oct. 2	Less amount paid from permit funds	18.80		
Nov. 12	.....do	14,000.00		
Dec. 10	.....do	16,000.00		
Dec. 28	.....do	4,600.00		
1896.				
Feb. 15	Less amount paid from permit funds	12,000.00		
Mar. 13	.....do	23,000.00		
May 18	.....do	12,000.00		
June 16	.....do	18,000.00		
Aug. 10	.....do	10,000.00		
Sept. 10	.....do	15,000.00		
			$124,618.80	
Sept. 30	Balance		2,711,124.52	
	Total		2,835,743.32	2,835,743.32

Statement of the Soldiers' Home interest account, from October 1, 1895, to September 30, 1896.

	Partial amounts.	Dr.	Cr.
Balance October 1, 1895			$20,095.33
Interest on balance, $2,690,042.83, from Oct. 1 to Dec. 31, 1895	$20,175.32		
Interest on deposit, Oct. 11 to Dec. 31, 1895	110.47		
Interest on deposit, Nov. 27 to Dec. 31, 1895	73.31		
			20,359.10
Interest on balance, $2,697,299.45, from Jan. 1 to Mar. 31, 1896	20,229.74		
Interest on deposit, Jan. 28 to Mar. 31, 1896	133.57		
			20,363.31
Interest on balance, $2,687,692.19, from Apr. 1 to June 30, 1896	20,157.69		
Interest on deposit, Apr. 29 to June 30, 1896	209.47		
			20,367.16
Interest on balance, $2,698,130.95, from July 1 to Sept. 30, 1896	20,235.98		
Interest on deposit, Aug. 28 to Sept. 30, 1896	73.49		
Interest on deposit, Sept. 26 to Sept. 30, 1896	4.80		
			20,314.27
Less interest on principal paid—			
Fourth quarter of 1895	88.12		
First quarter of 1896	81.29		
Second quarter of 1896	65.59		
Third quarter of 1896	68.63		
		$303.63	
Less interest paid—			
Fourth quarter of 1895	20,095.33		
First quarter of 1896	20,270.98		
Second quarter of 1896	20,282.02		
Third quarter of 1896	20,301.57		
		80,949.90	
Balance		20,245.64	
Total		101,499.17	101,499.17

The treasurer of the United States Soldiers' Home in account with the inmate pensioners for moneys received under section 4, act approved March 3, 1883, and deposited with the Treasurer of the United States.

PENSION MONEY RECEIVED.

1895.			
Oct.	1.	Balance on hand	$46,626.04
	31.	S. L. Willson's checks	915.93
Nov.	30.	S. L. Willson's checks	67.03
Dec.	31.	S. L. Willson's checks	19,004.94
1896.			
Jan.	31.	S. L. Willson's checks	333.24
Feb.	29.	S. L. Willson's checks	480.03
Mar.	31.	S. L. Willson's checks	19,839.55
Apr.	30.	S. L. Willson's checks	326.16
May	31.	S. L. Willson's checks	92.57
June	30.	S. L. Willson's checks	19,484.64
July	31.	S. L. Willson's checks	576.34
Aug.	31.	S. L. Willson's checks	18.67
Sept.	30.	S. L. Willson's checks	19,785.16
		Total	127,550.30

PENSION MONEY DISBURSED.

1895.			
Oct.	12.	Amount paid the estate of Michael McKeon, deceased	$1,437.00
	31.	Pension pay roll for October, 1895	1,653.97
Nov.	30.	Pension pay roll for November, 1895	419.70
Dec.	16.	Amount paid Reuben M. Wright, pensioner	36.00
	26.	Amount paid the estate of Joseph Eustace, deceased	132.00
	31.	Pension pay roll for December, 1895	15,455.64
1896.			
Jan.	4.	Amount paid to Roger Monahan, pensioner	39.00
	10.	Amount paid the estate of William Dinsmore, deceased	720.00
	20.	Amount paid the estate of Peter Bunton, deceased	205.00
	30.	Amount paid the estate of James Coon, deceased	87.00
	31.	Pension pay roll for January, 1896	1,156.40
Feb.	5.	Amount paid Frederick Lindner, pensioner	50.00
	25.	Amount paid the estate of John Cannon, deceased	82.00
	29.	Pension pay roll for February, 1896	537.03
Mar.	6.	Amount paid James Regan, pensioner	13.00
	23.	Amount paid Louis Grade, pensioner	40.00
	25.	Amount paid the estate of James Byrnes, deceased	45.00
	31.	Amount paid the estate of Jeremiah Hockman, deceased	12.00
	31.	Pension pay roll for March, 1896	15,491.87
Apr.	30.	Pension pay roll for April, 1896	2,512.50
May	25.	Amount paid the estate of H. D. Johns, deceased	36.00
	30.	Pension pay roll for May 1896	1,228.30
June	26.	Amount paid the estate of Thomas Boyne, deceased	68.00
	26.	Amount paid the estate of L. S. Grigsby, deceased	94.00
	30.	Pension pay roll for June, 1896	16,873.02
July	6.	Amount paid Joseph Miller, pensioner	50.00
	31.	Pension pay roll for July, 1896	2,069.57
Aug.	31.	Pension pay roll for August, 1896	202.67
Sept.	10.	Amount paid the estate of George F. Holmes, deceased	4.00
	12.	Amount paid the estate of Benjamin R. White, deceased	303.00
	14.	Amount paid George Krager, pensioner	26.00
	30.	Amount paid the estate of Charles Ott, deceased	60.00
	30.	Pension pay roll for September, 1896	16,283.65
	30.	Pension moneys of deceased pensioners transferred to the Home fund	3,282.00
	30.	Balance in United States Treasury	46,844.98
		Total	127,550.30

Annual report of the number of pensioners in the United States Soldiers' Home, rate of pensions, etc., September 30, 1896.

Pensioners drawing, per month—	
$6	151
$8	144
$10	57
$12	297
$12.50	1
$13	1
$14	38
$15	2
$16	30
$17	69
$18	1
$20	3
$22	3
$24	15
$25	1
$30	15
$50	1
$72	1
Total	830

Pensioners present in the Home:		
Pensioners whose money is drawn by the treasurer	563	
Pensioners who have assigned their certificate	11	
		574
Pensioners absent:		
On outdoor relief	251	
On suspension	5	
		256
Total number of pensioners, September 30, 1896		830
Total number of pensioners, September 30, 1895		767
Alterations since last report, September 30, 1895:		
New certificates received for inmates	73	
Admitted and readmitted	203	
		276
Loss by discharge	160	
Loss by death	53	
		213
Net gain during the year		63
Description of certificates:		
Army invalids		519
Army, act of June 27, 1890		140
Mexican war		165
Indian war		2
Navy, original		3
Navy, act of June 27, 1890		1
Total		830

NOTE.—There are 6 pensioners in the Government Hospital for the Insane, whose money is drawn by the treasurer.

Farm account United States Soldiers' Home, October 1, 1895, to September 30, 1896, consolidated.

DR.	
Labor, forage, fuel, fertilizers, implements, seeds, and repairs	$3,818.78

CR.	
133 bushels beets	56.20
7,684 heads cabbage	257.52
49 bushels carrots	23.75
1,117 dozen ears corn	99.98
62 bushels cucumbers	23.20
875 pounds horse-radish	26.25
128 bushels kale	19.20
2,305 heads lettuce	46.10
1½ bushels okra	2.25
11,440 bunches onions	87.07
3,220 bunches parsley	$94.45
145½ bushels parsnips	73.00
1,394½ bushels potatoes	616.90
6,740 bunches rhubarb	92.15
87½ bushels salsify	65.62
2,655 pounds squashes	26.55
46 bushels string beans	17.90
440 bushels tomatoes	163.15
11 bushels turnips	3.85
145 tons hay	1,777.50
Balance to debit of farm	246.19
Total	3,818.78

Estimate of vegetables in the ground on United States Soldiers' Home farm September 30, 1896.

3,000 heads of cabbage, at 2 cents	$60.00	150 bushels spinach, at 60 cents	$90.00
100 bushels carrots, at 40 cents	40.00	300 bushels turnips, at 35 cents	105.00
1,500 pounds horse-radish, at 3 cents	45.00		
2,000 bunches parsley, at 2 cents	40.00	Total	455.00
100 bushels salsify, at 75 cents	75.00		

Garden account of United States Soldiers' Home, from October 1, 1895, to September 30, 1896, consolidated.

DR.

Labor, fertilizers, seeds, tools, fuel, and implements	$2,915.37

CR.

94 cords wood	141.00
20,670 plants, trees, and shrubs raised in garden and greenhouse	1,188.50
Balance to debit of garden expended in improvement of grounds	1,585.87
Total	2,915.37

NOTE.—This department has the care of the ornamentation of the grounds, lawns, flowers, shrubs, trees, and fruit.

Annual report of members of the United States Soldiers' Home receiving outdoor relief September 30, 1896, rates of relief, pensions, etc.

Number receiving outdoor relief:	
$8 per month	266
$4 per month	4
$2 per month	56
Total	326
Number receiving outdoor relief September 30, 1895	312
Net gain during year	14
Nonpensioners receiving outdoor relief	75
Receiving pensions:	
$6 per month	65
$8 per month	45
$10 per month	7
$12 per month	103
$14 per month	3
Receiving pensions—Continued.	
$16 per month	4
$17 per month	13
$20 per month	1
$22 per month	1
$24 per month	5
$25 per month	1
$30 per month	3
Total nonpensioners	75
Total pensioners	251
Grand total	326
Mexican war survivors	143
Men who have served 25 years or over	48
Nonpensioners of latter number	5

Fifteen members of the Home on outdoor relief have died since date of last report. Thirteen members were dropped from outdoor relief after June 30, 1896, in compliance with resolutions of the Board of Commissioners dated June 19, 1891, and July 18, 1896.

RICHD. C. PARKER,
Brevet Major, United States Army, Secretary and Treasurer.

Gen. D. S. STANLEY, U. S. A.,
Governor Soldiers' Home.

REPORT OF THE INSPECTION OF THE SOLDIERS' HOME.

WAR DEPARTMENT, INSPECTOR-GENERAL'S OFFICE,
Washington, D. C., December 16, 1896.

SIR: I have the honor to submit the following report of the inspection of the Soldiers' Home, District of Columbia, begun November 20, 1896, in which Mr. W. T. Kent, the accountant of the Department, assisted.

The officers of the Home were Brig. Gen. David S. Stanley, governor; Capt. D. A. Irwin, deputy governor; Maj. Richard C. Parker, secretary and treasurer; Lieut. Col. W. H. Forwood, surgeon.

Captain Irwin has filled the position of deputy governor since July 31, 1891. His persistent, intelligent, and soldierly efforts have been most effective; and his readiness, zeal, and efficiency in the performance of his duties and the marked improvement in all that was under his care deserves just recognition, now that his tour of duty is terminating.

The effects of the hurricane of September 29 last were still visible in the wooded parts of the reservation, and the leak marks in the hospital and other buildings may have been partly due or increased by it; but the roads had all been cleared of the débris, and, beyond some broken or uprooted trees, there was nothing to mar the beauty of the place; and painstaking care seems to have been exercised in maintaining grounds and buildings in their customary attractiveness.

NEW CONSTRUCTION.

The new amusement hall erected during the year was not quite completed, though it is understood that under the contract it should have been completed by May 1, 1896. The contract price is $64,000, and $5,740 for heating apparatus. The amount paid out during the year on this building was $47,000 on account of the hall, $4,719.30 on account of heating and ventilating apparatus and increasing the boiler capacity at the boiler house, and $2,078.28 for services of architect, inspector, and other expenses.

There are 502 acres in the tract owned by the Home, of which about 28 are used for farming purposes, 12 for the garden, 42 for lawns, and 200 for pasturage, and there are about 200 acres in woodland and 20 acres occupied by the buildings.

MEMBERS.

The average number of officers and members present during the year ending September 30, 1896, was 688, which is a slight increase over the number reported the year before and a gain of only 63 over the average

of ten years ago. The highest number present during the year was 722, on February 28, 1896, and the lowest 657, on July 6, 1896; and the total cared for was 1,535, against 1,755 the preceding year.

The average absentees number 380, which is the same as reported for the year before; the greatest number absent being 416, on July 8, 1896, and the lowest 351, on January 22, 1896. The age of the members present September 30, 1896, averaged 55.67 years. At date of inspection there were 45 vacant beds in barracks.

The length of service in the Army ran from 5 months to 30 years, with an average length of 14.69 years.

The present distribution of the personnel seems decidedly more commendable than the overcrowded condition that prevailed some years ago; and the absolute cleanliness and marked decorum, and indications of watchful and efficient care and management, are all the more noticeable, as they are accompanied by reduced expenditure and wise economy.

DISCIPLINE.

The regulations established by the Board of Commissioners for the internal police and discipline are enforced under the governor by the sergeants, Home police, and watchmen. Offenses do not appear specially numerous, those receiving disciplinary attention usually being drunkenness, absence without leave, and introducing liquor into the Home. This Home has not established a store or canteen like the National Home, though cigars, pies, etc., are sold as a private venture. The law prohibiting the sale of intoxicants within a radius of 1 mile of the Home does not seem to have been so effectively enforced as at some of the Branches of the National Home, and numerous places are said to have sprung up where a secret liquor traffic is carried on, and these old men are preyed upon. It is not known that any of the accidental deaths have been traced to these causes.

Of the average present during the year, 91, or 13.3 per cent, were tried once; 56, or 8.19 per cent, twice; and 31, or 4.53 per cent, more than twice; and 506, or 73.98 per cent, were not tried at all, and over 80 per cent of the average present were not punished. There were a total of 345 offenses committed by 178 men, of whom 31 seem to have committed over 40 per cent. The penalties attached consist of labor on roads and grounds, confinement in guard room, suspension, and dismissal. The guard room was in good condition, and one member was in confinement at date of inspection. Sixteen members were dropped from the rolls for absence without leave or desertion. The discipline at this Home compares favorably with that at similar institutions.

AMUSEMENTS.

Facilities for amusement consist of billiard, pool, and bagatelle tables, cards, chess, checkers, and dominoes, occasional variety entertainments, band, and library. Each barrack building has a sort of assembly room set aside, which is located on the ground floor in the Anderson Building and in the basement in the other four.

The billiard hall is located in the basement of the Sherman Building. It was in good condition and contains three billiard, one pool, and two bagatelle tables. There is no charge for these games and the tables are reported in constant use. Facilities for cards and other sedentary games are reported ample, each of the five amusement rooms containing tables. The rooms are inspected daily by a commissioned officer.

Whether additional innocent amusements, both out of doors and in,

may not be practicable, and something more acceptable offered than basement rooms, has doubtless received and deserved consideration.

The band is maintained during the entire year with an average membership of 14, all of whom are members of the Home. Its cost for the past year has been $1,925.04 for pay of the musicians, and $95.97 for instruments, and 155 concerts were given.

The library contained 6,074 volumes, which is an increase of 34 over the number reported last year, and of nearly 49 per cent during the past ten years; and 32 papers and 17 periodicals are subscribed for. Books may be taken from the library for two weeks at a time; and 12,694 were read, which gives an average of over 18 books per man. Fiction and history are in greatest demand, and the following are the ten books most read: Napoleon's Memoirs, Macaulay's England, Trilby, Fort Frayne, Bragelonne, A Rebel Queen, A Gentleman of France, A. D. 2000, Gabriel Conroy, and Edith Percival. The reported capacity of the reading room is 28, which seems small for an average daily attendance of 220.

There are three societies among the members, viz: Henry Wilson Post, G. A. R.; Gen. William F. Barry Garrison, R. A. N. U.; and Soldiers' Home Temperance Union, with a membership of 120, 46, and 130, respectively. The two societies first named meet twice a month, and the last named every Friday night in Sheridan Hall in the basement of the Sheridan building. They have no effect, it is reported, upon discipline.

RELIGIOUS SERVICES.

Divine services are held every Sunday by each chaplain, in the Home chapel, which has a capacity of 250, and is reported suitable for the purpose. There are three chaplains, a Catholic, an Episcopalian, and a Lutheran, who are paid $50 per month each, except the first named, who receives additional for organist and choir $15. They do not live at the Home. In addition to their Sunday services, they officiate at funerals and minister to the sick. The services are reported well attended.

BUILDINGS.

The buildings were all in excellent police and condition except some dormitory floors and the weather stains already mentioned; and over $2,000 was expended during the year for repairs of buildings and interior fixtures. The September storm caused damage to some of the roofs estimated at $575. Up to September 30, $53,797.58 had been expended on the new marble amusement hall referred to in last year's report. There are five barracks at the Home, known as the Scott, Sherman, Sheridan, Anderson, and King buildings. The two first named are of stone, and the last three of brick. The Anderson, which is stuccoed and is the smallest of the five, was not originally constructed for barrack purposes, and is used principally for the band. There is room in these buildings for 710 beds, though at date of inspection it was stated they contained 652, of which 607 were occupied. There are basements in all, which are used as amusement and smoking rooms, barber, tailor, upholsterer, and shoemaker shops, museum, reading and bath rooms, water-closets, and storerooms, and a few have bunks in them. The Anderson Building is the only one that has an attic, which gives sleeping quarters for four members and room for storing quartermaster property. The number of men to each bath tub averages 22.5, and the number of urinals and hoppers is one to each 31 men of the former and one to each 12 of the latter.

The barracks are heated by steam and hot air, and lighted by gas. The latter is reported at an expenditure of $5.97 per man per year.

Beds, bedding, and lockers were in good condition, and have noticeably improved during the past few years. The mattress in use here seems to be much superior to the one supplied at the National Home for Disabled Volunteer Soldiers. It is made of hair, and weighs 26 pounds; at the latter Home it is made of cotton, and weighs much less, though the one being furnished there now is several times thicker than formerly. The iron bedsteads seem to last interminably, and it is found that a breadth of 3 feet 6 inches gives decidedly greater comfort than a half foot less, especially to disabled men past middle life.

DISBURSEMENTS.

The accounts and disbursements of the treasurer were inspected from October 12, 1895, the date of last inspection, to November 20, 1896. The following is a summary:

HOME FUND.

Balance on hand October 12, 1895		$25,168.99
Received from the United States Treasury	$213,700.21	
Received from pension fund	3,282.00	
Received from sales	1,876.98	
Received from collections	1,214.26	
		220,073.45
Total to be accounted for		245,242.44
Disbursed as per vouchers		227,343.58
Balance on hand November 20, 1896		17,898.86

PENSION FUND.

Balance on hand October 12, 1895		$44,743.57
Received from pension agent		81,208.09
Total to be accounted for		125,951.66
Disbursed to pensioners	$76,510.28	
Transferred to Home fund	3,282.00	
		79,792.28
Balance on hand November 20, 1896		46,159.38
Total balance November 20, 1896		64,058.24
Distributed as follows:		
United States Treasurer	$63,240.86	
Assistant treasurer, New York	587.58	
Cash on hand	229.80	
Total		64,058.24

The records in the treasurer's office corresponded with his vouchers for receipts and disbursements, and were neatly kept. Perhaps it is more convenient for the treasurer to keep cash in his personal possession, averaging nearly $190 per month, and sometimes running as high as $340.18 at the close of the month; but with regard to other public funds the law requires that they shall be deposited and payments be made by check. This is found to be perfectly practicable and permits and insures a better accounting where applied. It is also noted that instead of taking a receipted voucher from each person to whom the amount is due, and thus making the abstract a record of all disbursements made and to whom made, as required for public funds, reimbursements are entered for cash payments.

On September 30, 1896, there were 563 pensioners on the rolls, of whom 557 were present. For the three months ending on that date the treasurer paid out on account of pensions $18,998.89, or an average of $34.11 to each pensioner present. The total amount of pension money received during the year was $80,924.26, and disbursed $80,705.32. There were 396 pensioners on the rolls who had balances to their credit. Of these, 3 had $1,000 or over each, 12 between $500 and $1,000 each, 120 between $100 and $500 each, and 261 less than $100 each, the total amounting to $16,844.98 on September 30, 1896, which seems to be kept lying idle on deposit. Six of these pensioners, whose continued savings foot up $3,529, are at the insane asylum. The pensions paid range from $6 to $72 per month, and average $11.78 per pensioner.

PERMANENT FUND.

The transactions affecting the permanent fund during the past three years may be stated as follows:

	1894.	1895.	1896.
Balance September 30	$2,479.343.32	$2,574,036.79	$2,690,042.83
Credit settlements	197,693.47	188,006.04	145,700.49
	2,677,036.79	2,762,042.83	2,835,743.32
Withdrawn for current expenses	103,000.00	72,000.00	124,618.80
Balance September 30	2,574,036.79	2,690,042.83	2,711,124.52

The reduction in the amount of credits to the permanent fund during 1895, as compared with the previous year, was but slight, but it is more marked during the year just closed, amounting to $43,305.55. Although a large draft was made on the fund for the new amusement hall, the balance at the close of the year shows an increase of about $21,000 over that of last year.

The annual expenses, exclusive of permanent improvements, have been reduced to $146,415.82, of which nearly $81,000 was met from the interest paid by the United States on the amount of the permanent fund on deposit with the United States Treasurer, and the remainder from the principal of that fund and some small incidental receipts as appears by the following statement:

RECEIPTS AND EXPENDITURES.

The following are the receipts taken up by the treasurer for the year ending September 30, 1896:

Balance on hand		$5,680.74
Received from permanent fund		124,618.80
Received from interest fund		80,949.90
Received from posthumous sources		321.11
Received from pension fund		3,282.00
Received from transportation		975.42
Received from sales:		
Current expenses	$278.00	
Subsistence	492.20	
Clothing	117.14	
Farm	565.15	
Construction	16.20	
Household	350.03	
		1,818.72
Total from all sources		217,646.09

The expenditures for the same period were:

Current expenses	$36,146.00
Subsistence	33,530.49
Clothing	10,374.25
Household	13,576.22
Hospital	18,043.16
Transportation	836.14
Construction	54,437.27
Repairs	2,025.91
Farm	6,248.73
Outdoor relief	26,471.06
Insane members at asylum	3,539.29
Posthumous fund	4,474.12
Total expenditures	$209,702.64
Balance September 30	7,944.05

Deducting from the expenditures the receipts from sales, the expense per capita during the year for an average present of 688 seems to have been distributed as follows:

Current expenses	$52.13
Subsistence	48.02
Clothing	14.91
Household	19.22
Hospital	26.23
Repairs	2.94
Farm	8.26
Total per capita	171.71

Compared with last year's expenses, these figures give a reduction of $16.30 per capita, and with the preceding year of $26.18.

It seems that the average per capita at this Home exceeds that at the National Homes for current expenses, hospital, clothing, and farm. This may be accounted for in part by the fact that it costs more proportionally for administration for a small number of persons than for a large number, to the manufacture by the National Home of the clothing for the members, and to the regular Home keeping in such excellent condition the extensive grounds and miles of roadways like a city park, and it has no post fund with which to share its expenses.

The per capita for subsistence, household expenses, and repairs seems to be less than at the National Home. In these, the favorable markets and the substantial character of the buildings are possibly factors.

In view of the diminishing receipts for the permanent fund, the large idle deposit and the loss thereby of interest amounting to a thousand dollars or so a year may deserve attention and a more business-like management.

OUTDOOR RELIEF.

The average daily number of members on outdoor relief during the year was 318.58, which is about 5 less than for the previous year. These beneficiaries received $26,471.06, or an average of $83.09 each for the year. The maximum amount paid was $96 and the minimum $24. The system of outdoor relief at this Home gives general satisfaction, and the expense seems less than half the cost of maintaining these beneficiaries at the Home. Combining these with those constantly present at the Home, a daily average of 1,006.58 members were cared for at an annual cost of maintenance per capita of $143.66.

If a system of relief founded on the same general plan could be provided for our disabled volunteer soldiers (and many are asking for it),

the capacity of the National Home to care for needy persons entitled to its benefits would be largely increased, especially during the winter months when the need is felt most intensely, and statistics demonstrate the overcrowding is greatest now.

EMPLOYEES.

The amount paid for services during the year was as follows:

3 officers	$2,984.88
28 noncommissioned officers	4,806.40
180 members	23,960.80
14 band	1,925.04
45 civilians	21,420.62
270	55,097.74

Compared with last year, there is a reduction of 6 in the number of employees, and of nearly $600 in the amount paid for services. The expenditures for services seem to be about 26.3 per cent of all expenses, and average $80.08 per member present. The ratio of employees to average membership is about 39.2. These figures are lower than those for the previous year. The following table shows the condition in this respect for the past five years:

	1892.	1893.	1894.	1895.	1896.
Per cent of total expenditures paid for services	24.6	23.7	31	34.5	26.3
Ratio of employees to average membership	28.6	29.7	37	40.7	39.2
Average per inmate	$64.87	$70.07	$79.44	$81.83	$80.08

PROPERTY.

Property and stores were in excellent condition and seemed to receive careful attention. The current supplies on hand September 30, 1896, are valued at $10,550. There are no quartermaster storehouses, stores being purchased only when required for immediate use, and materials and tools are kept at the shops to which they pertain. Inventories are taken semi-annually and verified by the treasurer, and returns are rendered to the Board of Commissioners.

Unserviceable property is disposed of by condemnation and sale. The only articles condemned and sold were 11 stoves, which cost originally $71.50, and brought $21.44. There were also condemned but not sold some 2,246 other articles, consisting principally of bedding, clothing brushes, crockery, etc., whose original cost is reported as $621.22—about 90⅓ cents per man.

No property books were exhibited in the treasurer's office. The property returns seem to be made up from the purchase vouchers every six months. Except medical supplies, which are purchased by the surgeon, all purchases are made by the treasurer. The clothing, when received, is turned over to the governor on invoice, commissary stores for regular issues to the commissary sergeant, and extra issues to the kitchen sergeant. Farm products are turned into the root-house, in charge of a corporal. There does not seem to be any well-defined accountability for the receipt and issue of stores. Would it not be well to confide that matter to one officer, whose records would show all the transactions relating to all property from its receipt until its final issue or condemnation?

It is believed to be to the advantage of the Home that purchases are now made largely on contract, and during the past year the method of competitive bids was adopted for the purchase of many articles. For instance, pease, for which $1 per dozen was paid in open market, were bought from the same dealer during the same month at 75 cents per dozen on bids; and corn, that 70 cents was paid for in open market, was obtained for 54 cents on bids, and other articles in similar proportion. Possibly a further saving could be effected if this method of purchase was applied to such articles as potatoes, turnips, cabbages, fish, chickens, fresh pork, sausage, etc. Section 3 of the act of March 3, 1883, prescribing regulations for the Soldiers' Home, directs that "all supplies that can be purchased upon contract shall be so purchased, after due notice by advertisement, of the lowest responsible bidder."

Whisky for which $3.75 per gallon was paid, and alcohol at $2.60 per gallon, were bought from local dealers. It is understood that these articles may be purchased from the Medical Department of the Army at much less cost, as that department purchases these articles without payment of the internal-revenue tax.

CLOTHING.

The clothing allowance at this Home—if there should be a positive allowance at all instead of adopting the National Home system of continuing Government proprietorship constantly—seems liberal, and consists of 1 pair sky-blue trousers; 1 blouse, unlined; 1 pair dark blue flannel trousers, 3 pairs shoes, 6 pairs stockings, 3 pairs drawers, 1 straw hat, 1 black felt hat, 2 flannel shirts, and 2 cotton shirts each year, and 1 dark blue coat and vest every two years. New clothing is issued to permanent members and second-hand clothing to needy, temporary members awaiting action of the Board of Commissioners. Pensioners who draw over a certain amount of pension must pay for their clothing, but they can not purchase beyond the allowance. This does not seem to be in accord with the act of March 3, 1883, section 5, "that a suitable uniform shall be furnished to every inmate of the Home without cost to him." No record of clothing purchased is made on the personal clothing record.

Although clothing is held to be Home property after issue to the men, it is dropped from the clothing books after such issue, and no record or account is kept thereafter of it, nor are the men required to turn in the old clothing on the issue of new. It seems that clothing has at times been issued at the stated periods without reference to the condition of the clothing in their possession, though greater care and watchfulness has been exercised.

There are no repair shops for clothing maintained by the Home. All repairs are made at the expense of the inmates, and it is stated that two tailors and two shoemakers are kept busy on such work.

Members on furlough are not furnished clothing, and, should they not return, the clothing left by them in the storeroom is taken up and reissued if new, or issued to temporary members if old. Worn-out clothing, unfit for further wear, is used for police purposes, as mops, etc. At the Volunteer Homes it is sold as rags, bringing as high as 11 cents per pound, and aggregating in a year over $5,000.

LAUNDRY.

Each member is permitted to send weekly one change of clothing to the laundry. The reports show that for the month of October, 1895 (five wash days), the number of pieces laundered was 1,955 shirts, 1,484

pairs drawers, 277 pairs stockings, 2,985 sheets, 2,986 pillows slips, 506 roller towels, and 427 hand towels.

Three men are employed in the laundry, and $1,513.84 was expended for laundry work during the year. This gives an average cost per capita of $2.20.

Pensioners are supposed to furnish their own towels when they bathe, but their washing is paid for by the Home, and also private underwear, if it has the Home number on it and is within the allowance. The contract price is so much per man, and the number of men for which payment is made is based on the number of sheets, without reference to the number of pieces of underclothing, provided no one has more than one piece of each kind. Forty-one per cent of the inmates do not have their shirts washed at the laundry, 53 per cent their drawers, and 91 per cent their socks.

FIRE DEPARTMENT.

Protection against fire consists of water plugs, hose and reel company of 50 men, rake and ax detail of about 100 men, and fire buckets on each floor, except the Sherman Building. The fire orders assign the men to their posts and require them to turn out on all occasions when the fire alarm is sounded. The apparatus is reported adequate and in good condition and frequently tested, and the firemen are said to be able to respond in a few minutes in case of fire. The most disastrous fire for which the fire department was called out occurred September 13, 1894, when fire broke out in three separate places. The first destroyed a shed and 25 tons of hay; the second burned down the stables, 45 tons of hay, 2 horses, and an ambulance, and the third destroyed a stack of 15 tons of hay. The loss was estimated at $7,000.

WATER SUPPLY.

The water supply is by steam pumping into the new water tower from wells on the Home grounds at a point below the hospital. It was formerly obtained from springs, but now principally by connection with the city waterworks. The lift is 185 feet, and the pumping station is run by two men at a cost during the year of $985.04, inclusive of $265.04 for coal and incidentals. At the Dayton Home these figures are: Total lift, 339 feet; number of employees, 8, at an annual cost of $3,360, exclusive of cost of fuel.

FARM.

The farm comprises 228 acres, 200 of which are in pasture. The farm report shows that the products were valued at $3,572.59, of which $1,777.50 was for 145 tons of hay, at 12.25\frac{5}{8}$ per ton, and $1,795.09 for vegetables, and that it cost for labor, implements, seed, forage, etc., $3,818.78, a balance against the farm of $246.19, but it is estimated that there are yet in the ground vegetables valued at $455. Such estimates, of course, are merely tentative, as in the case of potatoes last year. Five hundred and sixty-five dollars and fifteen cents was realized from the sale of some of the hay. In addition to the vegetables received from the farm it seems that $1,877.73 was expended for the purchase of fresh vegetables. With the large acreage available it would seem possible to have almost fully supplied the mess and hospital with fresh vegetables. But farming is like any other regular business and requires a practical and practiced and earnest expert to do the work at a profit

or acceptably. The attempts to produce milk or vegetables at these Homes may have appeared rather questionable to some persons, however irresistible the opportunity appears to be. Land of such value as this perhaps can not well pay as dairy or farming land, nor are the resident inmates or hired men always the best to carry on such an arduous, practical work.

The transportation of the Home consists of 2 ambulances, 1 buggy, 1 laundry wagon, 1 mail wagon, 1 market wagon, 1 milk wagon, and 6 carts for roads and grounds and other police purposes, and 13 public horses and 5 mules are kept. In addition there are 11 private vehicles and 8 private horses kept at the Home.

The garden is charged with $2,915.37 on account of labor, etc., expended in the care and ornamentation of the grounds, lawns, flowers, shrubs, and trees, and credit is claimed for $1,188.50 on account of plants, trees, and shrubs raised in garden and greenhouse, and $141 on account of 94 cords of wood. It is reported that no small fruit was raised in the garden this year.

The dairy is still maintained, though there are no public cows reported, and it is charged only with the expense of bringing the milk from the railroad depot to the Home. The present contract price of milk is 13½ cents per gallon, and the report of the District chemist pronounces it good. When there was formerly a herd at the Home, milk was credited to the dairy at 30 cents in 1890 and 28 cents in 1891 and 1892, and charged to the hospital and Home mess at cost of production, which was 15.87 cents in 1890, 16.53 cents in 1891, and 17.81 cents in 1892. Interference with private business does not seem to be economical by the record in this matter.

MESSING.

The dining hall and kitchen were in good condition, and the facilities for cooking and serving meals are reported ample and a decided improvement on its condition some years ago. The food seemed well cooked and satisfactory in quality and quantity. The bill of fare for the week ending November 14, 1896, is shown in Exhibit N. The following table shows the average daily amount issued and its cost for the months of December, 1895, and June, 1896, to both dining hall and hospital:

Month.	Messhall.						Hospital.					
	Amount issued.	Cost.	Average men present.	Amount per man.	Cost per pound.	Cost per man.	Amount issued.	Cost.	Average men present.	Amount per man.	Cost per pound.	Cost per man.
	Lbs.			*Lbs.*			*Lbs.*			*Lbs.*		
December..	2,781	$89.43	651⅓	4.28	$0.0320	$0.137	443	$23.58	113	3.92	$0.0509	$0.199
June.....	2,000	93.60	574⅔	5.04	.0323	.162	370	21.32	105	3.52	.0576	.202

Transients not connected officially with the Home were given 11,276 meals during the year. There are 7 men employed in the kitchen; 1 cook, 5 assistant cooks, and 1 butcher; and 23 in the dining hall, 1 sergeant and 22 waiters.

The swill and garbage is given to one of the members for removing. At some of the volunteer Homes it is sold, and it was here formerly. Breakage of crockery does not seem as high here as at some of the other

Homes. The percentage reported broken during the year is, bowls, 20; dinner plates, 11; soup plates, 10.5; butter plates, 13, and vegetable dishes, 10, or an average of 13⅔. The average allowance in the Army is 20.

HOSPITAL.

The hospital was in excellent condition throughout and displayed its usual admirable care and management. A new steel ceiling, as recommended in my last report, had been put up in the dining room and furnace ranges and plumbing repaired, at a total cost of $303.80. The signs of leakage have already been mentioned. Tables are set three times, which seems to indicate the dining room is too small.

On September 30, 1896, 76 of the 85 beds were occupied by patients, which is a decrease of 5 from the number reported a year previous. The average number of daily sick during the year has been 77.18 in hospital and 6.44 at sick call. This is a slight increase over the average for the preceding year. The following are the principal diseases and percentage of each:

Chronic: Tuberculosis, 7.58; senile debility, 5.69; rheumatism, 5.21; bronchial catarrh and epilepsy, each 3.31; asthma and heart disease, each 2.6; pneumonia, 2.1; and cancer, 1.63.

Acute: Alcoholism, 10.19; malarial fever, 3.31; influenza, 2.84; cholera morbus and diarrhea, each 1.42; rheumatism, 0.94; and pneumonia, 0.71.

Surgical: Fractures, 1.89; abscesses, 1.63; hernia, 1.18; sprains and ulcers, each 0.94; and wounds, 0.71.

The principal diseases of local origin are influenza and malaria, of which there were 12 and 14 cases, respectively. There were no infectious or contagious diseases during the year. The total number of patients treated was 2,775, and the average number of days each case was treated was 66.94 days in hospital and 1 day at sick call. There were 341 patients admitted to the hospital during the year and 137 discharged as cured. The number of deaths during the year was 67, against 55 the previous year, and the death rate per 1,000 present and absent was increased from 52 to 62.73. Forty-two members died in hospital, 5 in other places on the reservation, and 20 outside of the reservation. The causes of death were: Natural, 45; suicide, 2; result of accident, 1; and unknown, 19. The average age at death was 64.63 years.

Deceased members are buried in the Home uniform in a coffin made at the Home shops at a cost of $6.12. The funeral is reported to cost $6.42. Fifty-three members and 12 ex-members were buried at the neighboring national cemetery during the year. An allowance of $25 is made for funeral expenses of members buried away from the Home. These national cemeteries being established by law and properly cared for under their own organization, it seems much better to bury the old soldiers therein, as is done here and at Hampton, than to establish additional graveyards, which are liable not to be so perfectly and permanently cared for.

Hygienic conditions seem excellent and the sick are well cared for, $3,017.88 being expended during the year for extra diet of the sick. The average daily cost of the hospital ration, including special diet, per man, is reported as $0.198.

The insane are quartered in two small, barred isolation rooms when necessary, and in the general hospital quarters. When they can not be properly cared for here, they are sent to the Government asylum at St. Elizabeth.

The average annual number of insane is about 25, and between 3 and 4 have been sent annually to the asylum for the past five years.

The blind members are quartered on the first floor of the Scott buildings, and seem to receive all the assistance they need. Three are totally blind and 23 have impaired eyesight, so as to be unable to read. One man is employed to read daily to them.

The hospital employees number 29 members and 3 civilians, who received a total compensation during the year of $6,417.76, or an average of $200.59 each.

The expense for drugs and druggists' supplies, including dressing, etc., was $1,388.75 for the year, which is an expense per capita of about $2.02. The medicines most used during the year were cod-liver oil, 10 gallons; iodide of potash, 25 pounds; rochelle salts, 25 pounds; epsom salts, 20 pounds; extract cascara sagrada, 6 pounds; cathartic pills, 8,000; sulphate of quinine, 30 ounces; Dover's powders, 2 pounds; sulfonal, 16 ounces, and compound licorice powder, 4 pounds.

The usual exhibits, giving detailed information on various matters, are appended herewith.

Respectfully submitted.

J. C. BRECKINRIDGE,
Inspector-General.

The SECRETARY OF WAR.

LIST OF EXHIBITS.

A.—Field return of the inmates, October 15, 1896.
B.—Recapitulation of expenditures from October 1, 1895, to September 30, 1896.
C.—Amount paid to civil employees during September, 1896.
D.—1. Statement relative to members on outdoor relief.
2. Annual report of members receiving outdoor relief, September 30, 1896, rates of relief, pensions, etc.
E.—Statement showing the number of inmates present October 15, 1896, with length of army service; also the number of pensioners and rate of pension.
F.—List of contracts for supplies and services, September 30, 1896.
G.—List of extras, accepted bids, no formal contract executed, in force May 1, 1896, for the period of five months.
H.—Amount expended on officers' quarters and permanent buildings from October 1, 1895, to September 30, 1896.
I.—Garden account, from October 1, 1895, to September 30, 1896.
K.—Farm account, from October 1, 1895, to September 30, 1896 (consolidated).
L.—Vegetables and fruit furnished Home and hospital mess from farm and garden for the year ended September 30, 1896.
M.—Vegetables purchased in addition to those received from the farm for the year ended September 30, 1896.
N.—Home mess bill of fare for the week ended November 14, 1896.
O.—Extra washing done by the Eureka Steam Laundry during the month of September, 1896, for the Home.
P.—List of crockery in daily use in Home during the year ended September 30, 1896, with per cent of breakage.
Q.—Number of horses and mules owned and employed September 30, 1896.
R.—Hospital diet, general and special.
S.—List of medicines on hand September 30, 1896, and six months' supply received October 5, 1896.

A.—*Field return of the inmates October 15, 1896.*

Present for duty:	
Governor	1
Deputy governor	1
Secretary and treasurer	1
Surgeon	1
Hospital steward	1
Sergeants	20
Corporals	6
Privates	312
Sick:	
Noncommissioned officers	
Privates	79
Present, extra duty:	
Sergeant	1
Privates	129
Temporarily admitted	81
Invalided privates	95
Total	724
Aggregate	728
Absent:	
On outdoor relief	322
Insane asylum	18
With leave—	
Noncommissioned officer	1
Privates	44
Suspended	4
Present and absent:	
Total	1,113
Aggregate	1,117

Present, distributed among the buildings as follows:	
Scott Building*	229
Sherman Building†	110
Sheridan Building‡	120
King Building§	90
Anderson Building‖	43
North gatehouse	4
Eagle gatehouse	2
West gatehouse	1
South gatehouse	1
Southeast gatehouse	1
Whitney avenue gatehouse	1
Married men at old farmhouse	2
Married men who sleep outside	10
Hospital	110
Total inmates present	724
On outdoor relief (beneficiaries)	322
In insane asylum (inmates)	18
On furlough (inmates)	45
On suspension (inmates)	4
Total	389
Total inmates, present and absent:	
Permanent inmates, present and absent	706
Temporary inmates, present and absent	85
Beneficiaries receiving outdoor relief	322
Total	1,113

D. A. IRWIN,
Captain, U. S. A., Deputy Governor.

B.—*Recapitulation of expenditures from October 1, 1895, to September 30, 1896.*

Repairs to officers' quarters	$202.52
Compensation of the governor, deputy governor, treasurer, and clerk to the Board of Commissioners	4,184.88
Transportation furnished to discharged soldiers en route to the Home, to be refunded to the Quartermaster's Department	836.14
Fuel for the Home	6,600.90
Expenses of the hospital for medicine, medical stores, spectacles, false teeth, material for coffins, etc	2,095.56
Expenses of the hospital for mess and kitchen purposes and all running expenses, including compensation to inmates on duty and pay of civilian employees	15,947.60
Refunded to claimants as heirs of deceased soldiers	1,334.56
Refunded to claimants as heirs of deceased inmates	2,819.56
Clothing for inmates	10,374.25
Subsistence stores and ice, including special diet and stimulants for the sick	33,530.49
Expenses of the Home bakery	53.73
Bedding for inmates, bedsteads, blankets, upholsterer's materials, etc	116.10
Farm, garden, and dairy utensils, seeds, guano, manure, cultivation of garden, ornamentation of grounds, pay of farm, garden, dairy, and other employees	15,416.73
Mess and kitchen utensils and all other articles except bedding for the Home	940.07
Material for general repairs to buildings, repair of roads and fences, purchase and repair to harness, vehicles, etc., purchase of mechanical tools	1,769.66
Forage and medicines for Home animals, articles used in stables	866.59
Expenses of the library, governor's and treasurer's offices, post-office box rent, stationery, etc., for office of Board of Commissioners, freight, telegrams, and amusements	1,377.86
Incidental expenses, rental of telephone, hack hire, traveling expenses, professional services, and expenses Home chapel	393.03
Religious services	1,980.00
Laundry work	1,513.84
Compensation and monthly allowances to inmates nonpensioners on duty at the Home, except compensation to inmates on duty at Barnes Hospital	19,553.50
Commutation to members of the Home residing outside	26,471.06
Gas for the Home, including rental of Amicks improved gas regulators	3,027.45
Board and medical treatment of members of the Home in Government Hospital for the Insane	3,539.29
Funeral expenses of members of the Home residing outside	320.00
New buildings: Construction of the new amusement hall, heating and ventilating same, and increasing boiler plant	53,797.58
Permanent improvements: New fences, wells, repairs to bridges, lamp-posts, gas, lamps, paving, sewerage, etc	639.69
Total expenditures	209,702.64

RICH. C. PARKER,
Brevet Major, U. S. A., Secretary and Treasurer.

* With bedroom-space of 271,990 cubic feet, 1,184.23 cubic feet per man.
† With bedroom-space of 214,664 cubic feet, 1,951.5 cubic feet per man.
‡ With bedroom-space of 152,058 cubic feet, 1,267.15 cubic feet per man.
§ With bedroom-space of 106,594 cubic feet, 1,184.37 cubic feet per man.
‖ With bedroom-space of 55,874 cubic feet, 1,299.4 cubic feet per man.

C.—*Amount paid to civil employees during September, 1896.*

One clerk to Board of Commissioners	$100.00
One clerk to secretary and treasurer	100.00
J. B. Nichols, clinical assistant to the attending surgeon	100.00
Rev. D. C. De Wulf, religious services and services of choir	65.00
Rev. James A. Buck, religious services	50.00
Rev. Gustav Facius, religious services	25.00
Lulu Facéus, services as organist and in choir	25.00
One gardener and florist	50.00
Six day laborers in garden and grounds	194.25
One farm overseer	50.00
Six farm laborers	192.75
One driver of dairy wagon	19.00
One plumber	85.00
One blacksmith	75.00
One chief engineer, boiler house	75.00
One assistant engineer	60.00
Three firemen, at $33 each per month	99.00
One engineer at pump house	50.00
One chief cook	50.00
One assistant cook	25.00
One chief baker	50.00
One assistant baker	45.00
One ambulance driver	20.00
One man, care of horses, harness, and conveyances for treasurer	10.00
Total	1,615.00

RICH. C. PARKER,
Brevet Major, U. S. A., Secretary and Treasurer.

D[1].—*Statement relative to members on outdoor relief.*

Average number for one year from October 1, 1895, to September 30, 1896	318.58
Total amount paid for outdoor relief during year ending September 30, 1896	$26,471.06
Average amount paid per man for one year	$83.0907
Average amount paid per man for one month	$6.9242
Highest amount paid per man for one month	$8.00
Lowest amount paid per man for one month	$2.00

RICH. C. PARKER,
Bvt. Major, U. S. A., Secretary and Treasurer.

D[2].—*Annual report of members receiving outdoor relief September 30, 1896, rates of relief, pensions, etc.*

Receiving outdoor relief:	
$8 per month	260
$4 per month	4
$2 per month	56
Total	326
Receiving outdoor relief September 30, 1895	312
Net gain during the year	14
Nonpensioners receiving outdoor relief	75
Receiving pensions:	
$6 per month	65
$8 per month	45
$10 per month	7
$12 per month	103
$14 per month	3
Receiving pensions—Continued.	
$16 per month	4
$17 per month	13
$20 per month	1
$22 per month	1
$24 per month	5
$25 per month	1
$30 per month	3
Total nonpensioners	75
Total pensioners	251
Total	326
Of this number there are Mexican war survivors	143
Men who have served 25 years or over	48
Of this latter number there are nonpensioners	5

Fifteen members of the Home on outdoor relief have died since date of last report. Thirteen members of the Home were dropped from outdoor relief after June 30, 1896, in compliance with resolutions of the Board of Commissioners dated June 19, 1891, and July 18, 1896.

RICH. C. PARKER,
Brevet Major, U. S. A., Secretary and Treasurer.

E.—*Statement showing the number of inmates present at the Home October 15, 1896, with length of Army service; also the number of pensioners and rates of pension.*

ARMY SERVICE.

Length of service.	Number of men.	Length of service.	Number of men.	Length of service.	Number of men.
5 months	1	7 years	13	20 years	104
6 months	2	8 years	21	21 years	61
7 months	3	9 years	15	22 years	28
8 months	3	10 years	14	23 years	40
9 months	1	11 years	11	24 years	27
10 months	1	12 years	21	25 years	33
11 months	1	13 years	18	26 years	14
1 year	25	14 years	20	27 years	9
2 years	21	15 years	13	28 years	4
3 years	37	16 years	22	29 years	1
4 years	14	17 years	14	30 years	3
5 years	34	18 years	29		
6 years	15	19 years	31	Total	724
				Average number years	14.69

PENSIONS.

Rate per month.	Number of men.	Rate per month.	Number of men.	Rate per month.	Number of men.
$6 per month	86	$15 per month	2	$30 per month	10
$8 per month	103	$16 per month	25	$50 per month	1
$10 per month	46	$17 per month	57	$72 per month	1
$12 per month	192	$18 per month	1		
$12.50 per month	1	$20 per month	2	Total	575
$13 per month	1	$22 per month	1	Average monthly pension	$11.78
$14 per month	36	$24 per month	10		

D. A. IRWIN, *Captain, U. S. A., Deputy Governor.*

F.—*List of contracts for supplies and services, September 30, 1896.*

Telephone service, Chesapeake and Potomac Telephone Company, metallic circuit	per annum	$240.00
Amick's gas regulators, People's Gas Saving Association, furnishes five regulators and keeps same in proper order; furnishes the necessary burners for a good gaslight	service, per month	20.00
Fuel:		
White ash furnace coal	per ton	3.83
White ash stove coal	do	4.15
Cumberland coal	do	2.92
Ice	per 100 pounds	.30
Forage:		
Oats	do	.84
Shelled corn	do	.69
Flour	per barrel	3.82½
Beef, etc.:		
Fresh beef	per pound	.05½
Corned beef	do	.0283
Fresh mutton	do	.0599
Veal	do	.065
Laundry work:		
Per man (the laundered articles for each man per week consist of 1 sheet, 1 pillowcase, and 1 complete change of underclothing	per man per month	.20
Extra washing as follows: Woolen blankets, trousers and summer coats and caps	each	.05
Bedspreads	do	.03
Mattress covers	do	.04
Billiard table covers	do	.02
Table covers	do	.01
Sheets, pillowcases, and aprons	per 100	.75
Roller towels	do	.35
Hand towels	do	.25
Napkins	per gallon	.13½
Milk	per pound	.09½
Oleomargarine	per pound	.07½
Groceries:		
Beans	per pound	.06
Vinegar	per gallon	.09½
Candles	per pound	.0344
Soap	do	.82
Salt	per sack	.0497
"A" sugar	per pound	

Groceries—Continued.		
"C" sugar	per pound..	$0.0422
Pepper	do....	.05¾
Sirup	per gallon..	.16
Bacon	per pound..	.07½
Smoked pork, shoulders	do....	.0544
Pickled pork, shoulders	do....	.04¾
Pickled pork	per barrel..	8.50
Codfish	per pound..	.04
Ham	do....	.1087
Mackerel, Irish No. 2	per barrel..	17.30
Rice	per pound..	.03¾
Tea, green or black	do....	.18
Green coffee	do....	.15
Roasted coffee	do....	.1673
Mustard	do....	.22
Cheese	do....	.10½
Clothing:		
Black felt hats	each..	.53
Dark-blue sack coats	do....	2.70
Sky-blue trousers	per pair..	1.92½
Flannel shirts	each..	.57
Canton flannel drawers	per pair..	.24¾
Harvard ties	each..	.92½
Woolen stockings	per dozen pairs..	2.10
Pillowcases	each..	.11
Bedspreads	do....	1.72½
Construction of new amusement hall		64,000.00
Increasing boiler capacity for heating new amusement hall		5,740.00

RICH. C. PARKER,
Brevet-Major, U. S. A., Secretary and Treasurer.

G.—*List of extras, accepted bids, no formal contract executed, in force May 1, 1896, for the period of five months.*

Soda crackers	per pound..	$0.04½	New Orleans molasses	per gallon..	$0.22
Oyster crackers	do....	.04½	Evaporated apples	per pound..	.05⅜
Evaporated pears	do....	.07	Hominy	do....	.01⅛
Cucumber pickles	per gallon..	.15	California prunes	do....	.04½
White pepper	per pound..	.10	Sal soda	do....	.0085
Pearline	per case..	3.68	Evaporated apricots	do....	.09½
Lemons	per dozen..	.15	Macaroni	do....	.04⅞
Corn meal	per barrel..	1.85	Lima beans	per dozen cans..	.69
Dried currants	per pound..	.03	Pickled tripe	per pound..	.038
Lard	do....	.06¾	Pearl barley	do....	.02½
Granulated sugar	do....	.059	Graham flour	per barrel..	3.94
Quaker oats	do....	.02½	Evaporated peaches	per pound..	.0587
Cornstarch	do....	.03¾	Royal baking powder	do....	.40
Farina	do....	.07½	Cucumber pickles	per barrel..	5.50
Green corn	per dozen cans..	.54	Green pease	per dozen cans..	.75
Pickled pig's feet	per pound..	.039	Pabst beer	per dozen bottles..	.62½

H.—*Amount expended on officers' quarters and permanent buildings from October 1, 1895, to September 30, 1896.*

House No. 1, quarters of the governor	$57.81
House No. 2, quarters of the deputy governor	44.53
House No. 3, quarters of the treasurer	40.76
House No. 4, quarters of the surgeon	59.42
Total	202.52
On account of repairs and construction of permanent building:	
Boiler house, material, labor resetting boilers and repairs to steam apparatus	532.31
Greenhouse, lumber for repairs and material for increasing the heating capacity	375.02
Barnes Hospital, new steel ceiling in dining room, repairs to furnace and ranges, plumbing, etc	303.80
Sherman Building, plumbing repairs, paints	181.81
Home kitchen, repairs to elevator, coffee mill, etc	34.30
Sheridan Building, paints and oils, plumbing, and lumber for repairs	449.46
King Building, lumber for repairs to tables, plumbing	59.37
Home buildings, repairs to lockers and plumbing main water-closet	89.40
Home fire department, purchase of hose, play pipe, chemical fire pails	95.60
Amusement room, repairs to billiard and pool tables	70.25
New amusement hall, paper for blue prints, services of architect and inspector, printing, plans, construction of, including cost of addition to boiler plant for heating same	53,797.58
Roads and grounds, purchase of gravel for repairing roads	83.60
Pump house, repairs to pumping apparatus	31.44
Home bakery, repairs to ovens	53.73
Scott Building, lumber for repairs to porches, painting iron railing	38.32
East gate lodge, repairs to pump	1.50
Home chapel, material for upholstering seats	11.10
Anderson Building, plumbing repairs	1.99
Total	56,413.10

RICH. C. PARKER,
Brevet Major, U. S. A., Secretary and Treasurer.

I.—*Garden account from October 1, 1895, to September 30, 1896, consolidated.*

DR.

To labor, fertilizers, seeds, tools, fuel, and implements	$2,915.37

CR.

By 94 cords wood	141.00
By 20,670 plants, trees, and shrubs raised in garden and greenhouse	1,188.50
Balance to debit of garden expended in improvement of grounds	1,585.87
Total	2,915.37

NOTE.—This department has the care of the ornamentation of the grounds, lawns, flowers, shrubs, trees, and fruit.

RICH C. PARKER,
Brevet Major, U. S. A., Secretary and Treasurer.

K.—*Farm account, October 1, 1895, to September 30, 1896, consolidated.*

DR.

Labor, forage, fuel, fertilizers, implements, seeds, and repairs	$3,818.78

CR.

133 bushels beets	56.20
7,684 heads cabbage	257.52
49 bushels carrots	23.75
1,117 dozen ears corn	99.98
62 bushels cucumbers	23.20
875 pounds horse-radish	26.25
128 bushels kale	19.20
2,305 heads lettuce	46.10
1½ bushels okra	2.25
11,440 bunches onions	$87.07
3,220 bunches parsley	94.45
145½ bushels parsnips	73.00
1,394⅝ bushels potatoes	616.90
6,740 bunches rhubarb	92.15
87½ bushels salsify	65.62
2,655 pounds squash	26.55
46 bushels string beans	17.90
440 bushels tomatoes	163.15
11 bushels turnips	3.85
145 tons hay	1,777.50
Balance to debit of farm	246.19
Total	3,818.78

Estimate of vegetables in the ground on Home farm, September 30, 1896.

3,000 heads cabbage, at 2 cents	$60
100 bushels carrots, at 40 cents	40
1,500 pounds horse-radish, at 3 cents	45
2,000 bunches parsley, at 2 cents	40
100 bushels salsify, at 75 cents	75
150 bushels spinach, at 60 cents	$90
300 bushels turnips, at 35 cents	105
Total	455

RICH. C. PARKER,
Brevet Major, U. S. A., Secretary and Treasurer.

L.—*Vegetables and fruit furnished Home and hospital mess from farm and garden for the year ended September 30, 1896.*

Home mess	$1,370.53
Barnes Hospital	179.57
Total	1,550.10

No fruit furnished. Average number of men in Home and hospital during same period, 685.

RICH. C. PARKER,
Brevet Major, U. S. A., Secretary and Treasurer.

M.—*Vegetables purchased in addition to those received from the farm for the year ended September 30, 1896.*

Date of purchase.	Grapes.	Onions.	Apples.	Cabbage.	Potatoes, sweet.	Turnips.	Cabbage.	Apples.	Cauliflower.	Turnips.
1895.	*Baskets.*	*Bush.*	*Bbls.*	*Pounds.*	*Bbls.*	*Bbls.*	*Bbls.*	*Boxes.*	*Bbls.*	*Boxes.*
October	570	27	11	1,600	9	2	3	½	1	.....
November	85	39	19	1,640	1	4	2	.....	.....	4½
December	.....	45	15	1,260	1	6	2	.....	.....	.....
1896.										
January	.....	48	13	1,260	3	8	2	.....	.....	6
February	.....	38	½	.....	.....	7	.....	.....	.....	.....
March	.....	39	.....	.....	.....	6	3	.....	.....	.....
April	.....	42	.....	400	.....	4	1	.....	.....	.....
May	.....	19	.....	.....	.....	.....	1	.....	.....	.....
June	.....	13	.....	.....	.....	.....	2	.....	.....	.....
July	.....	20	.....	.....	.....	.....	1	.....	.....	.....
August	.....	25	7	1,700	4	.....	1	.....	.....	.....
September	231	54	12	2,600	8	6	.....	.....	.....	.....
Total	886	409	77½	10,360	26	43	18	½	1	10½
Cost	$92.85	$289.10	$166.75	$125.10	$57.00	$77.00	$41.98	$0.60	$3.25	$5.85

Date of purchase.	Cranberries.	Celery.	Potatoes, white.	Squash.	Spinach.	Kale.	Yams.	Parsnips.	Cabbage.	Strawberries.
1895.	*Boxes.*	*Stalks.*	*Bush.*	*Bbls.*	*Bbls.*	*Bbls.*	*Bbls.*	*Bbls.*	*Crates.*	*Quarts.*
October	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
November	4	216	98	.....	.....	.....	.....	.....	.....	.....
December	4	240	40	6	1	1	.....	.....	.....	.....
1896.										
January	.....	.....	320	9	.....	2	5	5	.....	.....
February	.....	.....	47 1/20	9	.....	.....	7	8	.....	.....
March	.....	.....	100	3	.....	1	4	6	.....	.....
April	.....	.....	200	3	2	2	.....	.....	11	.....
May	.....	.....	140	.....	.....	.....	.....	.....	23	360
June	.....	.....	240	.....	.....	.....	.....	.....	5	912
July	.....	.....	110	.....	.....	.....	.....	.....	.....	.....
August	.....	.....	.....	11	.....	.....	.....	.....	.....	.....
September	.....	.....	.....	11	.....	.....	.....	.....	.....	.....
Total	8	456	1,295 1/20	52	3	6	16	19	39	1,272
Cost	$25.00	$28.20	$423.63	$87.50	$4.50	$8.25	$43.00	$45.00	$87.25	$69.12

Date of purchase.	Blackberries.	String beans.	Raspberries.	Watermelons.	Potatoes, white.	Cantaloupes.	Cabbages.	Cantaloupes.	Total.
1895.	*Quarts.*	*Barrels.*	*Quarts.*	*Number.*	*Barrels.*	*Number.*	*Heads.*	*Barrels.*	
October	.....	.....	.....	.....	.....	.....	.....	.....	$138.68
November	.....	.....	.....	.....	.....	.....	.....	.....	169 60
December	.....	.....	.....	.....	.....	.....	.....	.....	149.25
1896.									
January	.....	.....	.....	.....	.....	.....	.....	.....	268.85
February	.....	.....	.....	.....	.....	.....	.....	.....	116.43
March	.....	.....	.....	.....	.....	.....	.....	.....	113.25
April	.....	.....	.....	.....	.....	.....	.....	.....	157.25
May	.....	.....	.....	.....	.....	.....	.....	.....	142.50
June	736	.....	.....	.....	.....	.....	.....	.....	209.06
July	512	1	200	100	5	.....	.....	.....	112.46
August	.....	.....	.....	545	.....	130	35	.....	134.70
September	.....	.....	.....	.....	.....	.....	145	10	165.70
Total	1,248	1	200	645	5	130	180	10	.....
Cost	$72.00	$1.25	$14.00	$81.40	$6.15	$4.45	$7.55	$10.00	1,877.73

RICH. C. PARKER.
Brevet Major, U. S. A., Secretary and Treasurer.

N.—*Home mess bill of fare for the week ending November 14, 1896.*

Sunday, November 8.—Breakfast: Corned-beef hash, bread, butter, and coffee. Dinner: Roast beef with gravy, mashed potatoes, pickles, stewed onions, grapes, bread, milk and coffee. Supper: Coffee cake, bread, butter, sirup, and tea. Milk consumed (57 gallons): For coffee, 11; tea, 6; kitchen, 6; and for mess hall, 34 gallons.

Monday, November 9.—Breakfast: Ham, hominy, bread, butter, and coffee. Dinner: Soup, boiled beef, potatoes, turnips, horse-radish, apples, bread, milk, and coffee. Supper: Stewed peaches, bread, butter, and tea. Milk consumed (57 gallons): For coffee, 11; tea, 6; kitchen, 1; and for mess hall, 39 gallons.

Tuesday, November 10.—Breakfast: Beef stew, bread, butter, and coffee. Dinner: Roast beef with gravy, potatoes, squash, pickles, apples, bread, milk, and coffee. Supper: Rice pudding, bread, butter, sirup, and tea. Milk consumed (57 gallons): For coffee, 11; tea, 6; kitchen, 11; and for mess hall, 29 gallons.

Wednesday, November 11.—Breakfast: Corned-beef hash, bread, butter, and coffee. Dinner: Soup, corned beef, cabbage, potatoes, horse-radish, apples, bread, milk, and coffee. Supper: Head cheese, bread, butter, sirup, and tea. Milk consumed (57 gallons): For coffee, 11; tea, 6; kitchen, 1; and for mess hall, 39 gallons.

Thursday, November 12.—Breakfast: Fresh pork sausage, hominy, bread, butter, and coffee. Dinner: Mutton stew, sweet potatoes, pickles, apples, bread, milk, and coffee. Supper: Bread pudding, bread, butter, sirup, and tea. Milk consumed (57 gallons): For coffee, 11; tea, 6; kitchen, 20; and for mess hall, 20 gallons.

Friday, November 13.—Breakfast: Codfish hash, bread, butter, and coffee. Dinner: Oyster stew, cold sliced meat, potatoes, salsify, pickles, apples, bread, milk, and coffee. Supper: Sweet potatoes, bread, butter, sirup, and tea. Milk consumed (57 gallons): For coffee, 11; tea, 6; kitchen, 11; and for mess hall, 29 gallons.

Saturday, November 14.—Breakfast: Beef stew, bread, butter, and coffee. Dinner: Pork shoulders, cabbage, potatoes, horse radish, bread, milk, and coffee. Supper: Stewed green apples, bread, butter, and tea. Milk consumed (57 gallons): For coffee, 11; tea, 6; kitchen, 10; for bakery, 10; and for mess hall, 20 gallons.

D. A. IRWIN,
Captain, U. S. A., Deputy Governor.

O.—*Extra washing done by the Eureka Steam Laundry during the month of September, 1896, for the Home.*

386 roller towels, at 75 cents per 100	$2.90
329 hand towels, at 35 cents per 100	1.15
89 aprons, at 1 cent	.89
91 jackets, white, at 5 cents	4.55
10 white caps, at 5 cents	.50
64 mattress covers, at 4 cents	2.56
3 bedspreads, at 3 cents	.09
2 blankets, at 5 cents	.10
Total	12.74

Regular washing by the Eureka Steam Laundry during the month of September, 1896, for the Home.

Date.	Sheets.	Pillow-cases.	Shirts.	Drawers.	Socks.
September 5	606	609	358	294	55
September 12	596	600	342	273	55
September 19	567	567	354	270	52
September 26	566	565	355	275	52
Total	2,325	2,341	1,409	1,112	214

Average number of men at Home, exclusive of hospital, 594, including married men in quarters (13).

P.—*List of crockery in daily use in Home during the year ending September 30, 1896, with per cent of breakage.*

	Bowls.	Dinner plates.	Soup plates.	Butter plates.	Vegetable dishes.	Total.
In use	988	898	787	234	234	3,141
Per cent of breakage	20	11	10½	13	10	13⅜

Q.—*Number of horses and mules owned and employed September 30, 1896.*

Horses:	
For carts on roads, grounds, and police	6
For laundry wagon	2
For market wagon	2
For hospital ambulance	2
For mail wagon	1
Total	13
Mules for use of Home farm	5

TRANSPORTATION.

	Governor.	Deputy governor.	Treasurer.	Clinical assistant.
Forage for horses	3	2	2	1
Buggy and single harness			1	

RICH. C. PARKER,
Brevet Major, U. S. A., Secretary and Treasurer.

R.—*Special diet for the week ending September 19, 1896, asked for by the patients or prescribed by the doctor.*

Ward and name of patient.	Breakfast.	Dinner.	Supper.
Ward A:			
Harrison	Oatmeal porridge	Milk	Milk.
Mackin	Oatmeal porridge	Milk	Milk, oatmeal porridge.
Gautchins		Milk	Milk.
Brown	Oatmeal porridge	Milk	Oatmeal porridge, milk.
Hartung		Milk	Milk.
Havlin	Oatmeal porridge	Milk, oatmeal porridge	Milk, oatmeal porridge.
Condon			Milk.
Ward B:			
Butts		Milk	Milk.
Newman	Oatmeal porridge	Pudding	2 soft-boiled eggs.
Campbell	2 soft-boiled eggs	2 soft-boiled eggs	2 soft-boiled eggs.
Smallsinger	Cornstarch pudding	Oatmeal porridge	Oatmeal porridge.
Granger		Milk	Milk.
Sullivan	Beef tea, 2 soft-boiled eggs.	Milk	Milk, oatmeal porridge.
Miller	Beefsteak and onions	Beef tea	Chocolate, butter toast.
Ward C:			
Bowker		Milk	Milk.
Owen	2 soft-boiled eggs	Milk	Milk.
Lehr		Coffee	Coffee.
Hogan	Oatmeal porridge	Milk	Milk, oatmeal porridge.
Thompson	Oatmeal porridge	Milk	Milk.
Ward D:			
Mickler		Milk	Milk.
Toussaint		Milk	Milk.
Ward E:			
Urban		Milk.	
Branigan			Oatmeal porridge.
Tahaney			Milk.
Hayden	Oatmeal porridge		Oatmeal porridge.
Ward F:			
Hug	Dry toast	Dry toast	Dry toast.
Bentson		Milk	Milk.
Dugan	Oatmeal porridge	Milk	Oatmeal porridge.
Bender	Beefsteak, potatoes, milk	Fried chicken, milk	Cocoa, milk, 1 fried egg.

On hand September 13 to September 19, 1896.

On hand September 13:
- Kitchen—
  - Milk ..... gallons .. 15
  - Beef, fresh ..... pounds .. 108
  - Hams ..... do 49
  - String beans ..... cans .. 36
  - Soap ..... pounds .. 2
  - Bread ..... do 4
  - Cake ..... sheets .. 4
- Dining room—
  - Cheese ..... pounds .. 14
  - Crackers, soda ..... do 18
  - Butter ..... do 15
  - Bread ..... do 60
  - Soap ..... do 2

On hand September 14:
- Kitchen—
  - Milk ..... gallons .. 15
  - Beef, fresh ..... pounds .. 172
  - Potatoes ..... barrel .. 1
  - Onions ..... bushel .. 1
  - Apples, cooking ..... barrel .. 1
  - Bread ..... pounds .. 6
  - Salt ..... do 10
- Dining room—
  - Butter ..... pounds .. 18
  - Bread ..... do 80
  - Sapolio ..... cake .. 1
- Wards, etc.—
  - Sapolio 3
  - Pearline 5
  - Soap 6

On hand September 15:
- Kitchen—
  - Milk ..... gallons .. 15
  - Corn beef ..... pounds .. 50
  - Cabbage ..... barrel .. 1
  - Beets ..... bushel .. 1
  - Bread ..... pounds .. 4
  - Flour ..... do 20
  - Soap 4
  - Sapolio ..... cake .. 1
  - Pearline ..... packages .. 2
- Dining room—
  - Bread ..... pounds .. 64
  - Butter ..... do 16
  - Soap ..... do 2
- Wards, etc.—
  - Matches ..... boxes .. 24
  - Blacking, shoe ..... do 2
  - Blacking, shoebrush ..... number .. 1

On hand September 16:
- Kitchen—
  - Milk ..... gallons .. 15
  - Beef, fresh ..... pounds .. 162
  - Green dried peas ..... do 25
  - Bread ..... do 4
  - Butter ..... do 10
  - Eggs ..... dozen .. 10

On hand September 16—Continued.
- Kitchen—Continued.
  - Potatoes ..... barrel .. 1
- Dining room—
  - Bread ..... pounds .. 68
  - Butter ..... do 20
  - Salt ..... do 12
  - Pepper ..... do 6
  - Mustard ..... do 6
- Wards, etc.—
  - Putz pomade ..... boxes .. 2
  - Tripoli ..... paper .. 1
  - Blacking, stove ..... box .. 1

On hand September 17:
- Kitchen—
  - Milk ..... gallons .. 15
  - Pork, fresh ..... pounds .. 58
  - Sausages, assorted ..... do 55
  - Head cheese ..... do 16
  - Beans ..... do 30
  - Cabbage ..... heads .. 12
  - Bread ..... pounds .. 2
  - Soap ..... do 2
  - Pearline ..... paper .. 1
- Dining room—
  - Bread ..... pounds .. 60
  - Butter ..... do 18
  - Sapolio ..... cake .. 1
  - Pearline ..... paper .. 1
  - Soap ..... pounds .. 2

On hand September 18:
- Kitchen—
  - Milk ..... gallons .. 15
  - Bacon ..... pounds .. 25
  - Eggs ..... dozen .. 30
  - Fish, fresh ..... pounds .. 75
  - Potatoes ..... barrel .. 1
  - Farina ..... pounds .. 5
  - Macaroni ..... do 8
  - Chicken ..... do 4½
  - Bread ..... do 6
- Dining room—
  - Bread ..... pounds .. 60
  - Butter ..... do 12
  - Soap ..... do 2

On hand September 19:
- Kitchen—
  - Milk ..... gallons .. 15
  - Beef, fresh ..... pounds .. 210
  - Vermicelli ..... do 2
  - Corn ..... cans .. 24
  - Baking powder ..... pound .. 1
  - Bread ..... do .. 4
  - Prunes ..... do .. 25
- Dining room—
  - Bread ..... pounds .. 64
  - Butter ..... do 15
  - Soap ..... do 2

Received, issued, and remaining on hand from September 10 to September 20, 1896.

Received and issued:
- Beef, fresh ..... pounds .. 781
- Beef, corned ..... do 60
- Pork, fresh ..... do 58
- Sausages, assorted ..... do 71
- Eggs ..... dozen .. 90
- Chicken ..... pounds .. 17½
- Fish, fresh ..... do 75
- Oysters ..... gallons .. 9
- Sugar ..... pounds .. 200
- Coffee ..... do 100
- Tea ..... do 10
- Bacon ..... do 50
- Butter ..... do 60
- Milk ..... gallons .. 150
- Bread ..... pounds .. 760
- Cake ..... sheets .. 8
- Onions ..... boxes .. 2
- Cabbage ..... barrels .. 2

Received and issued—Continued.
- Parsley ..... bunches .. 50
- Beets ..... bushels .. 2
- Potatoes ..... do 20

On hand September 21, 1896:
- Beef, fresh ..... pounds .. 45
- Eggs ..... dozen .. 29
- Sugar ..... pounds .. 35
- Coffee ..... do 10
- Tea ..... do 1
- Beans ..... do 30
- Rice ..... do 25
- Soap ..... do 120
- Bread ..... do 20
- Potatoes ..... bushels .. 17
- Salt ..... pounds .. 40
- Mustard ..... do 12
- Pepper ..... do 6

Requisition for stores and supplies for use of hospital during September, 1896.

Apples, evaporated	pounds	50
Apples, cooking	barrels	2
Baking powder	pounds	6
Beer, Pabst	dozen	4
Beans, Lima, dried	pounds	50
Beans, string	dozen cans	7
Beef, corned	number cans	3
Cabbage	barrels	4
Codfish, salt	pounds	75
Cheese	do	60
Corn	dozen cans	4
Chicken	pounds	50
Crackers, soda	do	50
Dublin stout	dozen	2
Eggs	do	300
Extract of beef	do	1
Farina	pounds	24
Fish, fresh	do	150
Grapes	do	200
Hams	do	300
Lard	do	20
Lemons	dozen	6
Macaroni	pounds	24
Melons	number	200
Oats, Quaker	pounds	60
Onions	bushels	8
Oysters	gallons	20
Prunes	pounds	75
Pease, marrowfat	dozen cans	7
Pork, fresh	pounds	150
Pearline	packages	75
Raisins	pounds	10
Rhubarb	1-gallon cans	24
Sausages, assorted	pounds	300
Sapolio	dozen	3
Sugar, granulated	pounds	75
Sardines	boxes	12
Salmon	cans	6
Tapioca	pounds	25
Tomatoes, 3-lb. cans	dozen	4
Tongue, rolled	cans	3
Vermicelli	pounds	24
Vichy	siphons	24
Wax tapers	boxes	2
Matches, safety	gross	1½

Full diet for the week ending September 19, 1896.

Sunday.—Breakfast: Boiled ham, baked potatoes, butter, bread, coffee. Dinner: Roast beef, gravy, mashed potatoes, string beans, bread pudding, butter, bread, coffee. Supper: Coffee cake, cheese and crackers, butter, bread, coffee.

Monday.—Breakfast: Irish stew, butter, bread, coffee. Dinner: Soup, roast beef, gravy, potatoes, stewed onions, butter, bread. Supper: Cold roast beef, Concord grapes, butter, bread, tea.

Tuesday.—Breakfast: Baked meat hash, butter, bread, coffee. Dinner: Corn beef, cabbage and potatoes, pickled beets, butter, bread, coffee. Supper: Rice pudding, cantaloupes, butter, bread, tea.

Wednesday.—Breakfast: Beef a la mode, potatoes, butter, bread, coffee. Dinner: Soup, roast beef, gravy, potatoes, stewed green dried peas, butter, bread. Supper: Cold corn beef, potato salad, butter, bread, tea.

Thursday.—Breakfast: Fried sausages, potatoes, butter, bread, coffee. Dinner: Roast pork, baked beans, cold slaw, butter, bread, coffee. Supper: Head-cheese, apple sauce, butter, bread, tea.

Friday.—Breakfast: Fried bacon and eggs, butter, bread, coffee. Dinner: Fresh fish, sauce, mashed potatoes, pudding, butter, bread, coffee. Supper: Macaroni and cheese, butter, bread, tea.

Saturday.—Breakfast: Meat hash, butter, bread, coffee. Dinner: Soup, roast beef, gravy, potatoes, stewed green corn, butter, bread. Supper: Cold roast beef, stewed prunes, butter, bread, tea.

HOSPITAL MESS.

Ration return for ten days, from the 11th to the 21st of September, 1896.

Required:		
Sugar	pounds	200
Coffee	do	100
Tea	do	10
Bacon	do	50
Butter	do	60
Clinical assistant		1
Hospital matron		1
Employees		30
Patients		81
Total		113

S.—*List of medicines on hand September 30, 1896, and six months' supply received October 5, 1896, at hospital.*

Aggregate number present (all invalids)	688
Average in hospital	77.18
Average at sick call	6.44

Articles.	On hand.	Received.
Acacia:		
Gum ..... pounds..	1	
Powdered ..... do....	10	
Acetanilid ..... do....	3	
Acid:		
Acetic ..... do....		2
Benzoic ..... ounces..	3	
Boracic ..... pounds..	5	
Carbolic, pure ..... do....	½	½
Carbolic, common ..... do....	40	
Citric ..... do....	¼	1
Gallic ..... ounces..	2	
Hydrocyanic, dil ..... do....	3	
Hydrochloric, C. P. pounds..		2
Nitric, C. P. ..... ounces..	2	16
Nitric, commercial. pounds..	5	
Oleic ..... do....	1	
Oxalic ..... do....	5	
Phosphoric, dil ..... do....	½	
Salicylic ..... do....	1	
Sulphuric, C. P ..... do....		1
Sulphuric, commercial do....		10
Tartaric ..... do....	2	
Tannic ..... do....	1	
Aconite root, powdered ... do....	1	
Alcohol ..... gallons..	1	16
Aloes ..... ounces..	2	
Ammoniac, gum ..... do....	1	
Ammonia:		
Aromatic spirits ... pounds..	1	
Bromide ..... do....	1	
Carbonate ..... do....	½	
Chloride ..... do....	1	
Salicylate ..... do....	1	
Valerianate ..... ounces..	1	
Water of ..... pounds..	15	
Amyl:		
Nitrite ..... ounces..	2	
Nitrite, pearls ..... dozens..	1	
Antikamnia ..... ounces..	2	6
Antipyrine ..... do....	6	
Aristol ..... do....	½	1
Arnica flowers ..... pounds..	1	
Arsenite of pot. sol ..... do....	1	
Atropia, sulphate ..... ounces..	½	
Bark, wild cherry, powd. pounds..	10	
Bismuth:		
Subnitrate ..... do....	2	
Subcarbonate ..... do....	1	
Bloodroot, powdered ..... do....	2	
Bromine ..... ounces..	6	
Camphor, gum ..... pounds..		5
Capsules ..... boxes..	8	
Cardamom seed, powd. pounds..	2	
Catechu ..... do....	2	
Calcium, phosph. precip ... do....	2	
Campho-phenique ..... bottles..	4	
Cerate:		
Cantharides ..... pounds..	2	
Resin ..... do....	1	
Chloranodyne ..... ounces..	4	6
Chloralamid ..... do....	3	
Chloroform, pure ..... pounds..	3	
Chloroform, commercial .... lbs..	2	
Chrysarobin ..... ounces	1	
Chloral hydrate ..... do....	8	
Cinchona ..... pounds..	3	
Cocaine, hydrochlorate. ounces..	½	
Cocaine tablets ..... bottles..	¼	1
Colchicum seed ..... pounds..	1	
Colloodium, flexible .... ounces..	5	
Copper, sulphate ..... do....	2	
Creosote, beechwood ... pounds..	2	
Copaiba, balsam ..... do....		5
Digitalis leaves ..... do....	¼	½
Diuretine ..... ounces..	1	
Elixir purgans ..... bottles..	6	12
Ether:		
Fortior ..... pounds..	4	6
Commercial ..... do....	1	3
Spirits, compound .... do....	½	2
Spirits, nitrous ..... do....	3	
Exucalyptol ..... ounces..	½	
Extract:		
Belladonna ..... do....	3	
Buchu, fluid ..... do....	16	
Cascara sagrada, fluid .. lbs..		3
Cascara aro, fluid ..... do....	2	
Cactus, fluid ..... do....	1	
Convallaria, fluid. .... do....	1	
Corn silk, fluid ..... do....	1	
Triticum repens, fluid. do....	1	2
Ergot, fluid. ..... do....	½	
Ginger, fluid ..... do....	½	
Grindelia, fluid ..... do....	2	
Guarana, fluid ..... do....	½	
Hydrastis, fluid ..... do....	1	
Ipecac, fluid ..... do....	½	
Licorice ..... do....	2	5
Licorice, fluid ..... do....	1	
Licorice, powdered ... do....	3	
Nux vomica ..... ounces..	2	
Opium, aq ..... do....	1	
Physostigma ..... do....	⅛	
Quebracho, fluid ... pounds..	1	
Sarsaparilla, fluid ..... do....	1	
Senega, fluid ..... do....	2	
Senna, fluid ..... do....	½	1
Spigelia, fluid ..... do....	½	
Stramonium ..... do....	½	
Uva ursi, fluid ..... do....	½	1
Flaxseed ..... do....	3	10
Flaxseed meal ..... do....	10	25
Formalin ..... do....	2	2
Gentian, powdered ..... do....	1	
Glycerin ..... do....	2	10
Glycozone ..... bottles..	8	
Glycyrrhiza, compound powdered ..... pounds..	½	2
Guaiac, resin ..... do....	½	
Hypnal ..... ounces..	2	
Hydrozone ..... bottles..		24
Iodine ..... ounces..	½	2
Iodoform ..... pounds..	3	8
Ipecac and opium, powdered, pounds	2	
Iron:		
Citrate and quinia .. ounces..	2	
Dialysed ..... pounds..	1	
Pyrophosphate ..... do....	1	
Reduced ..... ounces....	2	
Sirup, iodide of .... pounds..	1	
Tersulphate, solution .. do....	10	
Lanolin ..... do....	2	
Lactopeptine ..... ounces..	½	
Lead, acetate ..... pounds..	2	
Licorice root, powdered ... do....	½	
Listerine ..... bottles..	1	3
Lithia, carbonate ..... ounces..	2	
Lycopodium ..... do....	6	
Magnesia:		
Carbonate ..... pounds..	1	
Sulphate ..... do....	6	10
Mercury:		
Bichloride ..... do....	1	
Mild chloride ..... do....	¼	1
Metallic ..... do....	½	
Ointment, nitrate ..... do....	2	
Oleate ..... do....	1	
Pill mass ..... do....	½	
Red oxide ..... ounces..	2	
Red iodide ..... do....	2	
With chalk ..... do....	20	

S.—*List of medicines on hand September 30, 1896, and six months' supply received October 5, 1896, at hospital*—Continued.

Articles.	On hand.	Received.
Morphia:		
Acetate ounces	½	
Sulphate do	½	
Naphthalin pounds	1	
Oil:		
Anise ounces	1	
Cassia do	4	
Cedar do	4	
Cloves do	1	
Croton do	2	
Hemlock do	8	
Lavender do		1
Lemon do	4	
Malefern do	1	
Orange do	2	6
Peppermint do	8	
Rosemary do	3	6
Spearmint do	8	
Vaseline do	8	
Wintergreen do	2	
Castor gallons	4	
Cod-liver do	2	5
Cotton-seed do	4	
Turpentine do		60
Opium, powdered pounds	1	
Papain ounces	1	
Paraffin do		16
Pepsin do	4	
Peru, balsam pounds	1	3
Petrolatum do	10	20
Phenacetin ounces		6
Pills:		
Anticonstipation number		10,000
Asafetida do	250	
Camphor and opium do	500	
Cathartic, compound do	1,000	
Dover's powder do	200	
Mass hydrarg do	1,000	
Manganese, dioxide do	100	
Quinia, sulph., 2-grain do	100	1,000
Quinia, sulph., 3-grain do	300	2,000
Salol, 5-grain do	500	
Potassa:		
Acetate pounds	2	
Caustic ounces		4
Chlorate pounds	3	
Citrate ounces	8	
Cyanide do	½	
Bicarbonate do	3	
Bichromate pounds	5	
Bitartrate do	1	1
Bromide do	2	3
Iodide do	3	10
Nitrate do	2	
Permanganate do	2	3
Plaster paris do	5	
Plaster:		
Adhesive spools	18	12
Belladonna yards	5	10
Lead pounds	4	
Porous number	500	250
Mustard yards	5	5
Piperazine bottles		6
Quinia, sulphate ounces	4	15
Resorcin do	1	
Rhubarb:		
Powdered do	14	
Powdered, compound do	8	
Root do	2	16
Rochelle salts pounds		15
Salicin ounces	2	
Santonin do	2	
Silver, nitrate do	1	
Silver, nitrate, fused do	1	
Snakeroot pounds	3	
Soap:		
Castile cakes	18	
Castile, green bars		6
Green pounds		5
Soda:		
Benzoate do	1	
Bicarbonate do	2	5
Borate do	10	
Bromide do	4	
Caustic do	1	
Chlorinated sol bottles	4	12
Phosphate pounds	1	
Salicylate do	5	
Sulphate do	6	
Sulphite do	¼	1
Stramonium leaves do	1	4
Strychnia, sulphate ounces	½	
Sugar of milk do	8	
Sulfonal do	6	
Sulphur:		
Washed pounds		2
Roll do	5	20
Suppositories, hollow gross	½	
Tablets:		
Antiseptic—		
No. 3 number		500
No. 4 do		500
Calomel and sugar do	2,000	
Heart tonic do	150	500
Morphia, sulphate—		
One-eighth grain do	100	400
One-fourth grain do	100	400
One-half grain do	200	
Strychnia, sulphate—		
One-fiftieth grain do		100
One one-hundredth grain number		200
Tartar emetic ounces	1	
Tar, wood pounds	4	
Therapol ounces	2	24
Tincture—		
Belladonna do	40	
Cantharides do	16	
Chloride of iron do	32	
Cimicifuga do	8	
Guaiac, ammoniated do	8	
Opium do	16	
Opium, camphorated do	16	
Sanguinaria do	32	
Serpentaria do	16	
Veratrum viride do	4	
Trikresol pounds	6	
Wax—		
White do	1	
Yellow do	4	10
Whisky, rye gallons	3	
Wine, sherry do	1	
Wine, port do	1	
Zinc—		
Acetate ounces	8	
Chlorinated sol bottles	1	
Oleate pounds	1	
Oxide do	½	
Sulphate do	1	

REPORT OF BOARD OF VISITORS TO THE UNITED STATES MILITARY ACADEMY.

REPORT

OF THE

BOARD OF VISITORS

TO THE

UNITED STATES MILITARY ACADEMY

FOR THE YEAR 1896.

To the Secretary of War, the President of the Senate, and the Speaker of the House of Representatives:

The following report of the Board of Visitors, appointed in pursuance of section 1327, Revised Statutes, to the United States Military Academy at West Point, N. Y., June, 1896, is respectfully presented.

The persons constituting the Board are named below:

APPOINTED BY THE PRESIDENT OF THE UNITED STATES.

1. Hon. M. E. INGALLS..... Cincinnati, Ohio.
2. Dr. JOSEPH D. BRYANT..... New York, N. Y.
3. Hon. T. H. CLARK..... Montgomery, Ala.
4. Gen. JAMES H. WILSON..... Wilmington, Del.
5. Hon. HIRAM W. GARWOOD..... Bastrop, Tex.
6. Prof. W. WHITMAN BAILEY..... Providence, R. I.
7. Hon. ALBERT W. GILCHRIST..... Punta Gorda, Fla.

APPOINTED BY THE PRESIDENT OF THE SENATE.

8. Hon. GEORGE GRAY..... Wilmington, Del.
9. Hon. WILLIAM J. SEWELL..... Camden, N. J.

APPOINTED BY THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

10. Hon. GEORGE W. STEELE..... Marion, Ind.
11. Hon. ROBERT G. COUSINS..... Tipton, Iowa.
12. Hon. GEORGE B. MCCLELLAN..... New York, N. Y.

All of the members except Mr. Garwood reported at West Point, and after a temporary organization elected Gen. James H. Wilson president, Senator Sewell vice-president, and Professor Bailey secretary.

The following committees were appointed:

Appointments and examinations.—Messrs. Cousins, Clark, and Sewell

Discipline and instruction.—Messrs. Gray, Gilchrist, and Clark.

Armament and equipment.—Messrs. Steele, Garwood, and Sewell.

Buildings, grounds, and lights.—Messrs. McClellan, Bryant, and Wilson.

Fiscal affairs, supplies and expenditures for cadets.—Messrs. Ingalls, McClellan, and Gray.

Hygiene and athletics.—Messrs. Bryant, Bailey, and Gilchrist.

The examinations and exercises were conducted from day to day in the usual manner, and revealed the fact that the high standard of instruction, discipline, and proficiency which have always prevailed at the Military Academy have been fully maintained.

Every facility that could have been desired was offered for an examination of the administrative and academic departments of the institution, for the inspection of the grounds and buildings, and for obtaining a correct knowledge of the instruction and discipline of the cadets. Officers on duty at the Academy were detailed to accompany and assist the committees in their investigations. The Superintendent and his staff, as well as the professors and instructors, showed them every attention and gave them all necessary facilities for the performance of their duty. Every question, no matter to whom addressed, was fully and fairly answered, and every subject pertaining to the efficiency of the institution was thoroughly investigated and discussed.

Special attention was given to the requirements for admission into the Academy, and also to the curriculum of studies prescribed for the cadets.

While education has generally advanced throughout the country with its growth in population and prosperity, the standard of admission has not been materially raised since the foundation of the Academy. The Board of Visitors, after careful consideration of the subject, were unanimous in the opinion that the present requirements are not sufficiently comprehensive, and that in view of the course to be mastered after admission, elementary algebra should be added; but this can not be done under the present system without an act of Congress authorizing it. With the view of keeping the standard of admission abreast with the progress of education at large, and with the standard of admission to other educational institutions, the Board therefore recommends that section 1319, Revised Statutes, fixing the present standard of admission, should be repealed and a new section should be enacted, substantially as follows:

SEC. —. Appointees for admission into the Military Academy shall be examined in such subjects, at such times, and according to such regulations as may be prescribed from time to time by the Secretary of War, before they shall be admitted to the Academy.

This, it will be observed, will make the provisions for admission to the Military Academy conform substantially to those for admission to the Naval Academy, which are as follows:

SEC. 1515 (Rev. Stat.). All candidates for admission into the Academy shall be examined according to such regulations and at such stated times as the Secretary of

the Navy may prescribe. Candidates rejected at such examination shall not have the privilege of another examination for admission to the same class, unless recommended by the board of examiners.

This recommendation, it is believed, can be all the more safely adopted, because the first six months after admission may be fairly considered as a probationary period, in which special pains are taken to familiarize the new cadets with the prevailing methods of instruction and discipline, and to bring them into harmony with their environment.

The curriculum of studies and the methods of instruction and recitation seem admirably adapted to the exact and highly scientific education now required for army officers by all civilized nations. The time of the cadet is properly divided between rest, study, and recreation, and no trifling or waste of time is permitted. The system is the same for all, but inasmuch as the cadets are arranged in their classes from time to time according to their proficiency, and the amount of each subject and the minimum degree of proficiency required, are graduated from the head to the foot of the class, the burden of work is apportioned according to ability, and no injustice is done. While all are required to go over the same general course, and to give the prescribed amount of time to each study and exercise, all are not required to attain the highest degree of proficiency. Those in the higher sections cover more ground than those in the lower, and after graduating are assigned to the higher branches of the military service. In practice for many years, the system has been found to work well, and it is believed that the officers of our Army as a class are better educated than those of any other country, and are specially well fitted for active service in all branches of army work. It is largely due to this circumstance that the late General Upton, and many others who graduated well up in their class and were assigned to the artillery and the staff corps, served in the war of the rebellion with equal efficiency and distinction in the artillery, cavalry, and infantry, and that General Sheridan and others who graduated low in their class and were assigned to the infantry, served with equal or greater success in the cavalry, and even higher branches of the service.

The Board of Visitors found the grounds and buildings of the Academy and military post admirably cared for, in excellent condition, and generally well adapted to the purposes for which they are used.

The cadet barracks, an extensive and stately building of granite, contains ample accommodations, at the rate of two in a room for the average maximum strength of the corps, which is now 296. By the vacation of the rooms now used by officers and the dentist, and for the storage of trunks and other property, there would be sufficient accommodation for 384 cadets.

The rooms are well ventilated and heated, but it is worthy of observation that the system of lighting is capable of further improvement, without additional expense for plant, by the adoption of the recent improvements in the art of lighting by gas.

As the barracks and academic building are found to be ample for the accommodation of at least 88 more cadets, or two at large for each State in the Union, or one for each Senator, and the additional cost would be but slight, the Board recommends that an act of Congress should be passed, authorizing the nomination of one cadet by each United States Senator, in addition to those now nominated by each Member of the House of Representatives.

The new academic building designed by Richard M. Hunt, the late distinguished architect of New York, has been completed, with the exception of the clock tower, provided for in the original plans, but which would cost a considerable sum of money and would hardly improve the appearance of the building. This most excellent structure, as well as the new gymnasium, also designed by Mr. Hunt, are enduring monuments to his taste and ability. They are altogether admirable in design, materials, and stability. The cadet mess hall has been relaid with a tile floor, which adds to its cleanliness, but its walls are hung with portraits of distinguished officers, some of which are of questionable artistic merit. The Board of Visitors recommends that the Superintendent or the academic board should be vested with discretionary power to reject such portraits presented to the Academy as do not come up to the proper standard of excellence.

The library contains some 38,200 bound volumes and about 6,000 pamphlets. It is by far the largest and best military library in this country, and its value is almost priceless. The building in which it is housed has a very attractive exterior and a very unattractive interior, but it is damp and not fireproof, besides the library room itself is too small. Plans and estimates have been prepared for altering the present building and making it fireproof, and the Board recommends that the necessary appropriation should be made by Congress at the earliest possible day. The total estimated cost of these alterations is $70,000.

The quarters for married and unmarried officers, recently provided for by Congress, have been completed and occupied, but three more sets for married officers are badly needed. It is estimated that they will cost $8,000 per set, or $24,000 in all.

The riding hall is too small for the proper instruction of the cadets, and the "leg guard" is old and rotten and should be renewed. The building should be much enlarged or replaced by a new one of proper size, but no plans having been prepared, the Board of Visitors can not submit an estimate therefor.

The stables, although old, are fairly lighted and ventilated, but they accommodate only 98 horses. The main building should be extended south 43 feet, by which room for 12 additional horses can be provided.

If 50 additional horses should be purchased, which the Board strongly recommends as necessary for the proper instruction of the cadets in cavalry and artillery tactics and exercises, the stables will have to be increased accordingly, but as no plans or estimates have been prepared, the cost of this improvement can not be stated at present.

Congress at its last session appropriated $7,500 for a guardhouse at the south gate of the reservation, but the lowest bid which could be obtained therefor was $8,600; hence, the appropriation should be increased $1,100.

The cadet guardhouse is too small, and besides it is old and shabby. It should therefore be remodeled or torn down and a new one built in its place.

A small amount of grading and paving is needed around the new Academic building and a sidewalk should be laid from the south dock to the plateau above. These improvements, estimated at $7,900, should be made as soon as the money is provided for them.

The hotel, built seventy years ago, is insufficient in size and accommodations and is badly arranged. The rooms are small, the furniture old and shabby, and the bedding and carpets are poor in quality and condition. The rent is $2,000 per year, $1,000 of which is allowed for repairs, but if the whole rent were applied to the betterment of the furniture and accommodations, the result would not then enable those who are compelled to go to West Point to find at the hotel such comfort as should be furnished in a building owned by the United States.

Obviously the house should be remodeled and refurnished, or it should be replaced by a new one, as experts may recommend after a careful examination. Plans and estimates not having been submitted, the cost of the necessary improvements can not be given in this report.

The barracks for the band and also for the enlisted and general-service men on duty at West Point are in good condition and are sufficient for the present, but the barracks for the engineer troops are inadequate for their proper accommodation and should be remodeled and extended. Those for the cavalry detachment, built in 1891, are a disgrace to the service. They stand near the cavalry stables under the side of a hill which is some 20 feet from the west end. They are badly ventilated, and in consequence of the wet rock on the north side and the wet earth under the floor, they are damp and chilly even on warm summer days. They are insufficiently provided with baths and washing facilities.

The Board of Visitors recommends that the present unsatisfactory condition of these barracks should be remedied without delay. The rock north of the barracks, for a distance of 25 feet at least, should be blasted and removed, in all about 1,800 cubic yards, at a cost of about $2,000. The space under the ground floor should be excavated, drained, concreted, and properly ventilated from the inside, and the present inefficient exterior ventilators should be closed. New bath tubs should be provided, and the soapstone troughs now used by the men for washing should be replaced by 8 suitable lavatories. A wooden floor should be laid in the kitchen, the plaster ceilings, which are continually falling, should be replaced by iron ceilings, and the building should be painted both within and without.

The enlisted men's guardhouse is too small and is badly lighted and ventilated. It should be replaced by a new one.

The subject of the sanitary condition and needs of the entire post received the personal attention of a distinguished medical practitioner, a member of this Board, and his investigations were so thorough and have led to such important results, and the report prepared by him is so complete, that the Board not only concurs fully in its conclusions, but desires to have it and its accompanying documents published as a part of this report.

The cadet hospital is in excellent condition and generally well suited for its purposes, but the water-closets in the rear of each floor should be removed to the outside of the rear wall, additional bathrooms should be provided, and an operating room constructed in accordance with the requirements of modern surgery is absolutely necessary. The court-yard requires regrading, draining, and repaving.

It is estimated that the operating room will cost $2,400. The other improvements at the hospital, it is estimated, can be provided for $5,300.

It has been found by an expert, whose report is submitted with that of the committee on hygiene and athletics, that the water from the mountains impounded in the reservoirs which supply the post requires filtering before it can be safely used. The new reservoir should be completed, and this can be done at a cost of $15,000. A properly constructed filter with a daily capacity of 500,000 gallons should be added as soon as possible. The Board is unable to state what this will cost, but believes it can be built for about $25,000.

The following tabular summary of the approximate cost of carrying out the improvements herein recommended is submitted, with the further recommendation that the Secretary of War should cause the immediate preparation of the additional estimates, under the direction of the Superintendent, necessary to complete the table:

Reconstruction of library building	$70,000
Completion of the new reservoir	15,000
Filtering beds (approximate)	25,000
Grading and paving about new academic building	5,300
Sidewalk from south dock to plateau	2,600
Three sets of officers' quarters, complete	24,000
Additional appropriation for guardhouse at south gate	1,100
Operating room at cadet hospital	2,400
Other improvements at cadet hospital	5,300
Total	150,700

To the foregoing should be added:

Additions and improvements at the cavalry barracks
Extension and repairs of riding hall.
Extension and repairs of stables.
Remodeling and rebuilding cadet guardhouse.
Improvement of the engineer barracks.

Improvement and grading at cavalry barracks.
Rebuilding enlisted men's guardhouse.
Remodeling or rebuilding hotel.

The Board desires to add that, while it does not wish to be understood as recommending immediate appropriations for any of the above-mentioned improvements, the cost of which has not yet been estimated and can not therefore be given, it entertains no doubt that they will be called for in the near future, and hence it suggests that proper plans and specifications and estimates therefor should be prepared under the supervision of the Superintendent, for the information of Congress, without unnecessary delay.

This Board renews the recommendation of several of its predecessors, that the senior assistant of the instructor in ordnance and gunnery should be granted the same pay and allowances as are now provided by law for the assistant professors of the other departments of instruction. This is obviously just, and should be authorized by Congress for the excellent reasons frequently stated before.

It also heartily concurs in the recommendation of previous Boards that the efficient services of Mr. Herman J. Koehler, sword master and instructor in gymnastics, should be rewarded by the rank, pay, and allowances of a first lieutenant in the Army. It recommends that the band at the Military Academy be increased to forty pieces, as has been frequently recommended before, and the reasons for which are fully set forth in several previous reports.

The admirable and eloquent address delivered to the graduating class by the Hon. Robert G. Cousins, who was, at the request of the Superintendent, designated by the Board of Visitors for that duty, is regarded as worthy of preservation and is made a part of this report.

In conclusion, the Board calls attention to the fact that the soldiers on duty at the Post of West Point are apparently efficient and perform the duties required of them in a satisfactory manner, but they are far from models in soldierly bearing and appearance. This probably arises from the circumstance that with the exception of the engineer company they are a detachment of what are known as "general-service men," who perform the duties of cavalry, infantry, and artillery, and have the care of the horses used for the instruction of the cadets. Inasmuch as this is a historic spot of great national interest, and therefore, as well as because it is the site of the Military Academy, it is frequently visited by foreign officers and travelers of distinction, it is suggested that a picked battalion of infantry, a squadron of cavalry, and a battery of horse artillery should be stationed on the reservation, which is amply large for their accommodation, if suitable barracks and stables were provided for them by Congress. The subject is worthy of further careful consideration, perhaps by a board of officers, which if convened should furnish plans and estimates for the necessary buildings and improvements.

With the improvements herein recommended, and which it is believed the Government can well afford to make, the Military Academy would be not only the best but the most complete school of the kind in the world, and this ought to be a matter of pride and satisfaction to every American citizen.

All of which is respectfully submitted for the Board by—

JAMES H. WILSON,
President.

WM. WHITMAN BAILEY,
Secretary.

JUNE 15, 1896.

REPORT OF COMMITTEE ON HYGIENE AND ATHLETICS.

Surely both nature and history have endowed West Point with potent influences well calculated to encourage the development of physical manhood and unalloyed patriotism in a remarkably unstinted manner. The influences of the magnitude and grandeur of nature's handiwork, supplemented by that of the records and objects of past patriotic endeavor can but inspire those who seek the benefits of the institution with high and noble resolves. Therefore the selection and proper maintenance of the place for the training of the country's military scholars is doubly wise, since it suitably emphasizes alike an appreciation of the principles of great physical and moral forces. However, the proper fruition of the influences of these inspiring examples requires the recognition and the wise support of those vested with legislative and executive control.

Sound bodies and established good health are quite as essential to mental attainment and practical outcome as are a befitting curriculum and wise military discipline. It is proper, we think, to keep in view the fact that the degree of practical human efficiency is measured quite as often by sound physique as by profound attainment. The committee examined carefully into the influences exercised by the matters properly coming before it for consideration.

THE DRAINAGE.

Little, indeed, can be suggested in the way of improvement in this regard. The high elevation above the Hudson River, the natural contour of the surface, and the sandy nature of the soil supply quite as fully as nature can the desiderata of good surface drainage. If but a brief though well-considered attention were given to the gutters and surfaces of the roadways at various parts of the post, the outcome would be conducive to good taste and add much to the comfort and convenience of many interested persons.

THE HOSPITALS.

The hospital for cadets is, with but few exceptions, admirably suited for the purpose. The water-closets in the rear of each floor of the hospital should be removed from the lavatory and placed outside of the contiguous walls of the building. This change will be in the interest

of good health and the maintenance of proper self-respect of those who are required to use them, and, moreover, will conform to the common requirements now practiced in the construction of such places. An increase in the capacity for bathing here is earnestly advised. In one small room, 9 feet 10 inches long by 4 feet 6 inches wide, on the top floor, is found a bath tub, water-closet, and washstand devoted to the use of ten men. Surely the mere mention of this fact will, for obvious reasons, lead to a correction of the abuse. In other respects the plumbing is suitably arranged, scientifically constructed, and appears to be in good order.

The operating room.—It will be noticed in the appended statement (Exhibit A) that modest estimates are made by Dr. Torney for the purpose of providing a suitable operating room. The statement contains no item of contemplated unwise expenditure. No request is made in this respect that is not of established significance in the construction of operating rooms in civil hospitals. No objection can be reasonably made to any of these items, unless it be by some one incompetent to judge of their necessity or who is wedded to the idea that soldiers need not receive the benefits of scientific surgical attainment. Inasmuch as the high standard of instruction in the numerous lines of service connected with the Post is the issue of wise thought and persistent effort, your committee fail to comprehend the wisdom of any obstruction directed to medical and surgical effort, except it be by those who, while glorifying the ingenuity of human device for slaughter, withhold encouragement of commensurate means of relief, and thus reduce the physical status of war to the plane of scientific barbarism. Certainly, since the teachings of this institution characterize the most superior methods of offensive and defensive conflict, should they not exemplify also the latest established means directed to the relief of the unfortunate agents of conflict?

In this connection the committee is constrained to renew the advice of the committee of 1894 that instruction in the elements of hygiene and prompt relief to the injured be introduced into the curriculum and made a recognized requirement of the institution. We are not inclined as yet to regard the course of study in this branch as taught by the medical department of the Navy (see Report of the Board of Visitors, 1894) as sufficiently practical to meet the demands of lay official requirements in time of action on a battlefield. As before advised, the medical officers only should instruct in these lines of usefulness, as they appreciate to the fullest extent the practical bearing of the instruction, and therefore can impress it in a manner true to the exigencies of an occasion.

The courtyard.—The courtyard in the rear of this hospital is badly drained, owing to defects in the grade and structure of the pavement. The present defective pavement should be removed and a suitable one provided to meet the demands of good hospital sanitation.

The soldiers' hospital.—Aside from the presence of the water-closets and urinals within the hospital building, and in a place that contributes in the fullest degree to their offensiveness, little indeed can be said except in commendation of this establishment. It is already advised by the medical officers that the closets and urinals be removed from within the building, and nothing should hinder a prompt compliance with this recommendation.

THE BARRACKS.

The barracks of the cadets are cleanly and as well ventilated as a seemingly wise attention to discipline will permit. The question of the proper degree and variety of light that will best conserve the power of the eyes of the cadets during study hours is one requiring prompt and judicious action. There seems to be no doubt of the fact that much gain can be made in this direction, and that the reward of the effort will be promptly beneficial to the cadets, and finally to the military service at large. The variety of the light, the device for its use, the proper color of the walls, etc., are matters to which should be given the best scientific consideration before final action is taken.

The water-closets, urinals, and baths of the cadets are adequate in all respects for the fulfillment of their intended purposes; and, too, the ventilation, light, and cleanliness of the place merit a high degree of commendation.

The gymnasium and its appointments and the method of teaching are excellent, as is bespoken by the zeal and physical development incident to the system of instruction.

The barracks of the cavalry.—From a sanitary standpoint, these barracks present the antithesis of a wise expenditure of the public funds. Imperfect drainage and bad ventilation cause dampness and noisome odors to pervade the building; defective urinals and plumbing are present; in fact, the entire building bears the impress of unsanitary misery. It is earnestly advised that the urgent requests for needed improvements made by the medical officer in charge of the Post be heeded before extended outlay in other directions is made.

The engineer barracks.—This building is an old, and therefore an imperfect, one, especially as relates to bad ventilation and unwise utilization of capacity. The committee on buildings, etc., has spoken of the inadequacy of the barracks in no uncertain manner, and this committee desires also to add the weight of its disapproval, and urges that changes consistent with those of more modern construction be made. The water-closet accommodations are not only sadly incomplete to meet their purposes properly, but are so located as to contribute unnecessarily to the inherent unsanitary aspects of the structure itself. The objectionable water-closets are mentioned here especially, in order not only to justify the demand for their change in location and structure

already made by the medical officer in charge, but also to hasten, if possible, the contemplated consummation of his recommendation in these respects.

"Log Town."—These buildings are for occupation of soldiers and their families. The changes looking to improvement of this section, suggested some time since by the Superintendent, Colonel Ernst, are being carried into effect, and soon this unsightly and unsanitary feature of the Post will be eliminated.

The mess hall.—The building presents but a few sanitary defects. The yard in the rear of the building and the areas are badly paved and improperly drained; the pavement of the scullery is irregular, broken, and otherwise defective. These conditions cause unnecessary dampness from saturation of the soil with waste water and slops, and could be easily remedied with a limited expenditure. The waste pipes in the kitchen are defective, by reason of small size and improper direction.

THE DISEASES AT THE MILITARY ACADEMY.

The attention of the committee was called by the efficient medical officer in charge, Dr. Torney, early during the period of the visit to the repeated manifestations of malarial fever. The following tables, compiled by Dr. Torney at the request of the chairman, need no explanation, and illustrate the prevalence of malaria more forcibly than words can do:

No. 1.—*Comparative compilation of the cases of malarial fever occurring in cadets and officers from June 1, 1895, to June 1, 1896, with temperature and rainfall records.*

Month.	Mean maximum temperature.	Total rainfall.	Intermittent.	Remittent.	Typhoid.	Ephemeral.	Total.
1895.	°	*Inches.*					
June	82.60	2.63	0	0	0	2	2
July	76.16	6.86	9	1	0	9	19
August	83.80	3.42	64	0	0	10	74
September	80.10	1.16	54	17	0	0	71
October	58.15	4.22	16	4	0	0	20
November	50.60	5.58	6	3	0	6	20
December	41.80	4.20	1	0	0	21	22
1896.							
January	31.36	1.19	0	0	0	9	9
February	36.70	4.46	0	0	0	0	0
March	38.50	12.02	0	2	0	22	24
April	61.70	1.98	24	3	1	30	58
May	76.30	2.89	70	0	0	0	70
Total			243	35	1	109	388
June 8			17	0	0	0	17

As will be seen, the foregoing cases relate only to the cadets and officers. The ephemeral fevers do not appear to depend on malaria, as they bear no direct relation with its presence and are not controlled by the same remedial agencies as are the malarial fevers. The single case of typhoid fever could not be traced to a definite cause, and as every

precaution was taken during its presence, and none appeared thereafter, the cause can not be regarded as of local origin. The pronounced and increasing number of the malarial cases is suggestive of the presence of some active means of infection in the drinking water, the air, or in both. A comparative compilation of disease of the preceding year was made, with the following result:

No. 2.—*Comparative compilation of the cases of malarial fever occurring in cadets and officers from June 1, 1894, to June 1, 1895, with temperature and rainfall records.*

Month.	Mean maximum temperature.	Total rainfall.	Intermittent.	Remittent.	Typhoid.	Ephemeral.	Total.
1894.	°	*Inches.*					
June	82.23	2.08	2	0	0	2	4
July	86.45	1.04	2	0	0	18	20
August	81.74	1.83	2	0	0	14	16
September	77.10	6.30	1	0	0	17	18
October	63.84	6.25	1	0	0	20	21
November	(*)	4.08	0	0	0	32	32
December	36.41	2.92	0	0	0	14	14
1895.							
January	30.64	0.90	0	0	0	8	8
February	28.25	1.60	0	0	0	7	7
March	40.80	3.80	1	0	0	5	6
April	58.13	6.87	2	0	0	28	30
May	70.96	3.53	0	0	0	17	17
Total	.....	.....	11	0	0	182	193

* No thermometer.

The so-called ephemeral exhibitions were numerous, but they did not resemble malarial fever in any significant regard. At all events, the condition appeared to the special committee as of great importance, and, therefore, it was brought to the attention of the Board of Visitors at a special meeting called for that purpose, to which the Superintendent, Colonel Ernst; the medical officer, Dr. Torney, and the engineer, Captain Lusk, were invited to be present and take part in the discussion of the subject. It appeared that the matter had been under the consideration of these officers before this, and that measures of prevention had been taken, but without any practical result. The examination of the sources of the water supply and the inadequate means of filtration, taken in connection with the increasing malarial record of the cadets, seemed to the Board of Visitors as indicating quite clearly that prompt measures were necessary in order to establish any relation between a known cause and an effect so decidedly indicated. It was therefore moved and carried that the chairman of the sanitary committee be directed to communicate at once with the Secretary of War regarding the matter, and that the Secretary himself be notified to this effect by the Board of Visitors.

The following is an extract from the letter to the Secretary of War:

Finding, upon careful examination, that the water system and supply requires renovation and enlargement, we recommend that an investigation be made by the

War Department, and an estimate be secured and submitted to the next session of Congress for the amount necessary to furnish a healthful, adequate, and permanent water supply.

Resolved, That Dr. Joseph D. Bryant be, and he is hereby, requested, on behalf of the Board of Visitors, to communicate with the Secretary of War in regard to the sanitary condition of the United States Military Academy, with a view to the immediate adoption of means to remove the conditions that now affect, unfavorably, the health of the Post.

In accordance with the direction of the Board of Visitors, the chairman called at once on the Secretary of War, and was assured by him that the matter would receive prompt attention.

Almost immediately, Charles Smart, major and surgeon of the United States Army, a gentleman whose experience in such matters especially fitted him for the purpose, was designated to examine and report upon the question as soon as possible. His comprehensive report, bearing the date of June 21, certainly justifies the wisdom of the prompt provision for temporary effort at relief, and emphasizes the importance of the necessity of a higher grade and completer method of treatment of the drinking water in the future.

The report of Major Smart is so exhaustive, and the recommendations so wise, that the committee feel that nothing better can be done than to submit it in full, with the urgent advisement that its recommendations and the indorsement of C. H. Alden, Assistant and Acting Surgeon-General, be promptly and fully complied with. (Exhibit B.)

The chairman of the committee is assured already by the Secretary of War that directions are given for the carrying into effect of the subsidiary recommendations of this report. The chairman regards it proper to inform the committee that in a recent conversation (July 13) with Dr. Torney the chairman was informed that no abatement in the malarial diseases had as yet taken place. The prompt action of the War Department in causing the investigation of the matter, and the carrying into effect so soon of the only present local means of relief, should be regarded as an earnest of further and more decided efforts in this respect in the near future. Certainly the people of the various sections of the country, who earnestly meet the legal permission to send their best young men for education in the means of the country's defense, have the right to expect that every precaution will be taken by their guardians to preserve their health during the time of their befitment for the military service. In fact, the proper instillation of the principles of loyalty and patriotism in the minds of these young men requires that they shall be given the same care and protection during the incubative stages of their military career that the people of the country will demand of them as the nation's champions in times of war.

It is proper to say in this connection that malarial fevers prevail to a greater or less extent among the people of the villages located above and below West Point. But it is likewise true that the majority of these people are permanent residents, and therefore constantly exposed

to the indigenous malarial influences of these places, while at West Point scarcely more than a month or so is sufficient time for malarial outbreak in many of those who are new to the place and have not before this experienced an attack. The notion that the incoming cadets are already infected with the disease, and that the high order of sanitation of the place begets the outbreak, is inconsistent with the fact that this disease is quite liberally distributed among the members of the respective classes.

Ice is often polluted on account of the impurity of the source of production, and therefore it should not be used for drinking purposes when taken from such sources unless its purity shall have been determined by proper analysis.

As was aptly pointed out by the committee on hygiene, etc., of the Board of Visitors of 1895, the drinking water and milk should be above suspicion. No elements of alimentation are so commonly used as these, and none are so open to the influences of pollution. The approach of disease through these channels is insidious in the extreme degree, and it can not be regarded as a sufficient attention to duty to correct the errors after the harm is done. On the contrary, the possible occurrence of disease should be anticipated and forestalled by wise sanitary forethought and liberal expenditure.

The committee believe it to be both wise and just to direct the attention of the Board of Visitors to that which appears to be an improper discrimination made against the chief medical officer of the Post regarding the comparative amount of his official remuneration. It appears that the demands of the legitimate social and military courtesies of the place on the officers require an expenditure on their part which is much in excess of their salaried ability to meet in a manner consistent with the high status of the Post and the necessary regard for self-preservation. In order that these demands may be met wisely and justly, the great majority of the officers are accorded by Congress the pay of the next higher in rank. Although here the official duties of the medical officer are comparatively onerous, indeed, and albeit the social and military courtesies bear with relatively equal weight on him, yet he has been thus far denied the assistance accorded to his colleagues for this purpose. The committee believe that no distinction should be made in the relative remuneration of those who bear equal burdens in the service, and express the hope that the present injustice to the chief medical officer of the Post will be remedied in the future.

The committee can not close this report without the acknowledgment on their part of the uniform courtesy and earnest cooperation in their efforts of all in authority in the War Department, both at West Point and at Washington.

JOSEPH D. BRYANT, M. D.
ALBERT W. GILCHRIST.
WM. WHITMAN BAILEY.

EXHIBIT A.

WEST POINT, N. Y., *June 26, 1896.*

SIR: In compliance with your request, I respectfully submit the following estimate of the funds required for the construction of a proper operation room in the cadet hospital:

Removing floors, walls, and ceiling	$50
Concrete filling for floor	80
Tile floor	400
Lining walls with enameled brick	850
Blocks and tiling for ceiling	450
Iron beams, window casings, and sash, with plate glass for windows	250
Iron frame and sash for skylight	200
Water connections and washout trap	60
Sieman's gas burner, with connections	50
Total	2,390

It is proposed to convert the southeast room of the third floor into an operating room, and in its reconstruction to make it conform to all the requirements of modern surgical method in the treatment of diseases and injuries.

There is not now in this hospital a place suitable for the performance of surgical work under strict aseptic and antiseptic conditions, and in accordance with the high standard of excellence which surgeons now strive to attain in the repair of injuries and operation wounds. The speedy construction of an operating room is so very necessary that it is urgently recommended that the appropriation for the purpose above indicated be made available upon the passage of the Military Academy appropriation bill for the fiscal year ending June 30, 1898.

Very respectfully.

G. H. TORNEY, M. D.,
Major and Surgeon, U. S. A., Surgeon.

JOSEPH D. BRYANT, M. D.,
Chairman of Committee on Hygiene and Athletics.

EXHIBIT B.

WAR DEPARTMENT, *Washington, D. C., June 21, 1896.*

SIR: In accordance with orders conveyed in letter from your office, dated June 16, 1896, I left Washington, D. C., on that date and passed the four days immediately following—June 17-20, inclusive—in investigating the prevalence of malarial fevers at the United States Military Academy, West Point, N. Y., and the sanitary condition of the Post as bearing upon this prevalence.

The medical reports of West Point show that during the calendar year 1895 there were 172 cases of malarial fever among cadets and 115 among officers and soldiers. These numbers are equivalent, respectively, to rates of 595 and 298 per 1,000 of strength, and may be compared with 74, the average rate of the Army for that year, and with 35 for the cadets and 44 for the officers and soldiers, as the rates per 1,000 of strength for the calendar year 1894.

This increased prevalence in 1895 assumed a greater importance when it was found from recent medical records that there is a prospect of a largely increased malarial rate for the coming season. In 1895, notwithstanding its high rate, the malarial influence did not begin to manifest itself until July, while this year these manifestations began much earlier. The first case of the present year was recorded on March 30, and from that date to June 18, 132 cases have been taken into the cadet hospital for treatment, and a similar malarial prevalence has been experienced by the officers and soldiers of the military post.

From July 6, 1895, to June 18, 1896, the medical register of the cadet hospital shows the occurrence of 282 cases of intermittent fever, generally quotidian in type, and 28 cases of remittent fever, 2 of which were fatal. The daily details of this malarial record are submitted in Table A, appended, but the prevalence by months may be here stated as follows:

Month.	Intermittent.	Remittent.	Total.
July 6-31, 1895	10	0	10
August, 1895	64	0	64
September 1895	54	16	70
October, 1895	16	3	19
November, 1895	6	8	14
December, 1895	1	0	1
January, 1896	0	0	0
February, 1896	0	0	0
March, 1896	2	0	2
April, 1896	26	1	27
May, 1896	70	0	70
June 1-18, 1896	33	0	33
Total	282	28	310

The duration of the intermittent attacks averaged three days; of the remittents, ten to twenty days. The intermittents presented the characteristic symptoms of what is popularly known as chills and fever, a chill more or less severe followed by stages of febrile reaction and perspiration, with a tendency to a recurrence of these phenomena, which recurrence was generally prevented by the free administration of quinine. I verified the diagnosis of several of these cases under treatment in the cadet hospital during my stay at West Point, and determined the presence of the plasmodium malariæ by microscopical examination of the blood. No case of remittent fever was under treatment during the period of my stay, but the thermographic charts of the cases on record were submitted to me, and from an examination of these charts I have no hesitancy in accepting the cases so recorded as cases of remittent malarial fever.

If the sickness indicated by the above statements had been additional to the regular sick rate of the Post, the increased sickness in the command would have attracted prompt attention; but these malarial fevers took the place of the influenzas and catarrhs of the winter season, and of the ephemeral fevers, tonsillitis and pharyngitis of the early spring, one set of febrile diseases subsiding as the other became prevalent. Table B, appended, shows how influenza prevailed in the winter months, yielding to ephemeral fevers as the weather became milder, and these to malarial fevers as warm weather set in. The ephemeral fevers of the early spring and late autumn had the duration of the intermittents, and oftentimes it was difficult in individual cases to distinguish the character of the disease by its mere symptomatology. The presence of the plasmodium in the blood or the efficiency of quinine as a remedial agent determined in these cases, as a rule, the diagnosis of malarial as distinguished from ephemeral fevers. In fact, these ephemeral fevers assumed a character of malarial periodicity as the warm season advanced, but with no ordinarily great increase of the general sick rate over that which would have been recorded from the ephemeral fevers alone. During the present season, however, 70 cases of intermittent fever recorded in May, as compared with 16 cases of ephemeral fever with no malarial cases in the corresponding month of 1895, could not fail to attract attention to the marked change in the character and prevalence of these febrile attacks.

It was found, however, by a reference to the medical records of West Point that the prevalence of malarial fever in the spring and autumn has been within limits a constant recurrence, and even that its prevalence to such an extent as was experienced in 1895–96 has not been unique in its history, for in the year 1880 there were recorded 121 cases among the officers and soldiers and 56 cases among the cadets, equivalent to rates per 1,000 of strength of 528 and 209, respectively. Table C, appended, gives the number of cases recorded annually from 1880 to 1895, inclusive,

among the officers and soldiers and among the cadets. From this table it will be observed that in every year during the period stated there was recorded a certain number of malarial cases.

I did not pursue the history of malarial fever at West Point beyond 1880, as this year furnished a general prevalence at the Post nearly as great as that given by the calendar year 1895. In 1880 the average prevalence of malarial fevers in the Army as a whole was much greater than it is now—186 per 1,000 of strength, as compared with 74 in 1895. This decrease is certainly due in great part to the abandonment of posts in notoriously unhealthy, i. e., malarial, localities, but no small part of it must be credited to the greater care given of late to the drainage, sewerage, and water supply of the malarious posts that continue to be occupied. It was my privilege to meet Col. C. T. Alexander, of the Medical Department, during my visit to West Point. This officer was post surgeon at the Military Academy during the endemic prevalence of the fever in 1880. Its occurrence then, however, did not impress him as constituting any unusual condition, fresh, as he was, from service in connection with more serious developments of malarial poisoning at Western posts. (See Table D for a daily and monthly summary of the cases among cadets in 1880.)

While the records of the Post show that the causes of malarial fever have affected officers, soldiers, and cadets every year during the spring, summer, and autumn, and that in certain years these causes have been more malign than in others, it was found that a similarly varying prevalence and intensity affected not only the families of officers and enlisted men and other civilians at the Post, but the residents of the civil settlements in the vicinity. In the village of Highland Falls, for instance, a certain number of cases occur every year during the period of prevalence at the military post, and at the present time there is a greater prevalence in the settlement than is usual so early in the season of the year. This was reported to me by Dr. Brown, the health officer of the village, who informed me also that only a small number of the cases that occur come under medical observation, as the people are so familiar with the disease and its remedy. The pharmacist of the village corroborated this by the information that the call for quinine this year was already quite considerable.

This extended prevalence indicates that the cause or causes of the fevers are not to be found in any unsanitary condition which is local or peculiar to any of the persons quartered on the military reservation. And, as a matter of fact, there is little in the nature of unsanitary conditions to be found at this station. In the language of the surgeon of the Post: "The ordinary conditions affecting the health of the individuals residing on the reservation are almost ideal, as they are well housed, well clothed, and well fed. The disposal of the refuse of the Post is made under proper supervision, and with the exception of small quantities of waste water occasionally thrown on the ground by the members of the families of enlisted men and officers' servants is satisfactory. The drainage of the land is very good, and the sewerage system ample and complete."

The few points that might be instanced as susceptible of improved condition are well known to the local authorities, who have remedial measures under consideration. The most notable of these are the damp site of the barracks of the cavalry detachment and the musty and unventilated state of the space underlying the flooring. Fevers have occurred at several of our military posts where this subfloor space has become damp and foul from organic decay in the absence of free communication with the external air, and where the warmth of the interior of the building has drafted up this soil air through the seams of the flooring. In the present instance, however, the flooring is sound, and the greatest care is taken of the condition of the underlying space consistent with the original faulty construction, but no care can prevent the soil from becoming saturated with moisture in rainy weather and continuing damp for a long time afterwards. It is suggested that the site be drained, the surface concreted and asphalted, and the subfloor space freely ventilated.

The causation of malarial fevers, according to our present knowledge, is associated with that fermentation in the soil which gives rise to the growth of vegetation. The conditions essential to this fermentation are (1) organic matter in the soil, (2) moisture, and (3) a temperature of 60° F. There are few soils so poor as not to have enough organic matter for vegetable growth in the presence of the other essential factors, and there are few places in the United States that do not have at some season a sufficiency of moisture in the soil to permit of this fermentation if the needful temperature is present; so that this fermentation which renders possible the germination of the annual vegetation depends practically on the occurrence of a temperature of 60° F. With a luxuriantly growing vegetation this soil fermentation is harmless to man, but in the absence of a vegetation corresponding in luxuriance to the energy of the fermentation malarial fevers are developed among the people of the locality; hence the malarious character of certain sandy and barren tracts and of lands where the vegetation has been wilted or destroyed by overflow.

In the Tropics the dry season is healthy, but as soon as the first rains fall malarial fevers occur and continue until the surface of the country is covered with vegetation. During the vigorous life of the tropical vegetation there are few fevers, but as soon as this life wilts and decays at the close of the fruiting season malarial fevers again appear and continue with virulence until the advent of the dry season, when the soil, sun dried and hard baked, ceases to ferment. In temperate climates medical observers have for ages back been accustomed to recognize spring and autumnal malarial fevers which correspond with those tropical fevers that occur, respectively, at the beginning and at the close of the rainy season. If in the spring we have the coincidence of organic matter and moisture in the soil with a temperature of 60° F., but without a corresponding luxuriance of vegetable growth, there will be an occurrence of malarial fevers among the people. If the advance of the seasonal temperature is slow, giving ample time for the growth of vegetation to keep up with the energy of soil fermentation, the season will be healthy, but if the onset of warm weather be sudden and early, so that the temperature of 60° F. prevails in advance of vegetation, the season will be unhealthy.

An examination of the malarial records of the United States Academy at West Point for the years back to 1880, in connection with the meteorological records of the Post for the same years, shows that in 1880 and in 1896 there has been this sudden and early onset of warm weather in the spring. In the former year the mean temperature rose from 49° for April to 66° for May, and in the latter from 50° in April to 64° for May. On the other hand, in the years characterized by comparative absence of malarial fevers at West Point the advance of the warm season has been slow, as in 1891 and 1894, when the mean temperature for May was in both seasons only 48° F., and the malarial prevalence among the cadets equivalent to only 43 and 35 per 1,000 of strength. In Table E, appended, the spring temperatures for 1880 to 1896 are given in this connection.

Correspondingly, in the autumn, if the warm weather is prolonged after the decadence of the annual vegetation, the season proves a sickly one.

Again, if at any time the vegetable growth which is natural to the surface becomes destroyed or if the relation between the vegetation and the soil fermentation be in any way disturbed, there will be malarial developments, as when new ground has been cleared for agricultural, engineering, building, road-making or other purposes. Nothing of this kind has recently been done at West Point, so that the present prevalence of malarial fevers must be regarded as in great part due to the climatic conditions. The harmful resultant of these climatic conditions was until lately regarded as an exhalation from the soil, a miasm, an influence, impalpable, gaseous, or ethereal, but since the discovery of the plasmodium in theblood of affected individuals the essence or germ of the disease must be a particular substance susceptible of growth like any other mass of amœboid protoplasm under suitable conditions.

It must be remembered, however, that malarial fevers are by many sanitarians regarded as propagated by means of surface-water supplies. The evidence on which

this belief is founded is strong. Such fevers have occurred on only one ship of a fleet, which ship was the only one of the fleet supplied with bad water. Malarial fevers prevail in nonmalarial districts when the water supply is surface water drawn from a locality where soil fermentation is active; and more convincing than all is the acknowledged fact that malarial fevers have ceased in localities notoriously insalubrious when the surface-water supply has been replaced by a pure, filtered water from deep wells. The life history of the plasmodium malariæ, which is recognized by the medical profession as the cause of periodic fevers, has not been followed outside of the human body, but that its history is connected with soil fermentation, as above stated, seems certain, and there appears, therefore, no reason for supposing that it may not be washed from the soil by surface waters. It is particulate, and therefore separable by filtration. Thus the immunity of certain people who use deep-well water may be accounted for, and thus we may predicate of certain others that they would be less affected by these fevers were their water supply filtered.

The only troops unaffected by malarial fevers at West Point in the autumn of 1895 were commands temporarily stationed there for target practice. They came from the posts in New York Harbor, and remained usually from ten days to two weeks. Their camp was supplied with water from the Post's system, but their drinking supply was usually obtained from a spring near their camp. Moreover, it has been observed by the medical officers on duty at West Point that families of officers at the Post have suffered less than others on the reservation, and this comparative immunity is credited to the greater care given by these families to boiling or filtering the water used as a supply for drinking.

The water supply of the Post is derived from three sources in the highlands back from the river, but all these waters are of the same general character. They fall upon a rich organic soil, the quality of which is amply demonstrated by the luxuriance of the vegetable growth which clothes its surface. In winter and spring two streams, the Cascade and Crows Nest, which make a steep descent from the highlands, suffice for the supply of the Post. Their waters are collected at present in a reservoir (the Delafield), from which they are in part passed through a filter before distribution. In summer these two sources fail, when recourse is had to the supply from Round Pond, a large basin of somewhat dark-colored water, which, when required, is led by conduit to the Delafield reservoir. The filter bed covers 1,400 square feet, and consists of gravel with only 1 foot of sand on top.

If filtration were properly carried on through this bed, its daily capacity would not exceed 70,000 gallons; but double this quantity of water is usually passed through it, the filtration being correspondingly insufficient. About one-third of the water supply of the Post is distributed without passing through the filter. I made an analysis of water from the Cascade, Crow's Nest, Round Pond, and Delafield Reservoir, and of that which had passed through the filter, the results of which are given in Table F, appended. The waters of the Crow's Nest and Cascade gave better results on analysis than that of the Round Pond, and better than that of the reservoir into which they were flowing, an anomaly explained by the fact that at the time the reservoir contained some of the Round Pond water. The filtered water showed an improvement over that taken directly from the reservoir. Chemically, all of these are fair samples of upland surface waters, free from any suggestion of typhoid fever infection, but open to the suspicion of malarial possibilities, which attaches, as above stated, to such waters.

In 1879 and 1880, while examining water supplies in the Southern States in connection with the prevalence of yellow fever, my attention was attracted to the frequency with which certain low forms of life were found in the microscopic examination of the sediment of such surface waters and foul cistern waters as had been suspected of causing remittent fevers. These lowly microscopic forms consisted of small transparent and colorless masses of jelly-like protoplasm presenting more or less sluggish amœboid movements. They are known to microscopists as rhizopods, and vary in form from the amœba and difflugia with thick protrusions from their mass to others

with fine ray-like filaments. So constantly since then have I found these appearances in waters which on other grounds were considered to be of doubtful quality that I would hesitate to authorize the use of any water containing them. They are present in the surface waters constituting the West Point water supply. These waters are clear and particularly free from visible suspended matters or sediment. The amœboids might escape detection in them, if looked for only in the trace of sediment which collects in twenty-four hours at the bottom of a vessel of this water, but they may readily be separated for miscroscopical observation by means of the centrifugal action of a rotary machine.

The hematozoon of malarial fever is a minute plasmic body similar, apparently, in constitution to these amœboids of the water, but whether they are correlated is unknown. This adds, however, to the argument on behalf of an efficient filtration of suspected surface waters.

In so far as the malarial fevers now prevailing at West Point are caused by climatic conditions or by the presence in the air of some product of soil fermentation induced by climatic conditions, there is nothing to be said that is not already well known to medical men and to most people who have been residents of malarious districts. The regulation of diet, exercise, etc., need scarcely be mentioned, as these are essentials of the curriculum and discipline of the Military Academy. The upper floors of dwellings should be used as sleeping rooms in preference to the lower floors. Necessarily the cadets when in camp are more exposed than when in barracks. The exposure is minimized by the excellent drainage of the site, the flooring of the tents, and the raised bunks. Orders have been issued to prevent lying out on the grass at night, which, it is understood, was in sultry weather the custom of some of the cadets. All unnecessary exposure to the night air, and particularly when fasting, should be avoided. Hence the recommendation of the surgeon that hot coffee or hot milk be issued to the guard reliefs between sundown and sunrise is a judicious one. Breakfast should be served as soon as possible after reveille. It has been ordered that breakfast shall precede sick call during the present encampment, which ends August 28, but as the season of remittent fevers is always prolonged through September and sometimes through October, it would be well to continue the early breakfast hour after the camp is broken up. The remedial and prophylactic virtues of quinine, Fowler's solution, and other antiperiodics may be used under the direction of the local medical officers.

As to the condition of the water supply, purification by filtration is considered imperative. At the present time work is in progress on a reservoir for the collection of the running waters of the Cascade and Crow's Nest streams during the season of their free flow, with additions when necessary from the Round Pond. The reservoir is intended to hold 75,000,000 gallons, and when finished will give the Post a water supply assured as to quantity. It should be assured, as well, as to quality. It should be filtered before distribution, not so much for the improvement of its chemical character as for the removal of the amœboids or of the particulate cause of the periodic fevers which is more or less intimately associated with them. In the United States we are not so careful of the purity of our water supplies as are the people of Europe, and, in consequence, we have an excess of typhoid, malarial, and so-called typho-malarial fevers. The laws of Germany direct specifically the filtering of all surface waters before they are delivered for public consumption. In England and continental Europe the filter bed is an integral part of the water system when the water is not from naturally filtered spring or deep-well sources. In many sanitary matters we are a generation behind the people of Europe, and in this matter of pure-water supplies we are especially backward. The city of London has had filtered water for more than two generations.

In this country we build basins, really for storage, and assume that the sedimentation which takes place in them and the chemical purification which is understood to be a result of continued storage will give a satisfactory purity. This assumption is seldom, perhaps never, warranted. If warranted anywhere it would seem that the

new reservoir at West Point would give the garrison of that Post a strong claim to the warranty, for the reservoir will admit of sedimentation and storage for a period of eight months, giving ample time not only for the settlement of clay, sand, and other mineral particles but for the destruction of all dead and decaying organic matters by the bacteria of nitrification. From it we would get a supply of satisfactory purity as determined by chemical analysis, but it would continue to contain the same malarial possibilities which it possessed as it ran down the mountain ravines into the reservoir. This may readily be proved. The water of Round Pond has not been drawn upon to any extent for the use of the Post since last summer. It has been sedimenting and improving by nitrification and accumulating by the excess of rainfall over evaporation from the surface during the past eight months, yet the amœboid forms which I have described were found in water taken from below the surface of this pond at a point near its center (reached by boat) where the water was 20 feet deep. Filtration as practiced in Europe and as preached by the sanitarians of this country is the only known general remedy in a case of this kind.

There are methods of mechanical or rapid filtration by which the water is forced, under pressure, through sand in iron cylinders, and the filtering sand is washed every few hours by a reversal of the current. Usually in these systems a solution of alum, iron, or other coagulant of albuminoid or protoplasmic matter is added to the water prior to its entrance into the cylinders. A mechanical "plant" of this kind will transform a Potomac River turbidity into a liquid that is beautifully clear and sparkling. Many small towns, chiefly in the Southern States, have adopted this method of rapid filtration, and two years ago Davenport, Iowa, established waterworks of this kind, and is well satisfied with the results. Sanitarians generally, however, do not feel sure of the efficiency of rapid filtration, as there have been few bacteriological examinations of the unfiltered and filtered waters. Moreover, in the opinion of engineers, the slow or natural filter beds, as built originally in England and as now used in all European cities, are cheaper in the long run.

I therefore urge on behalf of the future healthfulness of the United States Military Academy that there be constructed a filter bed on the English model in connection with the reservoir intended for the future water supply of the Post. The present requirement of the garrison is said to be about 333,000 gallons daily, but in works of this kind present construction should provide for a probable extension of service. The filter beds should therefore have a capacity of 500,000 gallons daily. To permit of this they should have an area of one-fourth of an acre and should contain 6 feet of filtering material, broken stone, gravel, and sand, the last screened to 1 or 2 millimeters in diameter. They should be underdrained to draw off the filtered water into a distributing basin, and be provided with proper facilities for the inflow of the water from the reservoir. They should also be housed or otherwise well protected from the frosts of the winter season. The sand should constitute 3 or 4 feet of the thickness of the filtering layer, and in process of cleansing the surface it should never be scraped down to less than 2 feet. The depth of water on the beds should be regulated so that the filtration should be uniform and not much in excess of 2 gallons per square foot per hour, or 500,000 gallons as the daily output. The waters to be filtered are so freely oxygenated that there would be no need to let any part of the bed lie fallow for aeration. Filtration would therefore be continuous, and there is so little clay or other substance of a choking character in the water that the filter would run for many weeks at a time without the need for any material scraping of the surface sand.

The cost of such a filter bed depends on local conditions, and we have little experience of this kind in the United States. In Europe the average cost is known to be $45,000 per acre for open beds, with one-third added for covering when protection is needful. The filter bed 2¼ acres in extent recently constructed at Lawrence, Mass., cost $67,000, but no housing was given to the bed. At Ilion, N. Y., the 3,040 square feet of filter cost a little over $7,000, and the two beds at Hudson, N. Y., aggregating

32,000 square feet, cost about $55,000. From the figures it is assumed that a properly protected filter of 500,000 gallons capacity could be constructed at West Point for about $25,000, but the able engineer officers at this station are better able than myself to give precise figures.

I would urge, however, that whatever the estimated cost, an allotment be made or an appropriation secured from Congress to enable this work to go on in connection with the work on the reservoir now in progress. A large expenditure for the collection and storage of a water supply should always be supplemented by that percentage of increased expenditure which will purify the water and protect the health of the community in the future; otherwise a bad bargain for the community will be made by the official who authorized the large expenditure without the supplemental increase.

But this work, if allotted or appropriated for, looks only to the future, and the improvement of present conditions has to be considered. To meet the exigencies of the present time, the living albuminoids of the water used for drinking must be destroyed by boiling or by chemical means, or be removed by filtration.

Boiling is efficient in destroying the potency of malarial and other disease germs in water, but it leaves the water flat and unpalatable. It is difficult to get men to drink this boiled water when they can get other water more conveniently by turning a spigot. Distilled water produced by attaching a condensing coil to the ice machines supplied by the Medical Department to certain posts has been used with advantage, but this makes the drinking water supply dependent on the ice production, and is, therefore, expensive. But the experience gained in this way has shown the lessened prevalence of malarial fevers at posts in Texas, where the condensed water has been used.

Chemical means involving the coagulation of the protoplasm by alum, iron, or other germicides would no doubt be efficient; but our experience in these methods has been limited merely to coagulation as an accelerant of subsidence or as a preliminary to filtration in particularly turbid waters.

No doubt attaches to the efficiency of filtration after distribution of the water, provided the filtration is properly conducted. By filtration is meant not merely the removal of visible turbidity, but the removal of the germs that require the microscope or bacteriological methods for their discovery. The efficiency of certain porcelain cylinders has been demonstrated. In the French military service much benefit has been derived from their use at posts where an unfiltered supply is delivered. Surgeon-General Sternberg appears to have acknowledged the value of filtration through similar cylinders of American manufacture by the purchase and issue of a number for use in post hospitals. I would therefore recommend that instead of boiling or condensing the water for use in the cadet and company quarters these filters be issued and used until the post water supply is perfected by the completion of the permanent system above mentioned.

So far as the cadets are concerned, Colonel Ernst has informed me that he can and will provide them with water filtered through the Pasteur-Chamberland, or Columbia filters, purchased from the mess fund, and that orders will be issued that no water for drinking will be used except that which has been so filtered and provided. He has, however, no fund from which to purchase similar filters for the other members of the garrison. I therefore recommend that efficient filters be provided by the Quartermaster's Department for the company barracks and officers' and soldiers' quarters in such numbers as to give each person 1 gallon a day, and that when such provision is made, the use of unfiltered water be strictly prohibited. Until then the use of boiled water, cooled and aerated by pure ice, should be encouraged. The water of the spring near the barracks of the cavalry detachment might be utilized also, pending the arrival of a supply of filters. This spring might indeed obviate the necessity for the use of filters in the barracks and quarters in its vicinity. It might be used so far as it goes as a source of supply until filtered water can be distributed from the perfected water works.

If the recommendations of this report be carried into effect I feel confident that the epidemic of fever cases, which at present promises to be in excess of that prevalent for many years back, will be lessened materially, and that although the climatic conditions may be favorable to the development of malarial fevers, in future years the Post will have no such record hereafter as has been registered during the present spring.

In conclusion I desire to express my thanks for courtesies received and for information and valuable assistance to Col. O. H. Ernst, Corps of Engineers, Superintendent of the United States Military Academy; Maj. George H. Torney, surgeon; Capt. James L. Lusk, Corps of Engineers, and Capt. J. B. Bellinger, quartermaster.

I have the honor to be, respectfully,

CH. SMART,
Major and Surgeon, United States Army.

The ADJUTANT-GENERAL,
United States Army.

TABLE A.—*Cases of malarial fever on the records of the cadet hospital from July 6, 1895, to June 18, 1896.*

Date.	Intermittent.	Remittent.
1895.		
July 6	1	
11	1	
12	1	
15	3	
24	2	
30	2	
Total	10	
Aug. 1	3	
2	1	
4	1	
5	1	
10	1	
11	1	
12	2	
15	3	
17	2	
19	1	
20	6	
21	2	
22	6	
23	2	
24	2	
26	5	
27	1	
28	1	
29	5	
30	5	
31	13	
Total	64	
Sept. 1	4	
2	9	
3	8	
4	2	
5	2	
7	1	
8	1	
9	6	
10	2	
11	6	
12	4	
13	2	
14	1	1
16	1	
17	3	1
18	1	1
19		1
20		1
1895.		
Sept. 21		1
23		3
24		1
26	1	
27		2
29		1
30		3
Total	54	16
Oct. 1		1
2	1	
4	1	
8	3	
11	1	
13	3	
14	1	
15	1	
16	1	
17	1	
20	1	
21		1
22	1	
23		1
31	1	
Total	16	3
Nov. 1		1
3	1	
4	1	
5		2
6	2	
7		1
11		1
12		1
14		1
18		1
20	2	
Total	6	8
Dec. 9	1	
1896.		
Mar. 30	2	
Apr. 2	1	
3	1	
21	1	
22	2	

TABLE A.—*Cases of malarial fever on the records of the cadet hospital from July 6, 1895, to June 18, 1896*—Continued.

Date.	Intermittent.	Remittent.	Date.	Intermittent.	Remittent.
1896.			1896.		
Apr. 23	1		May 24	4	
24	3	1	25	3	
25	3		28	2	
26	1		29	1	
27	5		30	1	
29	3		31	1	
30	5		Total	70	
Total	26	1	June 1	2	
May 1	1		2	1	
3	2		3	1	
4	4		4	2	
6	2		5	4	
7	2		6	2	
8	4		7	3	
9	2		8	1	
10	6		9	4	
11	5		10	1	
12	1		11	2	
14	4		12	2	
15	2		13	1	
16	1		14	2	
17	4		15	1	
18	7		16	1	
19	4		18	3	
20	1		Total	33	
21	3				
23	3				

TABLE B.—*Prevalence of influenza, ephemeral and malarial fevers at West Point Military Academy from March 1, 1895, to June 18, 1896.*

Date.	Ephemeral fevers.	Malarial fevers.	Influenza.
1895.			
March	4	1	19
April	28	2	2
May	16	0	0
June	2	0	0
July	9	10	0
August	10	64	0
September	0	70	0
October	0	19	0
November	6	14	0
December	21	1	0
1896.			
January	8	0	54
February	0	0	56
March	22	2	1
April	30	27	1
May	0	70	0
June 1 to 18	0	33	0
Total	156	313	133

TABLE C.—*Malarial fevers at West Point. Admissions per 1,000 of strength.*

Year.	Soldiers.	Cadets.	Year.	Soldiers.	Cadets.
1880	528	209	1888	168	56
1881	268	117	1889	130	162
1882	43	52	1890	71	82
1883	50	61	1891	21	43
1884	129	155	1892	24	169
1885	119	298	1893	18	173
1886	72	178	1894	44	35
1887	125	95	1895	298	595

TABLE D.—*Prevalence of malarial fevers among cadets at the United States Military Academy in 1880.*

Date.	Cases.
Mar. 8	1
Apr. 9	2
24	1
25	1
Total	4
May 1	1
2	1
4	1
7	2
10	1
19	1
21	1
27	1
28	1
Total	10
June 2	1
4	1
5	1
6	1
7	1
10	1
15	1
16	1
21	1
Total	9
July 3	1
22	1
26	2
Total	4
Aug. 2	1
6	1
27	1
Total	3
Sept. 8	2
12	1
15	1
17	1
21	1
29	2
Total	8
Oct. 6	1
13	1
17	1
Total	3
Nov. 7	1
13	1
15	1
18	1
20	1
22	1
23	1
27	1
30	2
Total	10
Dec. 3	1
19	1
20	1
22	1
Total	4
During the year	56
Annual rate per 1,000 of strength	209

TABLE E.—*Spring temperatures and rainfall at West Point.*

Month.	Temperature.			Rainfall.	Month.	Temperature.			Rainfall.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
1880.	°	°	°	*Inches.*	1889.	°	°	°	*Inches.*
April	60	36	49	3.5	April	57	36	46	4.6
May	80	52	66	1.2	May	72	48	60	3
June	86	58	72	1.7	June	78	55	66	3.3
1881.					1890.				
April	57	32	45	.4	April	57	33	45	3.9
May	77	47	62	4.8	May	68	45	56	5
June	78	49	63	5.4	June	81	54	62	4.6
1882.					1891.				
April	53	34	49	2	April	46	35	40	2.7
May	66	41	53	6	May	53	43	48	1.9
June	83	54	70	5	June	64	52	58	2.5
1883.					1892.				
April	55	36	45	3.3	April	57	39	48	1.1
May	70	46	58	2.7	May	69	43	56	4.8
June	85	63	74	4.3	June	84	55	69	3.6
1884.					1893.				
April	57	37	47	2.3	April	59	37	48	3.2
May	70	46	58	3.8	May	70	50	60	8.2
June	83	53	68	2.5	June	81	59	70	1.3
1885.					1894.				
April	59	36	47	3.3	April	51	25	38	1.4
May	67	45	56	1.9	May	62	33	48	2.9
June	80	56	68	3.6	June	72	50	61	4.5
1886.					1895.				
April	62	40	51	3.5	April	58	37	48	6.8
May	69	49	59	4.2	May	71	41	56	3.5
June	76	53	65	3.6	June	83	61	72	2
1887.					1896.				
April	55	35	45	2.3	April	62	39	50	2
May	77	47	62	1.5	May	76	51	64	[1]
June	79	55	67	6.3					
1888.									
April	No record.			2.7					
May				6.2					
June				1					

[1] Not recorded.

TABLE F.—*Analysis of West Point waters, June 19, 1896.*

[The figures represent parts per 100,000 of the water.]

	Free ammonia.	Albuminoid ammonia.	Oxygen required.
Crows Nest	0.001	0.0095	0.233
Cascade	.0005	.0105	.193
Delafield	.001	.016	.207
Filtered water	.002	.012	.153
Round Pond	.003	.027	.220
Spring near cavalry barracks	.002	.007	.120

All these waters, except the last two, had a faintly yellow tint; the Round Pond water was notably darker than the others; the spring water clear and colorless. They contained but little more chlorine than is to be found in cistern or rain water.

[First indorsement.]

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
June 27, 1896.

Respectfully forwarded to the Adjutant-General of the Army.

This report of Major Smart may be briefly summarized as follows: Malarial fevers occur at West Point every summer, but in 1895 and this summer there was a large and sudden increase. It prevailed to about the same extent in the summer of 1880. This unusual prevalence is probably due to the sudden and early onset of hot weather, favoring rapid and abundant development of the malarial parasite. The marshy flats along the river near West Point are favorable fields for their growth. Malarial fevers are more prevalent than usual this season in the vicinity of West Point and in other places for the same cause. The sanitary condition of the Post is excellent and in no way responsible.

Major Smart, however, attaches great importance to the agency of drinking water from surface sources as one of the channels through which the malarial germ gains access to the human system, and recommends that the entire water supply of the post be purified by filtration and that filter beds be constructed in connection with the new reservoir. Their construction requires time and a considerable outlay, and as an immediate measure he advises that small or household filters be at once provided for all the water used at the Post for drinking.

The construction of filter beds must be left for future consideration, but as it is of the first importance that no suspicion of impurity should attach to the drinking water, it is recommended that Major Smart's recommendation as to immediately filtering it be carried out.

It is further recommended that if malarial fevers should increase this season to a very serious extent the cadets be immediately removed for the summer to some location at the seashore or in the mountains, not far distant, where malaria is known not to exist. As they are already in camp, this could be effected without delay. It is suggested that preliminary arrangements be made so that the transfer could be made promptly, if decided on.

C. H. ALDEN,
Assistant Surgeon-General, U. S. A., Acting Surgeon-General.

The views herein expressed by Maj. Charles Smart, surgeon, are approved by the Secretary of War, and action will be taken by the Superintendent of the Military Academy in accordance with the recommendations submitted.

The Quartermaster's Department will furnish, upon the requisition of the Superintendent, the efficient filters that may be needed for the company barracks and officers' quarters.

GEO. D. RUGGLES,
Adjutant-General.

ADJUTANT-GENERAL'S OFFICE, *July 8, 1896.*

ADDRESS OF HON. ROBERT G. COUSINS, M. C.

In the first place I wish to make my acknowledgments for the distinguished compliment of being designated to address you on this occasion. One day shortly after my arrival here, when I was beguiled to that historic summit known as "Crow's Nest," these generous and gallant members of the Board of Visitors, who prefer the pleasures of these fascinating environments to the anxious hair pulling that usually attends the evolution of an impromptu speech, concluded to offer me upon the altar of a distinguishment which naturally belongs to some dignified gentleman, such as a United States Senator, a general, or a railway president. [Laughter and applause.]

In view of the fact currently reported that a large number of the graduating class have contracted pressing engagements [laughter], and, in the words of a distinguished soldier and statesman, "I shall not detain you long." [Laughter.]

As has been declared by most of my predecessors who have spoken for previous boards of visitors, "This is historic ground." [Laughter.] If there is any doubt on that question, it can be settled by reference to any standard history of the United States. I have also verified the statement by several consultations and diligent investigation at the club. [Merriment.]

I can say to the Superintendent and members of the faculty that the present Board of Visitors have made faithful examinations of the various departments of the institution, of the buildings and grounds, and of fiscal affairs. They have looked into your method of treating conic sections, and have reveled in the equations of the parabola and hyperabola and asymptote, and have even gone so far as to test, with due precaution, the drinking water of the institution, which seems to have been entirely overlooked by previous boards. [Great laughter.]

In regard to the course of instruction in the Academy, it hardly seems possible to conceive of one more appropriately adapted to the purpose. It has been urged by some that the course is too extended and severe, but the fact that you are graduating, with efficiency and thoroughness, a class of over seventy members who have the mental ability to pass examination ordeals with such brilliancy that even the wisest and severest looking members of successive boards tremble in their shoes for fear that some question may be asked them in the presence of the class, and with such physical agility that they can ride most any number of horses at the same time, either forward or backward, shows that the course of study is within the mastery of the average cadet. [Applause.]

On the other hand, it is sometimes asserted that the curriculum is not sufficiently comprehensive and that there are subjects taught in other institutions of the world that are not here. While that is true, there is probably no institution in the country in which the student masters a greater or more practical course of study within the same period of time. And I think it will be quite generally conceded that a soldier, even though he be required to master but two languages, ought to be permitted to graduate with at least one lung. [Laughter and applause.]

Upon the whole, I congratulate the members of the faculty of this institution, which was the first and dearest ward of the nation and which is now the pride of our country, upon the excellence of your devoted labors. And I congratulate the country upon the practical achievements of the institution.

And now, gentlemen of the class of '96, my fellow bachelors, I am glad of the opportunity afforded me of making your acquaintance in this manner. If I can be remembered by all of you with as high esteem as you have made me feel for you by the excellence of your manly and scholarly accomplishments, I shall be most fortunate indeed.

There are, I believe, seventy-three of you. Your number of failures has been low. Your grade or standard of merit is high. Therefore you expect much of yourselves. He is greatest who makes all that is possible out of himself. As Emerson advised, "Insist upon yourself." There is no power within the heavens above that would, or in the earth beneath that can, ever defeat a combination of integrity and industry.

You have graduated. That is to say, you have been getting ready to do something. But to merely graduate is not to become a lawyer or a doctor or a soldier. A young man was once seen wading around in a pond of cold water. Someone asked him what he was doing there. He replied that he was catching cold and getting hoarse so he could sing bass at a funeral. [Laughter.] I trust that your preparation here has been more pleasant and profitable, but academies and colleges and universities do not make lawyers and doctors and mechanics and engineers and generals any more than a pond of cold water makes bass singers. They simply prepare men to make something of themselves. Goethe once said, "A chip burns because it has the right kind of stuff in it." As a general rule men succeed for the same reason that a chip burns.

Success, however, may depend upon two conditions, ability and circumstances. Sometimes there is a latent ability that civil life does not awaken.

The people of Carondelet, Mo., who bought wood of an ordinary looking man, with trousers in his boots and wearing an old felt hat, something over a quarter of a century ago, had no idea that that man's funeral would be conducted by the United States of America, and that belts would be taken off of wheels and factories be as silent as the grave at the hour of that wood hauler's burial. Those who sold hides to a

tanner near Galena, Ill., just before the civil war, had no idea that in honor of his funeral, Westminster Abbey would resound with the echoes of a special hymn, and that the sweetest soloist on earth would go from Paris unto London, like a bird of song, to send her matchless, mournful melody across the wide, sad sea, from continent to continent. And yet such was the honor finally paid to him who, a graduate of this institution, had not yet known renown at 37 years of age.

The secret of that man's success was silence, thought, intensity, thoroughness, persistence.

* * * * * * *

The warfare of the future shall be solved largely by intelligence. The terrible engines of destruction already make the old-time charge impracticable. Before your light battery, which I saw perform to-day, the Old Guard of Napoleon would be useless. Let no future soldier think of riding into glory at the head of a brilliant charge. The plume will do for dress parade, and the diadem shall belong to the brow of scientific thought.

One of the greatest problems for the future is the protection of great cities. The control and defense of a great metropolis is a larger problem for the modern soldier than the former conquering of a continent. What are you going to do if the lights of New York City should be suddenly put out? What military scientist can solve the problem of the pandemonium that would exist in utter darkness with a formidable foe at hand? Given the problem of a great metropolis in absolute darkness and her waterworks destroyed, what military engineer will announce a solution that will save the city and its million souls from sword and flame and dynamite?

Such are the problems for the modern student of military science.

* * * * * * *

Even as long ago as our civil war military success depended more upon the solution of great and intricate problems than upon the brilliancy of dashing charges and spectacular movements. The civilization of eighteen hundred years waited with breathless silence upon the siege of Vicksburg. A century of hope was thinking out a way to cross a river with no place to embark and no place to land. Through the weary nights of doubt and disappointment Slavery and Liberty were peering through the gloom, watching the feet of the worn and weary soldiery of America trying to find a place to stand. The heights were guarded by the cannon of the enemy. The swamps had no bottom. Contagion joined the weird procession. Malaria marched with the boys. Sometimes success must crawl. The Army of the Tennessee did everything. They dug, they trenched, they crept, they swam. They could not afford the luxury of night, so they carried candles to light them through the water and the gloom; but they never yielded. They had a leader and that leader had a purpose. He was a part of human progress—a fixed, determined man.

Doubtless all of you may have in mind the character of some great soldier as worthy of your study and your emulation. France will tell you now of an emperor who spent his lifetime trying to subdue mankind, and almost touched that pinnacle where he might have stood and said "I am monarch of the world." But the Waterloo of his destiny came, and the man whose ambition it was to chain the world became himself a slave in the midst of the murmuring sea. The proud Corsican, whose cradle was an island, dreamed that his sword would one day span the globe, and he awakened from his dream of despotism only to find himself banished from his own dominions to that sad sea island which became his grave. [Applause.]

In some future day I can hear Columbia saying to the world, "America had a son whose ambition it was to free and not subdue mankind. He drew his sword and the chains fell from a race. He said 'Surrender,' and the greatest rebellion of all history was compelled to hear his voice. He was lifted by a grateful people to the highest place of civil honor in the world. Then, in the evening of his great and useful life, he traveled round the globe and brought the proffered honors of the world and laid them at his country's feet. And when he died Labor let her hammer fall and Mammon locked the doors of trade—the world with silent tread followed a single bier." Such was Grant, the great American who left the flag of the Republic over a united country. [Great applause.] For your emulation I commend his patient character and great ability, and in your charge our common country trusts her flag. [Applause.]

For more than a quarter of a century of peace your evening gun has sounded to that flag its salutation of a loyal people, and fluttering on the melody of patriotism it has been given to your vigilance and faithful keeping in the nighttime, only to be lifted on Old Glory's staff to greet the morning sun and to command the willing homage of the world. [Applause.]

Wherever your commissions may direct you, you will hear that evening salutation, and sometimes when in your memory you hear the patriotic melodies of these dear old days of school life they will be mingled with the familiar voices of your messmates—and maybe with some more tender voice—and there will come into your eyes a mist of tears, and through it all, and through the mystic glimmer of the years, you will always, always see the emblem of your country, the matchless banner of the stars. [Great applause.]

Interwoven with the memory of things that are the nearest and the dearest to your hearts that flag will color all your friendships with the lasting blue of true fidelity and its red will fire your courage with unconquerable ardor. Your honor and your manhood shall keep its purity and be forever typified by that banner's stainless white, and looking to its stars your minds shall contemplate the power and majesty and unity of all the States—our nation. [Long-continued applause.]

UNITED STATES MILITARY ACADEMY.

ANNUAL REPORT

OF THE

SUPERINTENDENT UNITED STATES MILITARY ACADEMY.

HEADQUARTERS U. S. MILITARY ACADEMY,
West Point, N. Y., September 26, 1896.

SIR: I have the honor to submit this my annual report for the Military Academy for the year ending September 1, 1896.

PERSONNEL.

The number of officers and instructors on duty at West Point September 1, 1896, was 7 professors, 1 associate professor, 55 commissioned officers, 1 chaplain, 1 sword master, and 1 teacher of music; a total of 66. (See roster appended, marked A.) The number September 1, 1895, was 65. The increase during the year was due to a gain of 1 officer for duty in the department of law and history, made necessary by the reorganization of that department.

One professorship became vacant and was abolished. The office of chaplain was created and filled. In all 20 officers joined during the year, 3 died, and 16 were relieved.

The Academy has to mourn the loss by death during the year of a number of its most valued members.

On the 10th of January, 1896, Rev. William M. Postlethwaite, chaplain and professor of history, geography, and ethics, died after a service at the Academy of over fourteen years. He had been successful to a remarkable degree in awakening and cultivating religious interest among cadets, the number of Protestant communicants at the time of his death being 86; the number when he assumed his duties in 1881 is said to have been 4. It was the opinion of the academic board that he had been hampered in this great work by his duties as professor, and that the results would have been still greater if he had had no duties other than those of chaplain. This matter having been presented to Congress by the War Department, an act was passed, approved February 18, 1896, which enacted, "That so much of section thirteen hundred and nine of the Revised Statutes of the United States as provides for the appointment at the United States Military Academy at West Point of one chaplain, who shall also be professor of history, geography, and ethics, and one assistant professor of the same, is hereby repealed: *Provided*, That the duties of chaplain at the Military Academy shall hereafter be performed by a clergyman to be appointed by the President for a term of four years, and the said chaplain shall be eligible for reappointment for an additional term or terms, and shall, while so serving, receive the same pay and allowances as are now allowed to a captain mounted." Under this act Rev. Herbert Shipman was appointed chaplain, and assumed the duties on the 25th of April last. The Academy has been fortunate in securing his services. The order issued from this office upon the occasion of Professor Postlethwaite's death is hereto attached, marked B.

On the 21st of April, 1896, the Academy suffered another heavy blow in the death of James Mercur, professor of civil and military engineering. The order from this office upon that occasion is hereto appended, marked C. One of the ablest officers in the Corps of Engineers, Capt. G. J. Fiebeger, was appointed to succeed him as professor on the 4th of May last.

On the 13th of October, 1895, a brilliant and promising young officer, First Lieut. A. M. D'Armit, of the Corps of Engineers, died after a brief service of a few weeks at the Academy.

Cadet Thomas C. Butterly, of the third class, died September 11, 1896.

The number of cadets present and absent September 1, 1896, was 332, including 1 foreigner receiving instruction by special authority of Congress. This is the largest number of cadets that has ever belonged to the Academy at one time. The number September 1, 1895, was 324, including 1 foreigner. During the year 19 were discharged for deficiency in studies, 7 resigned, 1 died, 2 were dismissed, and 73 were graduated, a total loss of 102, while there were admitted in all at the examinations held in March, June, and August, 110. For the three examinations referred to, there were appointed in all 307 candidates, including 125 alternates. Of these 59 failed to appear and 119 were found not duly qualified, either mentally or physically, or both. Of the remaining 129 who passed, 1 declined to take the oath, and 18 were alternates whose principals also passed, and for whom there were therefore no vacancies, leaving 110 who were admitted.

The number of cadets now authorized by law is 371, omitting the foreigner. There are therefore 40 vacancies. There will be many more before the end of the academic year. It is not possible to keep the corps of cadets full. I beg leave to renew the recommendation of former reports that a moderate increase be made in the number authorized by law, such for example as would be obtained by appointing two at large from each State to be nominated by the Senators representing the State in Congress.

ACADEMIC DEPARTMENTS.

The readjustment of the course of study in the department of modern languages, by which instruction in Spanish is transferred from the first-class to the third-class course, was completed during the year. Instruction in that department is now continuous during the fourth and third class years. Better results are obtained, and this in less time than under the old arrangement. The time left vacant by this change in the first-class course, amounting to about 60 recitations, was distributed among other subjects, as follows: Twenty recitations added to the course in law, 22 added to the course in history, 6 to the course in ordnance and gunnery, and 12 to the course in drill regulations.

Instruction in the department of history under the old programme extended only from September to January. It had therefore been completed for the year at the time when the act already referred to abolishing the separate professorship was passed. The instruction in history and historical geography heretofore given in that department has been transferred to the department of law. The advantages of this change are (1) a more compact organization, one department being fully able to perform the duties formerly divided between two, neither of which was fully occupied; (2) economy; (3) greater simplicity of administration, it being necessary to detail as instructors officers who shall be satisfactory to only one head of department instead of to two, as before. Moreover, the chaplain is left untrammeled in the discharge of his highly important duties.

All of the departments have derived great advantage from the increased facilities offered by the new Academy building. The first year's occupation of this building is an epoch in the history of the Academy. The occasion seemed to be appropriate for the preparation of a full account of the course of studies and methods of instruction employed here. Such an account, though often needed, is nowhere to be found in print. I called upon each head of department for a report which should give for his department a brief historical sketch, a statement of the present course, the organization of the personnel, description of a recitation, class reports, examinations, and a critical review. These reports have been prepared with care. They present a description of the Academy as an educational institution, and of the various stages of its development, which has not before been given, and which will be of great interest and value to all persons interested in the institution or in military education. The reports are hereto appended, marked D, E, F, G, H, I, K, L, M, and N.

The departments of practical military engineering and of ordnance and gunnery are now the only departments in which the senior assistants receive no extra compensation. It seems but just that in this respect they should be placed upon the same footing as the other departments, and that the senior assistants should receive the pay of captain mounted.

THE LIBRARY.

During the year ending August 31, 630 volumes were purchased for the library and 779 volumes were presented to it, making a gain of 1,409 volumes. There were returned to the War Records office 347 volumes of the records of the war of the rebellion, 99 volumes of the same work were transferred to the department of engineering, and 25 miscellaneous volumes were transferred or exchanged, making a loss of 471 volumes. These were all duplicates. The net gain during the year was 938 volumes and 218 pamphlets, making the total number of books and pamphlets in the library September 1, 1896, 39,141 volumes and 6,132 pamphlets.

As stated in former reports the library has entirely outgrown the space heretofore allotted to it, and one of the most pressing needs of the Academy is the reconstruction of the library building. The need becomes more and more pressing each year. Full plans, specifications, and estimates for the work were obtained under an appropriation contained in the act approved January 16, 1895. As it will be necessary to find temporary storage room for the books while the work is in progress, the Academy will be subjected to much inconvenience, and in order that that may be kept at a minimum, the work when undertaken should be pushed to completion as rapidly as possible. The recommendation of last year that the full amount of the estimate, $70,000, be appropriated at one time is renewed.

The report of the librarian is hereto appended, marked O. His recommendation that the salary of the assistant librarian be increased from $1,200 to $1,500 per annum is concurred in.

HEALTH.

The health of the command during the year was far from satisfactory. There were epidemics of influenza, malarial fevers, measles, and whooping cough. The last two prevailed among the civilians and enlisted men, and by careful quarantine arrangements were kept out of

the corps of cadets. Besides the deaths already mentioned, there were two deaths among the civilians residing upon the post. There were several cases of appendicitis, and several other desperate illnesses of various kinds in addition to those which proved fatal.

The post is well drained and well policed, and its general situation and condition are the same as in former years, when the health was good. Its water supply is the same, or at least it is derived from the same sources. The improvements in the latter which have been in progress for several years include more perfect filtering arrangements. Among my estimates for last year was an item for permanent filter beds, but the appropriation was not made. It is again submitted this year.

Under special instructions of the War Department an investigation of the causes of the prevalence of malarial fevers was made during the month of June by Maj. Charles Smart, of the Medical Department of the Army. Under date of June 21, Major Smart rendered to the Adjutant-General an able and interesting report, in which he attributed the difficulty to the water, and recommended filtration. He explained the fact that water gathered from the same grounds under apparently the same circumstances is healthy one year and unhealthy another by the different effects upon the soil and vegetation of differing climatic conditions. If hot weather occurs in the early spring, before vegetation has made a certain advance, the condition of the drainage basins and of the water gathered therefrom is different from that which pertains when the spring season opens gradually and regularly. The opinion of this distinguished officer is a powerful reenforcement to that of the authorities here that more perfect arrangements for filtering the water should be provided. No satisfactory explanation of the many forms of illness other than malarial with which the post has been afflicted has been discovered.

The report of the surgeon is hereto appended, marked P.

DISCIPLINE.

The state of discipline of the corps of cadets has been generally excellent. A few exceptional characters came into collision with the authorities during the summer encampment. Two of these were dismissed, after trial by court-martial, for hazing new cadets, and the others were suitably dealt with. The precision of movement of the battalion and the general excellence of drill in all of the military exercises in which cadets are instructed have never been greater than in the last year. A practical demonstration has been made that the omission of the drills on Wednesday afternoons has not been attended by any ill effects to counteract the benefits which were expected from it. The exhibition drills before the Board of Visitors in June have never been surpassed.

ACCOUNTS AND SUPPLIES.

The system of keeping the accounts and of furnishing the cadets with supplies continued essentially as heretofore reported. An abundance of good, healthy food in sufficient variety was furnished at an average cost of 53 cents per man per day, including extras for patients in the hospital. Clothing, books, and other articles were furnished of good quality and usually at low rates. The principal exception to the latter rule is the case of drawing instruments which each cadet is required to purchase. The price charged for these is $23.05, or more than half a month's pay. The instruments are imported, none of suitable quality being made in this country. The duty upon them is 35

per cent. Neither the quantity nor the quality should be reduced, and the price is as low as it can be made if the custom-house dues are paid. Legislation is recommended remitting the duty.

Attention is invited to the report of the quartermaster and commissary of cadets, hereto appended, marked Q.

ORDNANCE.

During the year the old rifles of the cadets were exchanged for the new magazine rifles, caliber .30. Important additions were made to the list of models and sample guns for the general theoretical instruction of cadets. Much study and labor were employed in the arrangement of the ordnance museum in the new Academy building. Particular care was given to the preservation of the battle and trophy flags, which were placed in glass cases hermetically sealed. All of the models and war relics were taken from their places of storage, cleaned, repaired, and set up, and the room was thrown open to visitors. Attention is invited to the report of the instructor of ordnance and gunnery, hereto appended, marked R.

I beg leave to repeat my remarks of last year upon the subject of the band, the master of the sword, and the adjutant of the Academy.

BAND.

By the act of March 3, 1877, the Military Academy band was reduced to 1 teacher of music and 24 enlisted men, which is its present authorized strength. Of the enlisted men 6 receive $34 per month, 6 $20, and the remaining 12 $17, with the usual allowances of enlisted men. At the time of this reduction the band consisted of 1 teacher of music and 40 enlisted musicians, of whom 10 received $34, and the remaining 30 received $30 per month, with the usual allowances of enlisted men. Since that date every Superintendent of the Academy, with perhaps one exception, and many or all Boards of Visitors have recommended an increase of the band. To anyone familiar with music it needs no argument to prove that the present numbers and pay are not sufficient. Is a good band really necessary to the practical efficiency of the Academy, is the only question which can be asked. The answer is plain when the purpose which the band subserves is considered. Military pomp has a serious and practical object—the cultivation of the military spirit. It is in the same category with patriotic songs, discipline, and monuments to dead heroes. There is no more essential part of it than good music. I recommend that the band be restored to the numbers and pay which it had before the reduction in 1877. I recommend further that the leader receive the rank, pay, and emoluments of a second lieutenant of infantry. The increase is desired not for the purpose of gratifying an idle vanity or merely to provide pleasure, but to improve the finer polish given to the finished product of the Academy.

MASTER OF THE SWORD.

The swordmaster is also the instructor in gymastics and swimming. He is a civilian, appointed by the Secretary of War. The present incumbent has worked up an admirable course of gymastics for the corps of cadets. His system of calisthenics has been adopted by the War Department for the use of the Army. He is required to preserve discipline and to exercise control of cadets while under his instruction.

It would greatly strengthen his hand if he should have military rank, and, in view of the great and increasing importance of his department, I recommend that legislation be solicited giving him the rank, pay, and emoluments of a first lieutenant of infantry.

ADJUTANT OF THE ACADEMY.

The adjutant of the Academy is also secretary of the academic board, and upon occasions of ceremony acts as aid-de-camp to the Superintendent. His duties are at least as important as those of an assistant professor, and they are more onerous, while his personal expenses are greater. It seems but just that the officer holding this position should receive the pay of captain, mounted, as in the case of assistant professors. Legislation to that effect is recommended.

WATER SUPPLY.

Good progress was made during the year in the construction of the new reservoir. The body of the main dam was completed and the coping set. The work remaining to be done upon this structure includes the parapet wall, paving carriage way on top, building the overflow and spillway, and the road connections at the end. An estimate of funds for completing the dam is submitted. Good progress was made in the removal of the deposit of soil and peat in the reservoir basin under an appropriation for the current year. It is hoped that this work will be completed by December 1, and that the reservoir may be used for the storage of water during the current year. The recommendation contained in my last annual report that filters of adequate size be provided is renewed. An estimate for that purpose is submitted.

Attention is invited, for details, to the report of the instructor of practical military engineering, hereto appended, marked S.

BUILDINGS AND GROUNDS.

Important improvements in the grounds were made near the cadet barracks and the Academy building, the streets being cut down and regraded, and a sidewalk of artificial stone being laid to embrace the fronts of both buildings. The grounds near the new quarters for unmarried officers were rearranged, graded, and sodded, and a concrete walk was laid. Many minor improvements were made. Attention is invited to the report of the quartermaster, heretofore appended, marked T.

The new figure of Fame for the battle monument was finally received and placed in position in May last. The new tablets, carrying the names of the enlisted men, were accepted and placed about the same time. The monument is now completed in a manner worthy of the place it occupies and of the names it perpetuates. Arrangements for dedicating it are still to be made.

Bids were again invited by public advertisement for the construction of the Cullum Memorial Hall, and a contract was made with the Probst Construction Company on the 22d of January, 1896. The contractors began the work promptly and have pushed it with commendable energy. By the 1st of September the walls of the basement and subbasement had been completed, the cut stone for the main building had arrived in large quantity, and several courses of it had been set.

ESTIMATES.

The estimates for the next fiscal year are essentially the same as those of last year. To the list of costly improvements such as the reconstruction of the library building, new water main, new filter beds, and completion of the new reservoir, it has been necessary to add the reconstruction of the south dock. Among the less costly improvements an item has been added for placing electric clocks in the Academy building, public offices, and barracks with a view to the distribution of time by modern methods. A few of the least pressing items submitted last year have been omitted this year, in order to keep down the total, which is considerably larger than the amount appropriated for the current year. The necessity of each item is explained in the remarks accompanying the estimates.

CONCLUSION.

In conclusion, I have to repeat my report of last year that the Academy is in a flourishing condition. It is passing through an era of improvement, so far as its equipment and outward physical condition are concerned, due to the greater liberality of Congress in recent years. The curriculum, both theoretical and practical, is the result of many years' experience, and has proved itself well adapted to the objects of the institution. Improvements in that direction are less rapid and less radical than in the other, but there also the Academy is advancing, as will appear from a perusal of the appendices already referred to as attached to this report. The professors and officers are accomplished, each in his sphere, and devoted to their work, and deserve well of the Government.

Very respectfully, your obedient servant,

O. H. ERNST,
Colonel of Engineers, Superintendent.

The ADJUTANT-GENERAL, UNITED STATES ARMY,
Washington, D. C.

LIST OF APPENDIXES.

A.—Roster of officers.
B.—Obituary order. Professor Postlethwaite (G. O. 1, U. S. M. A., January 11, 1896).
C.—Obituary order. Professor Mercur (G. O. 8, U. S. M. A., April 22, 1896).
D.—Professor Michie's report.
E.—Professor Larned's report.
F.—Professor Bass's report.
G.—Professor Tillman's report.
H.—Lieutenant-Colonel Mills's report.
I.—Professor Wood's report.
K.—Professor Davis's report.
L.—Professor Fiebeger's report.
M.—Captain Lusk's report.
N.—Captain Bruff's report.
O.—Report of librarian.
P.—Report of surgeon.
Q.—Report of quartermaster and commissary of cadets.
R.—Report of instructor of ordnance and gunnery.
S.—Report of instructor of practical military engineering.
T.—Report of quartermaster.

A.

UNITED STATES MILITARY ACADEMY,

WEST POINT, NEW YORK.

SUPERINTENDENT.

Col. O. H. ERNST, Lieutenant-Colonel, Corps of Engineers.

MILITARY STAFF.

Capt. WILBER E. WILDER, Fourth Cavalry, adjutant of the Military Academy and of the post; recruiting officer; commanding band and detachment of field music.

Capt. WILLIAM F. SPURGIN, Twenty-first Infantry, treasurer of the Military Academy, and quartermaster and commissary of cadets.

Capt. JOHN B BELLINGER, assistant quartermaster, U. S. A., quartermaster of the Military Academy and of the post; disbursing officer.

First Lieut. BARRINGTON K. WEST, Sixth Cavalry, commissary and treasurer; in charge of post exchange.

First Lieut. WILLIAM WEIGEL, Eleventh Infantry, assistant to the quartermaster, and officer of police.

Maj. GEORGE H. TORNEY, surgeon, U. S. A., surgeon.

Capt. CHARLES F. MASON, assistant surgeon, U. S. A.

Capt. CHARLES WILLCOX, assistant surgeon, U. S. A.

ACADEMIC STAFF.

Professors whose service at the Academy as professor exceeds ten years have the assimilated rank of colonel, and all other professors the assimilated rank of lieutenant-colonel.

DEPARTMENT OF NATURAL AND EXPERIMENTAL PHILOSOPHY.

Peter S. Michie, professor (February 14, 1871).

Capt. William B. Gordon, Ordnance Department, assistant professor.

First Lieut. Henry C. Davis, Third Artillery; Second Lieut. Joseph T. Crabbs, Eighth Cavalry, instructors.

First Lieut. Samuel D. Freeman, Tenth Cavalry, in charge of observatory and astronomical observations.

DEPARTMENT OF DRAWING.

Charles W. Larned, professor (July 25, 1876).

First Lieut. Charles B. Hagadorn, Seventeenth Infantry, assistant professor.

Second Lieut. Horace M. Reeve, Third Infantry; Second Lieut. Walter C. Babcock, Eighth Cavalry, instructors.

DEPARTMENT OF MATHEMATICS.

Edgar W. Bass, professor (April 17, 1878).

Wright P. Edgerton,[1] associate professor (July 1, 1893).

First Lieut. Daniel B. Devore, Twenty-third Infantry, assistant professor.

First Lieut. Charles P. Echols, Corps of Engineers; Second Lieut. George Blakely, Second Artillery; Second Lieut. Jay E. Hoffer, Third Artillery; Second Lieut. William M. Cruikshank, First Artillery; Second Lieut. John H. Rice, Third Cavalry; Second Lieut. David M. King, Fourth Artillery; Second Lieut. John W. Joyes, Fifth Artillery, instructors.

[1] Associate professor with rank of captain.

DEPARTMENT OF CHEMISTRY, MINERALOGY, AND GEOLOGY.

Samuel E. Tillman, professor (December 21, 1880).
First Lieut. Richmond P. Davis, Second Artillery, assistant professor.
First Lieut. Edgar Russel, Fifth Artillery; Second Lieut. Palmer E. Pierce, Sixth Infantry; Second Lieut. William R. Smith, First Artillery, instructors.

DEPARTMENT OF TACTICS.

Lieut. Col. Samuel M. Mills, captain Fifth Artillery, commandant of cadets and instructor of tactics (September 1, 1892).
Capt. James Parker, Fourth Cavalry, senior instructor of cavalry tactics.
First Lieut. Alexander B. Dyer, Fourth Artillery, senior instructor of artillery tactics.
First Lieut. Granger Adams, Fifth Artillery, assistant instructor of tactics, commanding company of cadets.
First Lieut. Wilds P. Richardson, Eighth Infantry, senior instructor of infantry tactics.
First Lieut. William H. Allaire, Twenty-third Infantry, assistant instructor of tactics, commanding company of cadets.
First Lieut. Willard A. Holbrook, Seventh Cavalry, assistant instructor of tactics, commanding company of cadets.
First Lieut. Robert L. Howze, Sixth Cavalry, assistant instructor of tactics, commanding company of cadets.
First Lieut. Matthew C. Butler, jr., Seventh Cavalry, assistant instructor of cavalry tactics.

DEPARTMENT OF MODERN LANGUAGES.

Edward E. Wood, professor (October 1, 1892).
First Lieut. Charles H. Hunter, First Artillery, assistant professor of the Spanish language.
First Lieut. Peter E. Traub, First Cavalry, assistant professor of the French language.
First Lieut. Marcus D. Cronin, Twenty-fifth Infantry; Second Lieut. Samuel C. Hazzard, First Artillery; Second Lieut. William R. Smedberg, jr., Fourth Cavalry; Second Lieut. Edward B. Cassatt, Fourth Cavalry; Second Lieut. James M. Williams, First Artillery, instructors.

DEPARTMENT OF LAW AND HISTORY.

George B. Davis, lieutenant-colonel and deputy judge-advocate-general, U. S. A., professor (August 20, 1895). (By assignment under act June 6, 1874.)
First Lieut. Barrington K. West, Sixth Cavalry, assistant professor.
First Lieut. Walter A. Bethel, Third Artillery; Second Lieut. Frank G. Mauldin, Third Artillery; Second Lieut. Robertson Honey, Fourth Artillery, instructors.

DEPARTMENT OF CIVIL AND MILITARY ENGINEERING.

Gustav J. Fiebeger, professor (May 4, 1896).
First Lieut. Thomas H. Rees, Corps of Engineers, assistant professor.
First Lieut. Francis R. Shunk, Corps of Engineers; First Lieut. Chester Harding, Corps of Engineers, instructors.

DEPARTMENT OF PRACTICAL MILITARY ENGINEERING.

Capt. James L. Lusk, Corps of Engineers, instructor (March 31, 1893).
First Lieut. E. Eveleth Winslow, Corps of Engineers, assistant instructor.

DEPARTMENT OF ORDNANCE AND GUNNERY.

Capt. Lawrence L. Bruff, Ordnance Department, instructor (August 17, 1891).
First Lieut. John T. Thompson, Ordnance Department; Second Lieut. Henry D. Todd, jr., Third Artillery, assistant instructors.

CHAPLAIN.

Rev. Herbert Shipman (April 22, 1896).

Herman J. Koehler, master of the sword.
George Essigke, teacher of music.

List of officers, with relative rank, at the United States Military Academy.

Names.	Corps or regiment.	On duty at Academy since—
Colonels.		
Ernst, Oswald H	Corps of Engineers	Apr. 1, 1893
Michie, Peter S	Professor (Feb. 14, 1871)	Apr. 23, 1867
Larned, Charles W	Professor (July 25, 1876)	Aug. 28, 1874
Bass, Edgar W	Professor (Apr. 17, 1878)	Sept. 15, 1876
Tillman, Samuel E	Professor (Dec. 21, 1880)	Aug. 28, 1879
Lieutenant-colonels.		
Mills, Samuel M	Captain, Fifth Artillery, commandant of cadets	Sept. 1, 1892
Wood, Edward E	Professor (Oct. 1, 1892)	Aug. 28, 1889
Davis, George B	Professor (Aug. 20, 1895)	Aug. 20, 1895
Fiebeger, Gustav J	Professor (May 4, 1896)	May 30, 1896
Major.		
Torney, George H	Surgeon, Medical Department	July 17, 1894
Captains.		
Spurgin, William F	Twenty-first Infantry	Sept. 2, 1881
Lusk, James L	Corps of Engineers	Mar. 31, 1893
Parker, James	Fourth Cavalry	Aug. 13, 1894
Bruff, Lawrence L	Ordnance Department	Aug. 17, 1891
Wilder, Wilber E	Fourth Cavalry	May 15, 1895
Gordon, William B	Ordnance Department	Aug. 20, 1894
Edgerton, Wright P	Associate professor (July 1, 1893)	Jan. 28, 1889
Mason, Charles F	Assistant surgeon, Medical Department	July 16, 1894
Bellinger, John B	Assistant quartermaster, Quartermaster's Department	Sept. 17, 1894
Willcox, Charles	Assistant surgeon, Medical Department	May 2, 1895
Shipman, Herbert	Chaplain (Apr. 22, 1896)	Apr. 25, 1896
First lieutenants.		
Dyer, Alexander B	Fourth Artillery	Aug. 31, 1892
Adams, Granger	Fifth Artillery	July 15, 1895
Hunter, Charles H	First Artillery	Aug. 20, 1896
Freeman, Samuel D	Tenth Cavalry	June 30, 1893
Richardson, Wilds P	Eighth Infantry	Feb. 10, 1892
Rees, Thomas H	Corps of Engineers	Aug. 22, 1893
Allaire, William H	Twenty-third Infantry	June 15, 1893
Thompson, John T	Ordnance Department	Aug. 20, 1896
Davis, Henry C	Third Artillery	Do.
West, Barrington K	Sixth Cavalry	Feb. 18, 1893
Shunk, Francis R	Corps of Engineers	Aug. 20, 1895
Holbrook, Willard A	Seventh Cavalry	Aug. 20, 1892
Devore, Daniel B	Twenty-third Infantry	Do.
Traub, Peter E	First Cavalry	Nov. 11, 1892
Davis, Richmond P	Second Artillery	Aug. 17, 1891
Russel, Edgar	Fifth Artillery	Aug. 22, 1893
Winslow, E Eveleth	Corps of Engineers	May 12, 1896
Weigel, William	Eleventh Infantry	Apr. 9, 1894
Cronin, Marcus D	Twenty-fifth Infantry	Aug. 22, 1893
Harding, Chester	Corps of Engineers	Aug. 20, 1896
Howze, Robert L	Sixth Cavalry	Mar. 24, 1896
Echols, Charles P	Corps of Engineers	Aug. 20, 1895
Hagadorn, Charles B	Seventeenth Infantry	Aug. 20, 1894
Butler, Matthew C., jr*	Seventh Cavalry	June 15, 1893
Bethel, Walter A	Third Artillery	Aug. 20, 1894
Second lieutenants.		
Todd, Henry D., jr	Third Artillery	Aug. 20, 1894
Mauldin, Frank G	....do	Aug. 20, 1896
Crabbs, Joseph T	Eighth Cavalry	Sept. 7, 1896
Pierce, Palmer E	Sixth Infantry	Aug. 20, 1895
Blakely, George	Second Artillery	Aug. 20, 1896
Hoffer, Jay E	Third Artillery	Do.
Smith, William R	First Artillery	Nov. 11, 1895
Reeve, Horace M	Third Infantry	Aug. 20, 1895
Cruikshank, William M	First Artillery	Aug. 28, 1895
Rice, John H	Third Cavalry	Aug. 20, 1895
King, David M	Fourth Artillery	Aug. 20, 1896
Hazzard, Samuel C	First Artillery	Aug. 20, 1895
Smedberg, William R., jr	Fourth Cavalry	Aug. 20, 1896
Honey, Robertson	Fourth Artillery	Do.
Babcock, Walter C	Eighth Cavalry	Do.
Cassatt, Edward B	Fourth Cavalry	Aug. 20, 1895
Williams, James M	First Artillery	Aug. 20, 1896
Joyes, John W	Fifth Artillery	Do.

*Relieved from duty at the Military Academy September 12, 1896.

TROOPS.

Battalion of cadets.

Lieut. Col. Samuel M. Mills, captain, Fifth Artillery, commanding.
Company A, First Lieut. Robert L. Howze, Sixth Cavalry, commanding.
Company B, First Lieut. William H. Allaire, Twenty-third Infantry, commanding.
Company C, First Lieut. Granger Adams, Fifth Artillery, commanding.
Company D, First Lieut. Willard A. Holbrook, Seventh Cavalry commanding.

Hospital corps.

Maj. George H. Torney, surgeon, U. S. A., commanding.
Capt. Charles F. Mason, assistant surgeon, U. S. A.
Capt. Charles Willcox, assistant surgeon, U. S. A.

United States Military Academy detachment of army service men.

Capt. John B. Bellinger, A. Q. M., quartermaster, commanding.
First Lieut. William Weigel, Eleventh Infantry.

Company E, battalion of engineers.

Capt. James L. Lusk, Corps of Engineers, commanding.
First Lieut. E. Eveleth Winslow, Corps of Engineers.

United States Military Academy detachment of ordnance.

Capt. Lawrence L. Bruff, Ordnance Department, commanding.
First Lieut. John T. Thompson, Ordnance Department.

United States Military Academy detachment of cavalry.

Capt. James Parker, Fourth Cavalry, commanding.
First Lieut. Robert L. Howze, Sixth Cavalry (on temporary duty).
First Lieut. Matthew C. Butler, jr., Seventh Cavalry. Relieved from duty at the Military Academy September 12, 1896.

United States Military Academy band and detachment of field music.

Capt. Wilber E. Wilder, Fourth Cavalry, commanding.

HEADQUARTERS U. S. MILITARY ACADEMY,
West Point, N. Y., September 14, 1896.

Official:

W. E. WILDER,
Captain, Fourth Cavalry, Adjutant.

B.

GENERAL ORDERS, No. 1. HEADQUARTERS U. S. MILITARY ACADEMY,
West Point, N. Y., January 11, 1896.

The acting superintendent announces with sorrow to the officers and cadets of the United States Military Academy the death of the Rev. William M. Postlethwaite, D. D., chaplain and professor of history, geography, and ethics of the United States Military Academy, at West Point, N. Y., at 9.30 a. m., on the 10th instant.

Professor Postlethwaite graduated from Kenyon College, Gambier, Ohio, in 1862, and from the seminary at same place four years later. He immediately entered the ministry and labored faithfully in his chosen profession until appointed to the chaplaincy and professorship at the United States Military Academy, December 21, 1881.

His services at the Academy since that date have been faithful, zealous, and efficient, and form a bright page in the history of the institution. His sterling sense of duty, his frank, manly character, together with his genial and sympathetic nature, gave him ready access to the friendship and confidence of his associates and pupils. These admirable traits greatly enlarged his opportunities and usefulness for good in every relation.

The general attendance and voluntary interest in religious exercises of every kind during his entire service at the Military Academy have constantly borne testimony

to his great moral influence with cadets. It is one of the noblest results of his service that this beneficent influence continues and lives after him to the increasing advantage of the institution and of the Army.

He labored conscientiously and unselfishly for the good of the Academy. In his death his pupils lose an able teacher, considerate friend, and safe counselor, his colleagues a capable and ever-courteous associate, the country a ready and devoted servant.

The officers and professors and the officers of the battalion of cadets will wear the usual badge of military mourning upon the sword hilt for the period of thirty days.

By order of Lieutenant-Colonel Mills:

W. E. WILDER,
Captain, Fourth Cavalry, Adjutant.

C.

GENERAL ORDERS, No. 8.

HEADQUARTERS U. S. MILITARY ACADEMY,
West Point, N. Y., April 22, 1896.

The Superintendent has to make to the officers and cadets of the Military Academy the painful announcement of the death yesterday at Fort Monroe, Va., of James Mercur, professor of civil and military engineering.

Professor Mercur was graduated at the Military Academy with distinguished honor June 18, 1866, and appointed to the Corps of Engineers. He served as assistant engineer upon the survey of the Northern Lakes, October 1, 1866, to August 23, 1867; at the Military Academy as instructor in philosophy, August 31, 1867, to July 31, 1872; with the engineer battalion at Willets Point, N. Y., August 3, 1872, to July 31, 1876; as assistant engineer in the removal of obstructions at Hell Gate, New York Harbor, and upon other civil works and upon fortifications in New York, August 5, 1876, to June 14, 1881; in charge of various river and harbor improvements, defensive works, and surveys in Virginia and the Carolinas, June 15, 1881, to March 31, 1884; and of similar works in New York, April 1, 1884, to September 29, 1884. The great ability, sound judgment, and high personal character displayed by him in all of these varied duties led to his appointment in 1884 to the chair which he afterwards so nobly filled and which he has just vacated by death.

The Military Academy has never sent out a graduate exemplifying to a higher degree the qualities of truth, courage, loyalty, faith, and charity, which it aims to cultivate; nor has it ever received back, to aid in the transmission of its traditions to others, any more perfect character than James Mercur. Firm but gentle, acute but charitable, critical but sympathetic, he commanded the love and confidence of all. To the cadet he was the kind and lucid teacher, to his colleagues the genial and clear-headed friend, to his commanding officer the able and trusted support. To all of these his death is a severe personal loss.

The officers of the Academy and of the battalion of cadets will wear the usual badge of mourning upon the sword hilt for thirty days.

By order of Colonel Ernst:

W. E. WILDER,
Captain, Fourth Cavalry, Adjutant.

D.

UNITED STATES MILITARY ACADEMY,
West Point, N. Y., June 25, 1896.

SIR: In accordance with the provisions of the circular dated October 3, 1895, Headquarters United States Military Academy, I have the honor to submit the following report:

1. HISTORICAL SKETCH OF THE DEPARTMENT OF NATURAL AND EXPERIMENTAL PHILOSOPHY, UNITED STATES MILITARY ACADEMY.

Its origin is to be found in the act of Congress, April 29, 1812, reorganizing the Military Academy, where provision was made for one professor and one assistant professor of natural and experimental philosophy. From the time of the foundation of the Academy, in 1802, till the passage of this act, natural philosophy constituted no part of the course of instruction, although occasionally some of the more advanced students were taught mechanics and practical astronomy from "Enfield's Institutes of Natural Philosphy."

Four professors have administered this department since its establishment, and its history can probably be best outlined by considering each administration in succession.

(a.) Lieut. Col. Jared Mansfield, Corps of Engineers, professor from October 7, 1812, to August 31, 1828.

Mansfield, after graduating at Yale College, taught mathematics, navigation, and the classics at New Haven and at Philadelphia. For the purpose of securing his services at the Military Academy, he was appointed captain of engineers in the Army May 3, 1802, and from this date till November 14, 1803, he served as acting professor of mathemathics. He was then detached to do duty as surveyor-general of Ohio and the Northwest Territory, in which occupation he was engaged until October 7, 1812; in the meanwhile he had resigned his Army commission July 23, 1810. Although his appointment as professor occurred October 7, 1812, he did not enter upon his duties until April 10, 1814.

But little information is obtainable from the staff records in regard to the details of instruction in this department during the administration of Mansfield. The regulations approved July 2, 1816, by Secretary of War Crawford, provided for "Philosophy, embracing mechanics, hydraulics, pneumatics, optics, chemistry, magnetism, and astronomy." The standard of proficiency, though not very high, was apparently somewhat difficult of attainment, due mainly to a lack of competent instructors; for, 9 members of the class examined in June, 1818, were required to review the course in philosophy, 6 to review it with the condition of passing it at the coming winter examination, and 3 were turned back to the next class, making 18 out of a class of 38 not well qualified.

In the January examination (1819) only 18 were found well qualified in Gregory's mechanics, 7 imperfectly qualified, 7 deficient, and 6 grossly deficient. From this time on the class was so arranged that the better qualified men were placed in the first section and the others in the second section. The sections contained 19 or 20 men each and recited two hours. Up to the summer of 1817 the instruction in philosophy is stated to have been of the most elementary character, "not a few graduates leaving the academy without having had any instruction whatever therein, and that the only apparatus in the professor's possession to illustrate his subject were a field transit and a clock."

"Enfield's Institutes of Natural Philosophy" appears to have been the first text-book used in this department for instruction, but in the fall of 1818 a treatise on mechanics, by Dr. Olinthus Gregory, of the Royal Military Academy, Woolwich, was introduced and taught to the first section of the class. It was apparently too difficult for the second section, for we find recorded "Cadet W. Morris, at present of the third, but late of the second class (having been reduced on account of inability to proceed in Gregory), prayed to be restored to the second section of the second class on the ground that that section would hereafter study only Enfield, in which he gave assurances of capacity to succeed."

Owing apparently to the unsatisfactory progress made in the study of philosophy, a committee consisting of Professor Mansfield and Assistant Professor Douglass was appointed to revise the course; their report approved, and adopted by the academic board April 19, 1819, was as follows:

"First. The first section, as now organized, to study and review the mechanics of Dr. Gregory, embracing the subjects of statics, dynamics, hydrostatics, hydrodynamics, and pneumatics in the first volume; the practical considerations in the second volume, and the description and theory of some of the most important machines. This part of the course to commence on the 1st of September and end at the commencement of the winter examination of this class in January.

"Second. The second section in the same time to go through with a corresponding, but more easy and familiar, course of mechanics, including hydrostatics, hydraulics, and pneumatics. The text-book for this purpose it has not been in the power of the committee as yet to decide certainly upon. They have reason to believe, however, that Parkinson's Mechanics, of which they have ordered a copy from England, will be found suitable and they propose a temporary course out of the books now on hand until this point can be determined.

"Third. From the close of the winter examination to the 20th of February following, sooner or later, both sections to study Hauy's Philosophy; this will comprehend the subjects of optics, electricity, galvanism, magnetism, and meteorology.

"Fourth. The remainder of the academic year, with the exception of one month for reviewing, to be devoted by both sections to a course of descriptive, physical, and practical astronomy, omitting only the more profound parts in the course for the second section. On this subject the committee have hopes of finding a suitable text-book in Woodhouse's Astronomy, a copy of which will be examined as soon as it can be received from England, and reported on in season for the next class.

"Fifth. Should the genius and capacity of the first section be such in any instance as to afford a redundancy of time, the committee propose to conduct them through the more valuable portions of Newton's Principia (Davis's edition)."

On the 29th of January, 1820, the academic board adopted a definite course in philosophy based upon the treatise of Dr. Gregory, as follows:

"*Statics.*—Equilibrium of forces; center of gravity; mechanical powers; strength and stress of materials; theory of arches.

"*Dynamics.*—Principles of uniform and variable motion; laws of falling bodies; motion of projectiles in vacuo; vibrations of pendulum; central forces and theory of planetary motion; percussion, and the phenomena of rotation of bodies.

"*Hydrostatics.*—The pressure of fluids; specific gravity; theory of the stability of vessels.

"*Hydrodynamics and hydraulics.*—Theory of effluent fluids; principles for estimating the force, motion, and resistance of fluids; application of these principles to the construction of water mills and other hydraulic works.

"*Pneumatics.*—Compression, density, and elasticity of air; theory of acoustics; constitution of the atmosphere and physical causes of winds, etc.; measurement of heights by the barometer; theory of pumps.

"*Machinery.*—Application of philosophical principles in the construction of the steam engine, pile engine, etc., and to the construction of the powers and maximum effects of machines. Experimental investigation of the properties of heat;

"Experimental investigation of the principles of common and galvanic electricity;

"Experimental investigation of the principles of magnetism.

"*Optics.*—General principles of light and colors; refraction and reflection of light; theory and use of lenses; construction of optical instruments as telescopes, microscopes, etc.

"*Astronomy (descriptive and physical).*—General account of the solar system and of the celestial and terrestrial spheres; motions of the earth and the various appearances and vicissitudes arising from them; solution of problems on the globes; figure of the earth; equation of time; motions, phases, and irregularities of the moon; eclipses of the sun and moon; theory of the tide; physical causes of the motion of the planets, satellites, and comets, and determination of their orbits; the fixed stars; theory of the connections arising from parallax, refraction, aberration, precession, and nutation.

"*Practical astronomy.*—Application of spherical trigonometry to astronomy; use of instruments and tables; observations for time, azimuth, etc.; different methods of determining geographical points; application of astronomy to navigation, and the construction of maps.

"The instruction in natural philosophy, like that in mathematics, will be proportional in extent, and in the manner of conveying it to the rank and capacity of the different sections, reserving always the more abstruse and profound operations under each particular head to the higher sections."

This was certainly a very comprehensive course for the time, and the text-book employed was a remarkably good one.

It seems, however, that it proved too difficult for the lower section, as Bridge's Mechanics was adopted January 22, 1824, for the lower sections. Professor Mansfield was much beloved and respected by the cadets and deemed an efficient instructor. He was extremely nearsighted and of such a delicate structure as to convey the idea of decrepitude; his manner was very gentle, and as a professor he was by no means rigid. As an astronomical observer he was quite renowned, and he had been engaged, before coming to the Academy, in extensive surveys of boundary lines.

(b) Edward H. Courtenay, second lieutenant of engineers, acting professor from September 1, 1828, to February 16, 1829, and professor from February 16, 1829, to December 31, 1834.

The staff records embracing the period of Professor Courtenay's administration are lacking in definite information in regard to the text-books used by the different sections of the class, and the times of their adoption by the academic board. For example, no record has been found of the introduction of Francoeur's Traité Élémentaire de Mécanique; yet it is certain that the first section studied this book in the fall of 1830, and presumably for some years thereafter; for in General Cullum's Biographical Register of the Graduates of the Military Academy, in Courtenay's record, it is stated that "the lower sections of the class studied Boucharlat's Traité de Mécanique, which Courtenay in 1833 translated into English and made additions and emendations to adapt it to the use of the cadets of the Military Academy." The French edition of Boucharlat was adopted as a text-book June 23, 1831, and the translation on the 12th of June, 1833. The only other changes in text-books were Brewster's Optics, adopted June 16, 1832, and Gummere's Astronomy, in place of Farrar's, June 16, 1834.

The points of special importance to be noted during the administration of Professor Courtenay are that the text-books used were of a very high grade, involving the use

of the calculus, and thus permitting the adoption of the analytic methods of investigation in place of the geometrical previously employed, and the evolution of a course especially adapted to the needs of a military education. Courtenay was peculiarly fitted for this task, for he was exceptionally able, erudite, and clear in his methods of instruction. It was extremely unfortunate for the interests of the Academy that the needs of his growing family forced him to seek more remunerative employment, for it is certain that his remarkable attainments would have left their impress upon its course of instruction, as strikingly as did those of his colleague, Mahan, in the engineering course.

(c) *William H. C. Bartlett, second lieutenant of engineers, acting professor from November 22, 1834, to April 20, 1836, and professor from April 20, 1836, to February 14, 1871.*

The administration of Professor Bartlett, extending as it did for more than thirty-six years, exhibits some abrupt changes of methods of instruction and of text-books until about the year 1857, when the course had been crystallized to satisfy his conception of its scope and character. Upon his recommendation the study of electricity was omitted from the course of natural philosophy February 12, 1839. Bartlett's treatise on optics replaced Brewster's February 26, 1839, and Roget's treatises on magnetism, electro-magnetism, and electro-dynamics replaced the "Library of useful knowledge" from which these subjects had been previously taught.

The "Programme of the course of instruction in natural and experimental philosophy," adopted by the academic board March 13, 1840, is given at length in volume 3 of the staff records. It is sufficient here to state that this programme is essentially the same as the tables of contents of Courtenay's Boucharlat, Bartlett's Optics, Gummere's Astronomy, and the treatises of Dr. Roget. Apparatus for the experimental illustration of the principles of natural philosophy was purchased from time to time, so that by the date of the establishment of the course referred to above Professor Bartlett was enabled to give instructive experimental lectures to his classes. The Ertel transit instrument, 72-inch focal length, 52 lines (French) aperture, was ordered November 7, 1842, and after completion was mounted in the east tower of the new library and observatory building. Subsequently a Fitz equatorial and a Troughton mural circle were mounted in the middle and west towers, respectively, thus providing an excellent equipment for observational astronomy.

For more than thirty years, and up to the autumn of 1850, the philosophical course had been based upon a knowledge of the differential and integral calculus, but for some reason that does not appear Bartlett recommended a text-book which he had prepared based upon Poncelet's work entitled "Synthetical Mechanics," to replace Courtenay's Boucharlat. This recommendation was approved and the book adopted September 6, 1850. It was rightly considered by some members of the academic board as a lowering of the high standard heretofore maintained at the military academy in the scientific courses. When "Bartlett's Optics and Acoustics" was proposed as a substitute for "Bartlett's Optics," September 13, 1852, the professor of engineering and the instructor of practical engineering submitted written papers in opposition to this change (see staff records, September 27, 1852), basing their objections upon the omission of the analytical methods of treatment and the use of the calculus in the new text-book. Notwithstanding these protests the academic board recommended the adoption of the book, and the War Department approved the action of the board. The following resolutions, submitted by the professor of engineering, were made a matter of record:

"*Resolved, first,* That the present academic board fully concur in the views and opinions expressed in a report of the academic board October 18, 1843, on the subject of the scientific instruction in the United States Military Academy, viz, 'With these views, and in the firm belief that the Government, having the opportunity of securing from a large body of the youth of the country, ought and is disposed to fix a high standard of talent and attainments for those who would secure the important advantages resulting from a term of study at the Academy, the board are unwilling to unite in any recommendation that a less extensive scientific course than the one now taught should be adopted for any of the cadets.'

"*Resolved, second,* That, in accordance with the spirit of the language above cited, the present board regard the method of the higher analysis as the best means of treating most of the subjects embraced in the branches of mechanics, optics, etc., and regard them as indispensable elements in the composition of any text-books for instruction in these branches, to the end that such books may be, in the spirit of paragraph 11, United States Military Academy Regulations, 'the class books best suited for instruction in the department of natural and experimental philosophy.'

"*Resolved, third,* That the attainments made by the cadets in analytical geometry and the differential and integral calculus are sufficient to enable them to acquire understandingly the elements of natural and experimental philosophy as treated by these methods in the best text-books on these subjects."

Though no formal action was taken on this paper, it, in connection with the protests of those members of the academic board who had pronounced in favor of a higher standard, undoubtedly had a strong influence in bringing about a marked change in the character of the text-books, for on the 29th of August, 1853, the academic board, on the recommendation of the professor of philosophy, adopted the following resolution:

"*Resolved*, That it is hereby recommended to the Secretary of War to authorize the use of 'Bartlett's Elements of Analytical Mechanics' as a text-book upon mechanics in the place of the one now in use, the reason for this recommendation being that in the new work the calculus is employed as the means of discussion, whereas in the old one the subject is treated mostly by the aid of geometry."

"Gummere's Astronomy" was superseded by "Bartlett's Spherical Astronomy" September 5, 1855, and this was the last change of text-books that occurred during Bartlett's administration, except to replace from time to time an old edition by a new one. A very important modification of the course was made, however, December 8, 1856, upon the recommendation of a committee of the board by which the subject of electricity was transferred to the department of chemistry on the ground that "it was more immediately connected with chemistry than with the course where it is now taught, and in the expectation that in this way time may be found to make the present course of electricity more complete."

Professor Bartlett's long service at the Military Academy ended February 14, 1871, by his voluntary retirement at the age of 66 years. He left a permanent impress of his marked ability upon his course of instruction and enriched it with certain important characteristics that are certain to endure for many years. He possessed the rare faculty of perceiving essential and fundamental principles and of being able to formulate them by a mathematical expression of a single law from which the whole of analytical mechanics could be deduced. As early as 1853, in the preface to his work on analytical mechanics, he published this great generalization: "All physical phenomena are but the necessary results of a perpetual conflict of equal and opposing forces, and the mathematical formula expressive of the laws of this conflict must involve the whole doctrine of mechanics. The study of mechanics should, therefore, be made to consist simply in the discussion of this formula, and in it should be sought the explanation of all effects that arise from the action of forces." This law is now generally recognized as that of the conservation of energy, and too much credit can not be given to Professor Bartlett for the clear perception which enabled him to anticipate by so many years the introduction of this great law of generalization in the course of instruction at the Military Academy before it was adopted in the schools. He considered this as his greatest contribution to the course of instruction, and in this opinion the great body of his pupils heartily concur. Professor Bartlett had the gift of being able to engage the respect and affection of his pupils. He was very happy in his illustrative lectures, which were known as "experiments," and which he employed mainly to fix principles in the minds of his pupils. His mind was essentially analytic in character, but at the same time capable of enlarged generalization. In his later years he discarded those geometrical methods of proof which so markedly characterized the earlier years of his teaching, replacing them wherever possible by analytic methods. He left his department well equipped with apparatus for experimental illustration of the principles taught in his course for that time, and his successor found nothing that needed immediate modification in the course.

(d)—Peter S. Michie, captain, Corps of Engineers, professor of philosophy from February 14, 1871, to the present time.

The following brief outline of the successive changes will complete this historical sketch:

On the recommendation of a committee consisting of the professors of mathematics, philosophy, and engineering, appointed February 24, 1872, to "inquire and report whether any change of instruction can be made in the departments of mathematics, philosophy, or engineering the better to conform the instruction of either to the requirements of the others, and also to fix definitely what investigations and subjects in those branches of instruction shall be confined to the higher sections," a definite schedule was reported on the 6th of April and adopted. It embodied no change of text-books, but merely the omission of some of the more difficult subjects for the lower sections of the class. It is recorded in full in volume 8, Staff Records, pp. 375 et seq. A committee consisting of the professors of chemistry, philosophy, and the instructor of ordnance and gunnery, appointed June 8, 1872, for a similar purpose relating to those departments, recommended that "the subject of projectiles in mechanics" be transferred to the course in ordnance and gunnery.

On June 26, 1874, the ninth edition of Bartlett's Mechanics was adopted, for in this edition there were important modifications which adapted it better to modern

scientific usage, without sacrificing the excellent scientific treatment of former editions. Again, on June 10, 1876, Part 3 or Mechanics of Molecules was authorized to be taught in place of the corresponding parts of the text in "Optics and Acoustics."

The capability of the class to master the mathematical treatment of vibratory motion having been demonstrated by their success in the study of the mechanics of molecules led to the preparation of a text-book on wave motion relating to the principles of sound and light, which was submitted to the critical examination of a committee of the academic board, November 1, 1881, consisting of the professors of French, engineering, mathematics, and chemistry. The favorable indorsement of this book by the committee resulted in the substitution of it for Bartlett's Mechanics of Molecules and the Optics and Acoustics for use with the second class in the spring of 1882.

"Michie's Elements of Analytical Mechanics" superseded the corresponding parts of Bartlett's (Parts 1 and 4) June 21, 1886, and the second edition replaced the first August 29, 1887. Michie's "Hydrodynamics," adopted November 7, 1887, replaced Part 2 of Bartlett's Mechanics, which latter book ceased from this time to be a text-book at the Military Academy. The third edition of Michie's Mechanics was adopted September 4, 1888, which was subsequently superseded by the fourth edition.

The adoption of Professor Young's General Astronomy to be used in connection with Bartlett's Spherical Astronomy was approved February 5, 1889; and finally that part of the latter book which had been retained was superseded by "Michie and Harlow's Practical Astronomy" April 30, 1891, and the latter by its second edition March 16, 1893. An addition was made to the course of instruction, by reason of these changes, in the following provision: "Practical instruction shall be given to the first class in the use of astronomical instruments and in making observations for time, latitude, longitude, and true meridian, from 9 to 10.30 a. m., and from 11.30 a. m., to 12.15 p. m., and on such nights as are favorable for observations from 8 p. m., to 10.30 p. m., on every week day from July 5 to July 31, both inclusive."

In the opinion of the undersigned the following important changes have been introduced into the course since the retirement of Professor Bartlett: The prominence given to the fundamental law of energy as the controlling law of all physical phenomena; the clearing up of many ideas that were vaguely impressed upon the minds of the cadets; the total excision of the idea that inertia can properly be regarded as a force and which was the source of a great deal of trouble; and a more systematic treatment of each branch of the course so as to connect them more intimately with the preliminary definitions and the fundamental equation. That these are decided improvements is clearly indicated by results of examinations in recent years as compared with former ones and the fact that it is not now impossible for those cadets who pass the mathematical standard to succeed in the course in philosophy.

Other modifications that have proved valuable are, in giving a definite value to each subject of the course, and to examine and fix the standard of merit when the subject is completed, so that mechanics is completed in January, wave motion, sound, and light by the middle of March, and astronomy in June.

2. COMPLETE STATEMENT OF THE PRESENT COURSE.

(*a*) ANALYTICAL MECHANICS.—Text-book, "Michie's Elements of Analytical Mechanics," divided into the subheads of mechanics of solids, of fluids, and theory of machines.

Mechanics.—First. General definitions of matter, force, and motion; systems of physical units; stresses and motive forces and the laws of their composition and resolution; gravity, weight, and centers of gravity; graphical statics; work and energy; the fundamental law of the conservation of energy, its application to a free rigid solid, and the deduction of the equations of translation and rotation.

Second. Mechanics of solids: General theorem of energy applied to a single free body; laws of motion of translation; of motion of rotation; moments of inertia; momental ellipsoid; instantaneous axis; a rigid solid under impulsion; permanent and stable axes of rotation; a rigid solid under incessant forces; the gyroscope; impact; spontaneous rotation; constrained motion in translation and about fixed axes; equilibrium.

Third. Mechanics of a system of bodies: The potential; conservation of motion of the center of the system; conservation of areas and of moments; relative acceleration; differential equations of orbits, with illustrative examples; central forces and their laws; planetary orbits; the anomalies; the solar system; Kepler's laws and the law of universal gravitation.

Fourth. Theory of the simple mechanical machines: Resistances of friction and stiffness of cordage; the lever, balance, wheel and axle, the pulleys, inclined plane, wedge, screw, and cord.

Fifth. Mechanics of fluids: Definitions and classification of fluids; laws of perfect gases; fundamental equation of the mechanical theory of heat; differential equations of the specific heat; Boyle's, Charles', and Poisson's laws. Hydrostatics: Center of pressure; buoyant effort; specific gravity; equilibrium and stability of floating bodies. Hydrodynamics: General theorem applied and equations deduced for liquid and gaseous flow; steady flow; Bernouilli's and Torricelli's laws. Hydraulics: Viscosity; formulas for flow through mouthpieces; hydraulic machines; water wheels, turbines, pumps; barometer and barometric formula.

(*b*) WAVE MOTION, ACOUSTICS AND OPTICS.—Text-book, Michie's Elements of Wave Motion Relating to Sound and Light.

1. *Wave Motion.*—General definition of elasticity; deduction of analytical expression for elastic forces developed in a medium; surfaces of elasticity; waves and wave function; harmonic curves and their composition; wave interference and general principles relating to wave motion; plane waves; wave surface determined and discussed.

2. *Acoustics.*—Propagation of a disturbance in air; properties of sound and of the ear; musical intervals and scales; resonance; velocity of sound in different media and its modifications; general equation for vibratory motion of stretched string and its modifications; the corresponding relations for vibrations of rods and columns of different material deduced; harmonic vibration, and of plates and membranes.

3. *Optics.*—Assumed properties of the luminiferous ether, photometry; velocity of light. Geometrical optics: Deviation of light by plane and spherical surfaces; lenses and their properties; secondary foci of oblique pencils; spherical aberration; caustics; optical images; optical instruments; telescopes and microscopes and their magnifying powers. Physical optics: Solar spectrum and fixed lines; dispersion; color; absorption and emission; achromatism and chromatic aberration; rainbow; interference of light; colors of thin plates; diffraction and wave lengths of light; polarization of light, and phenomena resulting therefrom.

(*c*) GENERAL ASTRONOMY.—Text-book, Young's General Astronomy.

1. The doctrine of the sphere; definitions and general considerations; astronomical instruments; corrections to astronomical observations, as dip, parallax, semidiameter, and refraction; dimensions and form of the earth, its rotation, mass and density; its orbital motion; precession, nutation and aberration; the calendar; the moon's distance, dimensions, mass, density, and orbital motion; its librations, phases and physical condition; the sun's distance, dimensions, mass, and density; sun spots; spectroscopic study of sun's light; study of sun's light and heat, and recent conclusions as to constitution of the sun; eclipses and occultations.

2. Geometrical illustration of central forces applied to planetary motions; lunar perturbations and tides; the planets, their motions, apparent and real; determinations of the diamenters, masses, densities, rotation periods, etc.; the sun's horizontal parallax, and methods of computing it; comets, meteors, stars, clusters and nebulæ.

(*d*) PRACTICAL ASTRONOMY.—Text-book, Michie's and Harlow's Practical Astronomy.

Explanation of the construction of solar, lunar, and planetary ephemerides; description and study of the field transit and its adjustments; determination of the instrumental constants; deduction of the equation of the transit in the meridian; determination of instrumental errors; time and equation of time; solar and sidereal intervals; problems of finding the clock error by meridian transits of stars and the sun; description of the sextant, its adjustments and errors; problems of time by single altitudes of a star and the sun; by equal altitudes; the form and dimensions of the earth; eccentricity of the meridian; the radii of the earth, lengths of a degree of latitude and longitude and the reduction of latitude; solution of latitude problems by circumpolars, by meridian altitudes, by circummeridian altitudes, by opposite and equal zenith distances, by Polaris and by equal altitudes of two stars; description of zenith telescope, and its errors, adjustments, and corrections; solution of longitude problems by portable chronometers, by telegraph, by lunar culminations and distances; the time of opposition and conjunction; the time of meridian passage; azimuths and the altazimuth instrument; declination of the magnetic needle; sundials and their construction; projection of a solar eclipse; the use of established forms for the practical solution of the foregoing problems in practical astronomy.

During a portion of the summer encampment practical instruction is given in the use of the sextant, field transit, and zenith telescope, to obtain the necessary data for the problems above referred to. At present this time is from July 5 to July 31, both inclusive.

(*e*) LESSONS IN EACH SUBJECT.—(1) The text on mechanics contains 362 octavo pages, and it is mastered in 50 advance lessons averaging 7 pages for each, 25 first-review lessons of about 14 pages each, and 20 general-review lessons preparatory to the examination. The usual practice is to advance 4 lessons and then to review them in 2. After the completion of these 6 lessons the class is brought together in the

lecture room, where the professor illustrates the principles contained in these lessons, by means of the apparatus provided for that purpose, in an informal lecture. As far as may be this apparatus is then taken to the different section rooms, to be used by the cadets themselves.

(2) Synopsis of lectures in mechanics:

(*a*) Introductory to the science; its fundamental concepts, assumptions, and definitions.

(*b*) Parallelogram of forces; methods of resolving and combining forces; bodies under stress, etc.

(*c*) Parallel forces, couples, moments and their composition and resolution.

(*d*) Impulsions and impact.

(*e*) Acceleration and laws of constant forces.

(*f*) Rotary motion, angular velocity, and acceleration.

(*g*) Constrained motion, spontaneous axis, pendulums.

(*h*) Machines.

(*i*) Laws of the gaseous state.

(*j*) Hydrostatics, buoyant effort, etc.

(*k*) Hydrodynamics, flow of liquids, Torricelli's and Bernouilli's laws.

(*l*) Air and water pumps, hydraulic ram, etc.

In addition to these, one or more sections, or the whole class is frequently brought into the lecture room from the recitation rooms to have some particular illustration given, as the necessity arises.

(3) The text on wave motion, sound, and light contains 272 pages, and to it is assigned 32 advance, 14 first-review, and 8 general-review lessons; the advance lessons being about 8 pages long. The same method of progress is pursued in this as in mechanics.

(4) Lectures in sound and light:

(*a*) Methods of transfer of vibratory energy; properties of sound; vibrational numbers.

(*b*) Musical intervals, consonant and dissonant; diatonic and harmonic scales; sympathetic resonance.

(*c*) Scheibler's tonometer; analysis and composition of tones; use of Helmholtz's resonators.

(*d*) Harmonic overtones; velocity of sound in different material; organ pipes.

(*e*) Vibrations of plates, bells, strings, rods, etc.; Lissajous's curves.

(*f*) Theory of beats and resultant sounds; phenomena of interference.

(*g*) Graphical and optical methods of the study of sound.

(*h*) Introductory to light; pencils, beams, and formation of images through small apertures.

(*i*) Reflection and refraction of light by prisms, lenses, and reflectors.

(*j*) Determination of focal distances; caustics; astigmatism.

(*k*) Telescopes, microscopes, and the cameras.

(*l*) The solar spectrum; color by dispersion and diffraction; absorption.

(*m*) Fluorescence; achromatism; the rainbow.

(*n*) Interference of light by Fresnel's mirrors; phenomena of diffraction.

(*o*) Polarization by double refraction, by reflection, refraction, and by the Nicol prism.

(*p*) Interference of polarized light and production of color.

(*q*) Uniaxal and biaxal crystals, rotatory polarization and saccharimetry.

(5) The general astronomy contains 526 pages, and to it is assigned 26 advance lessons, 10 first-review, and 6 general-review lessons. Several general lectures, with stereopticon illustrations, are given during the time of its study.

(6) Practical astronomy, 182 pages of text, is accomplished in 16 advance, 6 first, and 5 general-review lessons. During this period the field astronomical instruments are set up in the lecture room, where the cadets are instructed in their use and purpose. Ten problems, with data obtained from observation, are given out for solution, to determine the mean solar and sidereal clock errors, latitude, and longitude of the place of observation.

(7) Hours of study, etc.: In the department of philosophy the lessons are so proportioned as to require from three to three and one-half hours of study for preparation for each lesson and one and one-half hours for recitation in the section room. There are six recitations per week throughout the term.

3. ORGANIZATION OF THE DEPARTMENT OF PHILOSOPHY.

One professor, one assistant professor, and one or more instructors (there are now two), depending upon the number of cadets in the class. Each section contains not more than 12 cadets, and each instructor has charge of two sections, thus requiring of him three hours' personal instruction daily. To the assistant professor it is usual to assign the instruction of the first and last sections, and to the

other instructors the remaining sections, according to their rank. In addition to the instructors above mentioned the officer in charge of the observatory conducts the instruction in practical astronomy, under the direction of the professor of philosophy.

4. DESCRIPTION OF A RECITATION, ETC.

The section rooms assigned to the department of philosophy are large and well ventilated, furnished with individual desks and seats for the cadets. Blackboards for 12 men line two walls of the room. The instructor sits on a raised platform and is in his place before the section enters the room.

Each cadet, upon entering, takes the position of a soldier at the desk assigned to him, and after the section-marcher has reported to the instructor he then takes his seat. The lesson for the next day is then announced, it having been previously recorded on the blackboard behind the instructor's desk. The question is then put, "Are there any questions on the lesson of the day?" The utmost freedom is permitted for every member of the section to make known now every difficulty he has experienced in studying his lesson. The instructor, who is accomplished in his art, will, by a judicious explanation or a helpful suggestion, seek to lessen the step by which the student may be able to pass from what he comprehends to that which was before obscure, the aim being to make the student feel that the elucidation has in the main been accomplished by himself. By this means the self-reliant faculty is cultivated. After all the difficulties have been satisfactorily removed the instructor proceeds to portion out the lesson of the day and of the previous day among ten members of the section, reserving the remaining two for a searching examination by questions. The ten are sent to blackboards, where first they are required to write their names in the upper right-hand corner, and then to put their work down in a neat and orderly manner and in logical sequence, so that the instructor can, by a glance, note their progress and proficiency. When the cadet is ready to recite he takes up a pointer, faces the instructor, and assumes the position of a soldier. This is a general rule which, however, is departed from when a portion of the section-room time is to be employed in working out practical examples or in using the apparatus upon the experimental table; in such cases he is permitted to leave his blackboard after his work is made ready for recitation, and when his turn comes to be called on he resumes his place and position.

The manners of the section room are polite, formal, and soldierly. The instructor opens with, "Are you ready, Mr. Blank?" then, "Proceed, sir." The cadet then begins, "I am required to demonstrate the" (here follows the proposition given him). He then proceeds in a logical manner to point out the data he may assume, the successive steps in his reasoning, and the conclusions which legitimately follow. If he be perfect he will meet the cross-examination of his instructor at every point, and will then be entitled to the maximum mark on the lesson of the day. The marks are recorded in a section book kept by the instructor, and at the end of the week are transferred to a weekly report made out by him and submitted to the Superintendent of the Academy through the head of the department. These reports are open to the inspection of the cadets on the following Saturday, and they can then compare their standing with that of their comrades in the same section and in different sections.

In assigning subjects for recitation, the general practice followed is to give them out in such a way as to impress the cadets that strict impartiality is the rule, and that each shall have about the same task, the main thing being to secure from each the full time for study upon the lesson of the day and to make the penalty of negligence so severe as to be almost prohibitory. In delineations upon the blackboard colored chalks are used, so that the drawings will exhibit a neatness as well as an intimate knowledge of the subject. The head of the department employs the three hours during which the recitations continue in visiting the different sections, so that he may thoroughly examine at least twice a week every man in the class. His purpose is to keep himself well informed of each man's progress, to study their characters, to encourage the modest, and to temper the choleric and presuming. He consults freely with his assistants upon the proper transfers from one section to another, and in case of nonagreement defers action until further evidence brings concord of opinion.

5. WEEKLY CLASS REPORTS, TRANSFERS, ETC.

As previously stated, the weekly class reports are submitted to the Superintendent by the head of the department. Upon these are also recorded the progress made by the sections during the week and any recommendations of the professor for transfer. These he explains to the Superintendent, who, if the reasons commend them, so orders, and this order is published to the battalion of cadets at the next parade. The cadets so transferred, without further notice, join their new sections.

6. EXAMINATIONS.

The character of examinations, whether they are to be written or oral, has wisely been left to the decision of the head of the department, and while written examinations have been tried in the department of philosophy, in the opinion of the present head the oral method is much the better when the method of instruction is considered. By this method his colleagues on the academic board are kept informed of the progress of the department, the attainments of the instructors, and the thoroughness of instruction; besides these advantages, the opportunity of a close cross-examination upon doubtful points can be had and thus bring out the mental operations of the pupil, an advantage which a mere written test does not afford. In cases of doubtful proficiency the rule of the academic board is to subject such cases to a thorough written test after a doubtful oral examination. The subjects selected for an oral examination cover the entire course, and to make the choice impartial, they are drawn by lot by each cadet as he is called up. The weight of each oral examination is equal to that of five ordinary recitations. To determine the relative standing of the class in each subject of the course, the following method is pursued: To the aggregate obtained on the advance and first review add double the marks of the general review, and to this add five times the examination mark. The standard for proficiency has of late years come to be considered to be two-thirds of the possible maximum, especially if this be the case on the general review.

7. CRITICAL REVIEW OF THE PRESENT COURSE AND INSTRUCTION.

The undersigned, when he was appointed a cadet, was old enough to appreciate the value in mental training and the sound educational advantages derived from the methods of instruction pursued at the Military Academy. Graduating during the war, he found himself within a fortnight in charge of important military duties where he was thrown upon his own resources, and in every case he found that the methods of reasoning in which he had been trained here and the self-reliance which had been inculcated in him by the methods of study were sufficient to solve his problems to the satisfaction of his superior officers. Since those days he has had a long experience as a teacher, and has kept constantly in mind his own efforts as an ambitious young officer as well as the purpose of the Government in establishing this institution. He believes that the elements of character developed in the student by the course of instruction at the Military Academy are increased confidence in his own powers, reliance on his own individual effort, and capacity to test accurately his sources of information. These elements in the development of a man are of essential importance in a profession where he may be called upon in emergencies to exercise self-control and to meet manfully unforeseen difficulties. To accomplish these purposes the daily tasks are made of the requisite strength so as to demand all the study time allotted, and thus are secured the invaluable mental effort and discipline derived from hard study; second, the daily tasks are made progressive, based upon acceptable fundamental principles, continually exercise the reason, beget a growing confidence, and establish a belief in his ability to master every new difficulty; and finally, when the course is completed, the student finds himself equipped with a satisfactory knowledge of the essential principles of the branch of science, to which he may add by individual study without feeling the necessity of reconstructing his foundation. These the undersigned believes to be the true governing principles of all sound education.

Upon beginning the course in philosophy last September it was ascertained that few of the members of the class had studied physics. The improvement in mental strength, as exhibited at their final examination in June, was very marked, and I have not the slightest hesitation in affirming that the two courses of chemistry, chemical physics, etc., and philosophy, which together cover ten branches of physics, are to be credited with a substantial portion of this development. The course in philosophy has grown from the time of its first establishment, keeping pace with each new development of scientific truth and discarding that which could not stand the test of experience, and yet has always maintained a conservative character. It may be said, in conclusion, that, taking into consideration the object of the Military Academy, it does not seem possible to suggest any material change in the methods of instruction, the subjects taught, or appliances of instruction that would prove of substantial benefit.

Very respectfully, your obedient servant,

P. S. MICHIE,
Professor of Philosophy, U. S. M. A.

The ADJUTANT, UNITED STATES MILITARY ACADEMY,
West Point, N. Y.

E.

DEPARTMENT OF DRAWING, U. S. MILITARY ACADEMY,
West Point, N. Y., July 10, 1896.

SIR: In conformity with the wishes of the Superintendent as expressed in your communication of October 3, 1895, relative to "a full, definite, and concise account of studies and methods of instruction" at the Military Academy, I have the honor to submit the following relating to the department of drawing:

HISTORICAL SKETCH.

The subject of drawing is the second one to be mentioned during that period when the germ of the Military Academy was in process of creation by legislative acts of Congress. By the act of February 28, 1803, fixing the military peace establishment of the United States, section 2, the President of the United States is "authorized to appoint one teacher of the French language and one teacher of drawing, to be attached to the Corps of Engineers, whose compensation shall not exceed the pay and emoluments of a captain in the Army." The act of April 29, 1812, making further provision for the Corps of Engineers, section 2, gives explicit definition of the Military Academy and its personnel as consisting "of the Corps of Engineers and the following professors, in addition to the teachers of the French language and drawing already provided," etc.

The first mention of drawing as an organic "department" of instruction is in the appropriation act of March 25, 1826, making appropriation "for articles required for the mathematical, drawing, chemical, and mineralogical departments." From that date on, this, with other departments of instruction, is regularly appropriated for in the annual acts for the Military Academy. In the act of March 2, 1837, there is appropriated $800 "for a painting room for the professor of drawing." The professorship, however, was created by the act of August 8, 1846, section 3, enacting "That the teacher of drawing and the first teacher of French at the Military Academy shall hereafter be, respectively, professor of drawing and professor of the French language." The act of September 16, 1850, established the pay of the professor of drawing at $1,500 per annum, and that of the following year defined this as in lieu of the pay proper and allowances received under the provisions of the act of April 12, 1812.

By the act of March 3, 1855, the pay of the professorship was placed on the same footing as that of the other professors of the Military Academy.

The course in drawing commences with the appointment of Francis Desiré Masson as teacher in that branch in connection with the French language, under the provisions of the act of February 28, 1803. In September, 1808, he was succeeded by Mr. Christian E. Zoeller, a Swiss of limited education, who seems to have been unequal to the requirements of his position. At the end of April, 1810, he gave up the office, but was reappointed July 1, 1812, there being no incumbent during the disorganization of the Academy in the interim. Mr. Zoeller was succeeded January 5, 1819, by Thomas Gimbrede, a Frenchman of eccentric character, who was reputed to be a painter of miniatures previous to his appointment. Work now extant executed by him shows him to have had but little ability even in the stiff and dry academic methods of that time. In 1833 the distinguished artist, Charles Albert Leslie, was induced to accept the position after the death of Mr. Gimbrede, December 25, 1832. Mr. Leslie, who was appointed March 2, 1833, was of American parentage, although born in England. From the age of 5 to 17 he lived in Philadelphia, but after that period his life belongs to the history of English art. The dry and rigid environment of a military school in a country destitute of art could not but be distasteful to a man of Leslie's temperament and education, and his stay was therefore exceedingly brief. In June of the same year he was succeeded by Robert Weir, an American artist who had already achieved distinction, and who was destined to take honorable place among the American painters of the first half of the nineteenth century. Mr. Weir was born in New Rochelle, N. Y., in 1803; studied in Italy from 1824 to 1827, and at the time of his appointment had a studio in New York City. As teacher of drawing Mr. Weir became a member of the academic board of the Military Academy August 8, 1834, his long and honorable career in this institution closing with his retirement July 25, 1876, after forty-two years of continuous service. He was succeeded at this time by Charles William Larned, the present incumbent, then first lieutenant, Seventh Cavalry, acting assistant professor in the department of drawing, a graduate of the Military Academy of the class of 1870.

During the early period of the Academy—from 1802 to 1810—the course in drawing, like that of other departments, appears to have been of a very elementary character, confined to the use of instruments, such as they were, with a little topography and fortification drawing. The regulations of May 22, 1816, define the course as consisting of the drawing of figures, fortifications, and topographical plans, but

the demoralization of the Academy during the two subsequent years made all instruction abortive until the period signalized by the appointment of Colonel Thayer to the superintendency of the institution. At the beginning of his administration instruction in the use of pen and ink, and color, and the use of surveying instruments in the field was nominally given by Mr. Zoeller, but under existing conditions must have been both crude and ineffectual. Under the stimulating influence of the great Superintendent, however, work in this department soon took on a new character and embraced a much wider field, covering both figure and landscape work in pencil and ink, crayon, and color, and all forms of topographical drawing. In 1818 the relative count of drawing was as follows: Drawing, 1; mathematics, 2; descriptive geometry, ½; engineering and art of war, 2; French, 1; natural philosophy, 2; drill and discipline, 1½. It appears from the staff records that appointments to the corps of topographical engineers were at this time made according to proficiency in drawing, a practice that continued at least as late as 1830. Cadet Bache was appointed a captain in that corps for this reason, and so held in spite of protest, completing a long, useful, and distinguished career in that branch of the service. Until 1817 drawing was confined to the first class. In that year the collateral course of the second class was established.

In 1820 the course was defined to be: Elements of heads and figures in crayons, elements of landscape in crayons, practice in taking actual sketches in landscape from nature, elements of topography and the raising of maps.

In 1822 the course of drawing in the third class (second year) was established and dropped out of the first class (fourth year).

In 1823 the relative weights for the different years were established as follows: Third class—Mathematics, 3; French, 1; drawing ½. Second class—Philosophy, 3; chemistry, 1; drawing, 1.

The method of instruction appears to have been wholly that of copying from other drawings, a method pursued for many years to come, and which, while devoid of practical value or permanent results except to a very limited degree, is fruitful in deception and false pretenses. An investigation made in 1826 by a committee of the academic board into the practices of cadets in this work revealed an extensive demoralization, and the prevalence of fraudulent methods such as tracing, substitution, and the like.

In 1821 the course was further defined to embrace a series of elementary studies in landscape, the art of shading geometrical figures with India ink, sketches from nature, and elements of topography with pen, pencil, India ink, and colors. Instruction was given daily to the second class from 2 to 4 p. m., and alternate days to the third class during the same hours.

In 1825 it was further modified as follows: (1) Elements of the human figure; (2) a series of elementary studies in landscape with the pencil; (3) the art of shading geometrical figures with India ink; (4) the shading and finishing of landscapes in India ink; and (5) sketches from nature, and elements of topography with the pen and pencil, and with India ink, and colors.

At this time the relative count was made: Second class—Philosophy, 3; chemistry, 1; drawing 1. Third class—Mathematics, 3; French, 1; drawing 1. Fourth class—Mathematics, 2; French, 1.

In the distribution of time the second class attended drawing daily from 2 to 4 p. m., taking landscape and topography; the third class, Mondays, Wednesdays, and Fridays, from 2 to 4 p. m , taking the human figure.

In 1839 "the art of shading geometrical figures with India ink," and "the shading and finishing of landscapes in India ink," together with "sketching from nature," are omitted from the prescribed course. The relative count of the third-class course in drawing was changed to one-half, although it appears that daily attendance was required. The course was somewhat elaborated under Mr. Weir's direction, and in this year is described in the Staff Records as consisting of the following subjects, with a text-book, probably as a book of reference, on topography, prepared by Lieutenant Eastman, and adopted in 1837:

1. Geographical signs.
2. Topographical delineation of rocks and hills; wild and uncultured grounds; rivers; lakes, marshes, etc.
3. Formation of letters.
4. A course of topography with the brush, laying flat; broken and blended tints (symbolical of various grounds, etc.); shading mountains, rocks, trees, and other objects appertaining to wild or uncultivated countries. This completes the course in topography.

The course in free-hand work began with outline drawings of the human figure (anatomical) in three positions, and outline drawings from Flaxman and Retzch which conclude the third-class course. In the second class, landscape is taken up under the following heads: (1) Measurement; (2) form, simple and compound; (3) aerial perspective; (4) light, copying same size and different scales; (6) drawing on tinted

paper; (7) use of brush (sepia); (8) coloring; (9) finished drawings from standard works. The entire work seems to have been copied from models in the flat.

In 1848, at the instance of the professor of drawing, the count of drawing in the third-class year was raised to 1.

In 1865 the following scale of relative credits was adopted:

Second class—Philosophy, 300; chemistry, 150; drawing, 100; infantry tactics, 50; artillery, 50; discipline, 100.

Third class—Mathematics, 300; French, 100; drawing, 100; discipline, 100.

In 1867 the inspector of the Military Academy recommended that penmanship be made a part of the course of drawing and be assigned a separate value of 100 in credits. The academic board in accordance with this recommended that one hour each day be given to that subject in the beginning of the third-class course until each cadet shall have acquired, in the opinion of the professor of drawing, a sufficient proficiency. It also recommended that no additional count be given in the course of drawing to that branch.

In 1872, upon the recommendation of the academic board instruction in penmanship was discontinued for the reason that little benefit accrued to cadets from its study, and that the time could be more profitably employed on the elements of drawing.

In 1879 the construction of various problems in descriptive geometry, shades, shadows, and perspective, then undertaken by the third class in the department of mathematics, was made a part of the course in drawing.

In 1880 the professor of drawing submitted to the academic board the following propositions regarding the course of instruction in that department:

1. That there should be a written examination in the course of drawing coverin the subjects therein taught by lecture.

2. That a course of instruction by lecture, coupled with drawing from models, be given in the subject of mechanical engineering, embracing the elementary machines and movements.

3. That a portion of the time of the encampment be employed in practical surveying.

4. A detailed programme of the course in drawing.

A committee of the academic board was appointed to report upon these propositions, and recommended that there should be no written examinations in drawing; that such lectures as the professor of drawing shall deem necessary shall be prepared; that lectures and instruction upon the subject of mechanical engineering be wholly omitted; that the proposition regarding surveying during the encampment be so modified as to apply to the hours now devoted to drawing; and that the course as submitted with those modifications be adopted.

The following is the detailed programme submitted by the professor of drawing March 2, 1880, embodying the foregoing suggestions:

The following is respectfully returned as a detailed programme of the course of drawing in lieu of the recommendations contained in the accompanying documents.

FIRST YEAR, THIRD CLASS.

Topography; construction of problems in descriptive geometry, shades and shadows, and perspective.

Divided into two periods: Beginning with the academic year instruction in topography to be given to March 1 in each year. From March 1 to April 15, construction of geometrical problems.

From April 15 to close of term, practical topography in the field, reconnoissance, etc.

Course of instruction.—Beginning with the academic year the third class shall be instructed in the conventional signs of topography, and shortly after the inception of that work a lecture on that subject shall be delivered by the head of the department.

After the completion of the conventional signs a second lecture shall be given, covering the following subjects: Drawing instruments, their use and care; drawing papers, names, qualities, and uses; method of preparing paper for use; general rules to be observed in rectilinear and map drawing; construction of borders; lettering, explanation of different styles and principles of construction; scales, proportional, vernier, and scales of distance, their varieties and construction.

Immediately thereafter a third lecture covering the following subjects: Definition of topography and its objects; historical sketch of its progress and methods; explanation of the different systems and their relative merits; method of hill shading; construction of scales of shade and their application; principles of contours and sections.

Following these lectures the work of drawing scales of shade, inclination, distance, proportion, the drawing of maps from skeleton and plaster models, and the study of hill shading in ink shall be carried on.

Before the semiannual examination a fourth lecture covering the following subjects shall be delivered: Methods of projection of meridians and parallels; method of plotting from field work; plotting meridian and compass variation; the metric system of measure.

Between the close of the semiannual examination and the 1st of March instruction in colored topography, beginning with conventional tints and including the construction of maps from skeleton model.

From March 1 to April 15 construction of problems in descriptive geometry, shades and shadows, and perspective, to include problems in each of these subjects embracing fundamental principles, and generally variations in problems in text-books as follows: (1) Problems in descriptive geometry; (2) problems in shades and shadows (upper); (3) problems in shades and shadows (lower half); (4) problems in perspective (upper half); (5) problems in perspective (lower half).

From April 15 until close of year practical topography in the field, reconnaissance, etc.

Before going into the field a lecture shall be delivered covering the following subjects: Preparation and arrangement of note book; use of prismatic compass; manner of field sketches; use of odometer; pacing and hill sketching; method of running contours, including method of simultaneous location as used in United States Coast Survey; precautions necessary in reconnaissance and field sketching; improvised methods of leveling and measuring angles; practicability of slopes for troops.

Before the close of the academic year a sixth lecture shall be delivered covering the following subjects: General methods of large surveys; measurement of bases; general principles of triangulation and plotting; "filling in" and establishment of stations; method of survey west of the one-hundredth meridian; method of coast survey.

An examination (written) in the subjects embraced in the foregoing lectures shall be had at the close of the academic year. Cadets shall be required to take careful notes of the lectures and retain the same for use and reference.

SECOND YEAR, SECOND CLASS.

Free-hand drawing; machine, architectural, and geometrical drawing; theory of color and tinting.

Divided into two periods: First, free-hand drawing from September 1 to January 1; second, machine, etc., from close of semiannual examination to June 1.

Beginning with the academic year, a lecture shall be delivered by the head of the department on the subject of free-hand drawing, and perspective; outline; light and shade; methods and materials.

The class shall be instructed in free-hand drawing in black and white, beginning with simple block models of rectangular form in outline and increasing in difficulty until a fair proficiency in outline is attained. Shading shall then be applied to the simpler forms, and the models increased in difficulty according to the proficiency of the student. One copy from the flat may be made as examples of perfected drawing in the best methods. Instruction in landscape sketching in black and white shall also be given.

Beginning after the close of the semiannual examination a lecture shall be delivered by the head of the department covering the following subjects: Theory of color; quality and character of pigments; methods of coloring and tinting in water colors.

Instruction in this course shall begin by the laying of flat and graded tints illustrating the laws of harmonious contrast and the formation of compound and broken colors.

After their completion a lecture shall be delivered by the head of the department covering the following subjects: Construction of machines; fundamental parts of machines; classification of the elementary combinations; classification of the methods of connection; explanation of the principles of rolling contact, sliding contact, wrapping contact, link-work, and reduplication; toothed gear and method of construction; application of involute and cycloidal curves; pitch and methods of computation; relation of parts in spurwheels; screws, different kinds and construction; eccentrics, forms and applications; shafts and beams.

A second lecture explaining in detail the drawing of screws, toothed gear, eccentrics and their various curves shall be delivered before the close of the academic year.

A third lecture covering the subject of the orders of architecture, their origin and general proportions; fundamental architectural forms, and drawing of plans shall conclude the course of lectures in this department.

Careful notes of foregoing shall be taken and retained by the members of the second class.

It is also earnestly and respectfully recommended that a portion of the time of the third class during the encampment shall be devoted to the subject of practical surveying in the field, including use of the plane table, theodolite, level, and transit, the theoretical instruction being given as heretofore by the department of mathematics in the section room during the academic year.

I believe a greater practical familiarity with the details of surveying and plotting is very much needed by all classes of graduates. As this work is inseparable from its graphic delineation I believe it can be best and most economically taught in this department. So far as I know such is the practice in all the best technical and military schools in Europe.

CHARLES W. LARNED,
Professor of Drawing.

The academic board adopted the recommendation of the committee rejecting written examinations; recommended that no study upon the matter given in lectures of the professor of drawing shall be required in any time other than that allotted to drawing; rejected the instruction in mechanical engineering and applied mechanics, and recommended the appointment of a new committee for the consideration of the matter of surveying.

In 1883 a committee was appointed to consider and report upon the relative value given different subjects in the preparation of the merit roll. This committee recommended that a total count of 150 be given the subject of drawing in making up the general merit roll of the graduating class, divided as follows: Course, third class, September to June, 90; second class, September to June, 60.

This was modified by the academic board so as to make the total count 125, divided as follows: Course, third class, September to June, 75; second class, September to June, 50.

The attendance in drawing, which up to 1839 appears to have been daily for both classes, was changed between that date and 1842 so that the third class attended only on alternate days, excluding Saturdays, giving five attendances in two weeks. The second class continued to attend daily. This disposition appears to have remained undisturbed until 1857, at which time the hours of attendance of the third class were changed so as to permit instruction in riding to be given after November 1. Up to that day the whole class attended daily; thereafter it was divided into two sections, alternating in attendance until March 15, after which daily attendance was resumed. It does not appear from the Staff Records at what time the daily attendance of the second class was changed so as to substitute an alternating attendance of sections of one-half the class. This is, however, the arrangement at the present writing, and has been so for over thirty years.

PRESENT COURSE, JUNE, 1896.

Based upon the detailed programme submitted by the professor of drawing in 1881 as modified and adopted by the academic board the present course of instruction is arranged as given below, being the programme approved by the Secretary of War and incorporated in the academic regulations of October 1, 1894.

Course of technical and free-hand drawing.

FIRST YEAR.—PLANE AND DESCRIPTIVE GEOMETRY—TOPOGRAPHY—COLOR RECONNAISSANCE.

[September to January.]

Instruction in the course of the first year is as follows:

1. Problems of construction in the applications of plane geometry, ranging from the laying out of angles and polygons to the construction of the various plane curves, including the ovals and conic sections. Drawn in pencil. (4 sheets.)
2. The conventional signs of topography. Drawn in pencil and in ink. (2 sheets.)
3. Determination of lines of screen and construction of sections and gradients on contoured map. Explanation of contours and study of terrain. (1 sheet.)
4. Exercise in hachure work. Explanation of scales of shade. Drawn in ink. (1 sheet.)
5. Exercise in contouring from dictation. (1 sheet.)
6. Construction of scales of distance. Diagonal scales. Verniers. Explanations of their uses. Drawn in ink. (1 sheet.)
7. Plotting of triangulation for completed map from field record. General explanation of triangulation methods and measuring of bases. (1 sheet.)
8. Plotting of details of completed map from traverse notes. Explanation of methods of field notes and contouring. Inking and finish of completed topographical map. (1 sheet.)

[January to June.]

1. Theory of color. Color standards and constants. Color tests. Laying of washes. Complementary colors. Hues, tints, and shades laid in water colors. (2 sheets.)
2. Construction of problems in Descriptive Geometry. Shades, shadows, and perspective. (9 sheets.)

3. Topography in colors. Conventional signs. Completed map in colors. (1 sheet.)
4. Field reconnaissance and sketching. Methods and materials. Instruments and their use. Descriptions and explanations. Practic sketch from dictation. (1 sheet.)
5. Work in the field. Reconnaissance map of position with hand level, prismatic compass, and clinometer. Drawn on regulation form prescribed by General Orders, Headquarters United States Army. (1 sheet.)

SECOND YEAR.—FREE-HAND DRAWING—MEMORY DRAWING—MECHANICAL, ARCHITECTURAL, AND ORDNANCE CONSTRUCTION DRAWING.

Free-hand drawing.

[September to January.]

1. Lectures on form, light, and shade. Proportion, outline, technical and pictorial art, practical and aerial perspective. Drawing from wood blocks in outline in pencil. (7 sheets.)
2. Shaded drawing from blocks and plaster. (2 sheets.)
3. Drawing from memory. Originals—first, flat; second, blocks; third, buildings. (8 sheets.)
4. Mechanical free-hand drawing. Dictated. Parallels, angles, proportional parts, polygons and stars, frets, gear teeth. Isometric working drawings to scale. Isometric building to scale. Cavalier projections. Cavalier machine casting to scale. No ruler or implements allowed. (6 sheets.)
5. Free-hand drawing from flat. Figure outline. (2 sheets.)
6. Free-hand drawing from flat. Figure and landscape. Pen and ink and pencil. (2 sheets.)

Lectures on the above from time to time.

[January to June.]

Technical drawing (architectural, mechanical, ordnance construction).

1. Project. Plan, section, and elevation of barrack for a company of infantry—drawn to scale, printed specifications and data furnished. Finished in ink. Measurements figured. (1 sheet.)
2. Working drawings to scale of steam engine and principal parts. (1 sheet.)
3. Working drawings to scale of parts of buildings. (1 sheet.)
4. Elevation and working drawings to scale of ordnance constructions. (1 sheet.)
5. Plan, section, and elevation drawings of civil and military engineering constructions. (1 sheet.)

All of the above in color or ink alone, according to character. Nos. 2, 3, 4, and 5 occupy the time remaining after completion of No. 1. No. 1 is taken by entire class. The others are assigned according to corps to which cadet will probably be assigned on graduation. Engineers, No. 5; ordnance and artillery, No. 4; line corps, Nos. 2 and 3.

6. Fifteen to twenty short lectures on the graphics of building construction and forms; methods and drawings in the planning and construction of buildings; the steam engine and its essential parts; machine drawings. These are accompanied by diagrams and models, and the use of the stereopticon.

Sheets of data, working drawings, blue prints, and photographs used for data in the foregoing are from the following sources: Corps of Engineers and Report of Chief of Engineers, U. S. A.; Ordnance Bureau and Reports of Chief of Ordnance, U. S. A.; Pneumatic Gun Carriage and Power Company, United States; Baldwin Locomotive Works, United States; Krupp's and Gruson's Werke, Prussia; Canet System, Forges et Chantiers de la Mediterranée, France; Maxim-Nordenfelt Gun and Arms Company, England; construction details, Austrian Military and Geographical Institute, Vienna, Austria; Notes on Building Construction, South Kensington, London, England; Details of Building Construction, Professor Chandler, Boston Institute of Technology; Senior Course in Mechanical Drawing, Professor Thorne, Franklin Institute, Philadelphia. Ordnance material and models in relief also used as models.

The Third Class attends daily, Saturdays and Sundays excepted, from 2 p. m. to 4 p. m., until November 1, after which day the class is divided into two sections—the first section, until January 1, consisting of the odd numbers in general class standing; the second section of the even, these sections alternating in attendance. After January 1 the division of the class is similarly obtained from the standing in drawing at that examination, and alternation continues until March 15, after which daily attendance, Saturdays and Sundays excepted, is resumed until the end of the term.

The Second Class alternates in sections throughout the term, being divided into two sections of odd and even numbers, obtained from the standing in drawing at the end of the third-class year. Its hours of attendance are from 2 p. m. to 4 p. m. For

the better preservation of order the third class when attending daily is divided into four sections, which, at the close of attendance, are dismissed and retire separately under charge of separate section marchers, who are responsible for infractions of discipline.

HOURS OF ATTENDANCE.

Total number of hours of attendance of third class, first year.

	Hours.
September 1 to October 31, daily, two hours	88
November 1 to December 31, alternate days, two hours	42
January 12 to March 15, alternate days, two hours	45
March 15 to May 31, daily, two hours	110

Giving, out of 172 hours' total attendance during first term, 130 hours for each cadet, and out of 200 hours' total attendance during second term, 155 hours for each cadet.

Number of hours devoted to each subject for each cadet.

First term:	Hours.
Problems in application of plane geometry	28
Conventional signs of topography in pencil	22
Conventional signs of topography in ink	18
Line of screens, gradients, construction of roads, sections, and study of terrain	6
Contouring from dictation	6
Exercise in hachures	2
Construction of scales, etc	8
Platting triangulation for map from notes	6
Platting details and finishing map from notes	34
Total	130

Second term:	
Theory of color, etc., laying flat and graded washes in water colors	20
Problems in descriptive geometry	75
Topography in colors	30
Practice in plotting from dictation by field reconnaissance methods	4
Reconnaissance work in the field with compass and protractor sheet	18
Platting contours in the field	4
Reconnaissance without instruments	4
Total	155

Total number of hours of attendance of second class, second year.

[Attendance alternate days throughout year.]

First term, September 1 to December 31:	Hours.
Number of hours, 172; half of which for each cadet	86
Second term, January 12 to May 31:	
Number of hours, 200; half of which for each cadet	100

Number of hours devoted to each subject:	
Drawing from wood blocks in outline	28
Shaded drawings	12
Drawing from memory	12
Mechanical free-hand drawing, including isometric and cavalier projections	18
Hill outlines	4
Free-hand drawing from the flat	12
Total	86

Second term, January 12 to May 31:	
Barrack project, about	40
Working drawings to scale of steam engine, engineering and fortification drawings, ordnance and architectural construction, etc., about	60
Total	100

Total number of hours' attendance, for entire second year	372
Half of which for each cadet	186
Total number of hours for department in two years	744
For each cadet	471

CLASS REPORTS AND MERIT MARKS.

Class reports are submitted weekly, each cadet being given a merit mark on his week's work. These marks are scaled on a maximum of 3, and are determined from a consideration of two factors, i. e., progress and quality. A time schedule compiled from the records of the department and the result of several years' experience is maintained for each separate piece of work. If a cadet begins a piece of work on Monday and has on Saturday completed the full amount of work according to the schedule, he is marked accordingly for progress. Going a second time over the class, the element of progress is entirely ignored and a mark for quality alone is given.

In work of certain character, where quality is considered most important, e. g., conventional signs in color, the quality mark is given a multiplier of 2, and the resulting mark for the week would be determined as in the following example: Quality mark, $2.5 \times 2 = 5$; progress mark, 2.4; total, 7.4; reduced to a scale of $3 = 2.47 =$ mark for week.

In certain other portions of the work, as, for example, descriptive geometry, quality and progress are rated equal and given the same weight in the determination of the mark.

Exact record of progress is kept by recording against each cadet at the end of every week the number of hours to his credit according to schedule in the particular piece of work upon which he is engaged. By this method a glance at the record tells exactly what each cadet has done each week of the term, and as the work is filed away as fast as completed in the drawer allotted to him, the most complete information is always immediately available as to the status of every member of the class at any period of his instruction. The marks, with rating both for quality and progress, are posted in the classroom weekly, so that cadets know in what element of their work they are deficient.

As each problem, construction, or drawing to be inked is completed in penciling, it is examined by an instructor, and if approved is so marked by him over his initials in pencil; the cadet is thereby authorized to proceed to the inking, and upon the completion of this stage of the work it is again brought to the instructor for final approval, which, if accorded, is stamped in ink, with the instructor's name; otherwise the word "disapproved" is stamped in a similar manner. Upon each drawing is also stamped the name of the cadet and date of completion, a brief of the course of drawing to which it belongs, and, if a problem, an enunciation of its requirements.

At the examinations closing the year's course, drawings of special excellence are retained by the head of the department for preservation in the academy gallery—a custom which has been adhered to for over seventy years, and, as a result, a collection of drawings dating back to the early twenties, and bearing the names of graduates whose reputations are national, is exhibited on the walls of the Academies.

PLANT.

The halls and rooms devoted to the department of drawing in the academic building completed in 1895 were planned by the head of the department to meet the requirements of the special and comprehensive course taught. They were designed also to give a maximum amount of light and a perfect system of ventilation, together with abundant space for both student and instructor. Besides these requirements of the drawing academies, there was to be provided a lecture room, with complete illustrative apparatus, and an auditorium which should accommodate 150 spectators, each of whom should have an unobstructed view of the platform; a photograph gallery with developing, enlarging, and chemical rooms; a model room; and a workshop for repairs, preparation of material, etc. All of these were to be so disposed as to occupy the same relative space in the new as in the old building.

The two main halls or academies are devoted to the work of the second and third classes, respectively. They are located upon the top floor, the ceilings being formed by the arched iron trusses supporting the roof, giving a maximum height of 29 feet at the crown of the arch. The second-class academy accommodates comfortably 50 students on a floor plan of 50 by 42, or approximately 2,000 square feet. The cubic contents of the room is 49,000 cubic feet, affording nearly 1,000 cubic feet of air per man for a maximum seating of 50 men. As a matter of fact the size of sections has not yet exceeded 40 men. The room may be lighted either from sides or from above. Side light is given by four large double windows, 7 by $8\frac{1}{2}$ feet, two of which are on the east and two on the north side of the room. These are closed by double iron rolling shutters, meeting at the meeting rail and rolling up and down. Light from above is supplied by a north skylight on slope of roof, screened by draw shades of white cotton and of dark green hollands, working separately. The skylight is 20 by $22\frac{1}{2}$ feet, covered with one-fourth inch hammered glass. With side windows closed the skylight gives abundant light for the most exacting work on the darkest days. By the use of screens and side windows any desired effect of light and shade can be produced for free-hand model work.

The Third-class Academy is considerably larger, and is designed to accommodate a maximum of 100 men on a floor plan of 3,025 square feet—50 by 60½ feet. Its cubic contents is 74,000 cubic feet, giving 740 cubic feet per man for a class of 100 men. It has a north skylight 20 by 44 feet, screened as in the second-class academy, and has eight similar windows, arranged three on north, three on west, and two on south side of room. Heated air is supplied through openings at middle height of north and west walls by the indirect system, being forced in by steam fan and extracted through ventilators at bottom and top of walls. In addition large ventilators are build on ridge of roof, operated from side walls through universal joints. As a result the air of the academies is at all times fresh and odorless and sufficiently warm in the coldest weather One large porcelain double sink in second-class and two in third-class academy, set in Tennessee marble with floor drip and facings, supply washing facilities.

The Lecture Room, 40 by 48 feet, is provided with a lantern gallery and Colt dissolving electric stereopticon. At the opposite end are black and white roller curtains, 20 by 25 feet, and the platform, when lantern is not in use, is lighted by a skylight over the auditorium, provided with roller iron shutters worked by a crank and gear from platform. The seats are arranged as in a clinic and the space beneath is utilized for storage.

The Photographing Rooms open from lecture room, and are arranged in two stories. Above is located the gallery, 23 by 23 feet, with skylight; below are dark room with small and large developing tanks, the latter capable of 9 feet enlargements; the Chemical Room, with tank, retouching table, and negative closet; the Enlarging Room, furnished with 9-foot enlarging screen on railway, sensitizing table, and lens screen, with light closet wired for electric arc light.

The Model Room, 46 by 22 feet, contains models in plaster of the Propyleum (restored), the Parthenon, the Temple of Pæstum, and others; also of anatomical figure, the flying Mercury of John of Bologna, the Apollo, the Germanicus (so called), and others (casts from the Louvre); a large collection of hands and feet and ornamental details; a complete framed house in perfect detail, to a scale of one-sixth; a working model of four horsepower, direct-acting vertical steam engine, scale of one-half; topographical facsimile model in plaster of the Military Academy and post of West Point, constructed by Lieut. C. P. Townsley, Fourth Artillery, under the direction of the head of the department; topographical models in plaster; a collection of original water colors by English water-colorists; large cubes, spheres, and cylinders for lectures on light, shade, and form, besides a large number of smaller block models for free-hand drawing; a great variety of lithographs, engravings, prints, diagrams, and charts covering the field of genre and landscape drawing, studies of the human figure, architecture, building construction, steam engines and machinery, engineering and ordnance constructions, topography and cartography, including the complete issue of the Coast and Geodetic Survey and the United States Corps of Engineers. It is intended to complete the collection of topographical and cartographic prints so as to include the work of the principal European nations. Complete working-shop drawings of the principal constructions of the ordnance department are on file, together with others of civil manufactories. In connection with descriptive geometrical drawing there is also a demonstrative apparatus with models, designed by the head of the department to overcome the difficulties experienced by many in understanding the graphical elements and practical applications of this subject. This apparatus presents the demonstration of all the elementary problems in descriptive geometry, shades, shadows, and perspective as actually seen in space.

EXAMINATIONS AND STANDARD OF PROFICIENCY.

Examinations are held and class standing determined by inspection of marks and drawings. The latter are displayed upon racks and tables so as to be easily examined and compared. As the course is mainly technical and constructive, the marking is according to schedule and very close, so that very little deviation from the standing resulting from marks is found necessary after a comparison of the work. In the course of free-hand work, from September until January of the second-class year, more change results from the final inspection of work than at other times. No special weight is given the examinations as in other departments, since, as they are a full presentation of the entire work, they are of necessity wholly determinative of standing.

The standard of proficiency exacted is such as long experience has demonstrated to be fully within the grasp of the diligent and fairly intelligent student, without reference to natural pictorial gifts. As three-fourths of the course is geometrical in its elements, and technical or constructive in its character, mainly executed with drawing instruments, and as the free-hand work is confined to practicing and developing the perception of proportion and relation in the simpler elementary forms, beginning with blocks and elementary analysis of landscape, it is found that

studentswith no natural pictorial powers whatever find no difficulty in passing and even in standing well in this study. A cadet, therefore, who constructs with correctness and accuracy the problems in plane and descriptive geometry, plots and completes from traverse notes and triangulation sheet with correctness and fair neatness of finish the required topographical map, and shows ability to draw a fairly accurate reconnaissance field sketch, will be declared proficient in that portion of the course, although the pictorial finish may be 50 per cent inferior to that of the head man. In free-hand work the student must show a very rare incapacity for perception of form to be declared deficient therein. In the course of architectural, building construction, engineering, and ordnance drawing the same conditions obtain as in the geometrical and topographical work.

The course of drawing at the Military Academy at the present time is based mainly upon the fact that the practical language of modern construction of every sort is technical drawing. The most casual investigation of any one of the many constructive arts of the world from architecture and engineering—all the machinery of peace and the enginery of war—to the humblest of manufactures will show that from the beginning to the end its operations depend upon the line; that its original conception must appear as a design upon a plane surface; that its operatives perform their allotted tasks under the guidance of linear drawings upon which they are absolutely dependent; that in turn the tools with which they work and the machinery they control owe their creation to the same medium, and that only by and through this medium is that great differentiation of labor possible which brings to birth the modern arts of peace and war. It is because the constructive drawing of form has so enormously outgrown the limits of pictorial art, is so practically and vitally associated with every activity of modern creative energy, and is such an indispensable medium of expression to the entire industrial world, that it is imperative that every school of technical science, civil or military, should require of its students a sufficient proficiency in this graphic language both to use it as vehicle of plan and design and to read and correctly interpret from the designs of others.

The foregoing expresses the practical considerations upon which the instruction of this course is based. There are others, educational as well as practical. These are the cultivation of the visual faculties of apprehension; the clear, vivid, and accurate perception of the objective world; judgment—the power of comparison and discrimination between formal relations, shape, proportion, distance, quality; memory—the clear and accurate retention of formal images, involving correct and luminous description; and sensibility—involving ideas of beauty, harmony, grace, and refinement. Of these the first three are directly and practically of the highest importance to the officer both as commander and subordinate. Although the eye has always been the most important of the faculties of sense in the decision of tactical questions, and both general and individual action in the crises of battles, there has never been a time when a clear vision and accurate memory of objective facts was of such importance as it is at present to the general and to the subordinates. Estimates of configuration, of distance, of relation, of shape, are vital in the disposition of troops where the slightest disadvantage of position may, with modern weapons, prove fatal, and these must be decided by the eye of the commanding general. He also requires for strategical dispositions the fullest and most accurate information possible, obtained by his subordinate officers through scouting and reconnaissance, and to this end a good eye and a retentive memory for formal facts are indispensable, together with sufficient graphical ability to put them clearly upon paper. Free-hand drawing is the direct educator of these faculties, and although with the majority the pictoral result will be small from the artistic point of view, yet a comparatively short training under careful instruction will stimulate all these faculties, even in those of small natural gifts, in a remarkable degree and develop habits of observation entirely dormant.

Technical drawing, also, aside from its practical bearing, is a direct educator of the mind and habits of thought. The technical drawing deals with facts, with exact relations, with geometrical laws. Correctly done it can not lie; and incorrectly done it exposes its own errors. It holds the student in the grip of visible and tangible demonstration; the smallest error can not be evaded or hidden. Like analytics, every step in a constructive drawing has logical and positive connection with what has gone before; but unlike the methods of quantity, the work can not be done by formulæ. It demands a perpetual watchfulness and foresightedness—a knowledge at every moment of precisely what is to be done and its effect upon the whole; a clear knowledge at the beginning of the conditions involved, their accurate development, and the exact correspondence of every detail at the completion of the work. A working drawing must take apart with such perfect accuracy that the reassembling produces facsimile, so that the body of independent coworkers can be held to strict conformity. It produces a strong sense of responsibility in the draftsman, because a wrongly placed bolt in a complex mechanism, or a beam out of place in a building may have fatal results in the construction. The project drawing locates

theory and develops self-reliance and practical ability. Its lines and dots constitute the actual doing of that which theory has expounded, and bring into play judgment, foresight, and creative ability.

It is unfortunately true that in the educational systems of the United States there is a most lamentable neglect of training in the elements of drawing. No other civilized nation of commercial greatness neglects this subject, and in the schools of Germany, France, and Austria on the Continent instruction is continuous from the primary schools through to the highest. England, with her elaborate system of science and art instruction radiating from South Kensington, has spread it broadcast throughout the kingdom. The representatives of our system, however, who present themselves at the Military Academy are for the greater part wholly deficient in any, even the most rudimentary, instruction in drawing. I do not find that an average of 10 per cent have had elementary training—in some classes not 5 per cent. It is therefore necessary that instruction here should begin at the illiteracy in this branch—a condition that is not paralleled in any other subject.

The result to be achieved is therefore twofold. First, to train the faculties of vision and those of execution through the hand when at a period of comparative maturity they are entirely dormant; second, to teach the general principles of technical drawing so that the graduate shall have an intelligent acquaintance with the constructive language of engineering, architecture and building construction, topography and cartography, and machinery, and shall be able to make a fairly good free-hand drawing of natural and artificial form. In his capacity as commanding general, commanding officer of a post, engineer, ordnance, and artillery officer, quartermaster, surveyor, subaltern on reconnaissance or supervising construction, he is liable to require any or all of this knowledge, and at least to translate it to his subordinates. The instruction is therefore twofold—in the practical graphical work and by lectures copiously illustrated, coupled with constant oral criticism.

The cardinal principle upon which instruction is based is that all work shall be *original*, that is to say, that every project or problem shall be the student's own work, constructed from the data or model according to the principles governing it. The only copies from drawings permitted are in the case of a few outline studies of the human form and landscape at the close of the course of free-hand instruction. The next condition exacted is accuracy, after which comes pictorial excellence and neatness. The ultimate purpose is to give a sound general training in the elements of technical and free-hand drawing so as to familiarize the student with the methods of graphical work in the various fields of topographical, geometrical, structural, and mechanical drawing to a sufficient extent to enable them to understand the graphics of these subjects when required to interpret them, and to possess a reasonable facility of design therein, rather than to attempt to carry any one of them to a degree of development appropriate only to special courses in schools of application. As a matter of fact the more apt students do attain a facility and skill which enables their work to bear comparison with that of the best of the special schools either in this country or abroad. In the free-hand course the ultimate aim, after the cultivation of the perceptive faculties, is to give a sufficient pictorial skill to enable the graduate to make outline sketches of general landscape and hill forms to accompany topographical and reconnaissance reports. Further than this with the average man it is not possible to go. Artistic power can not be taught; it must be innate in the same way as are poetic, rhetorical, or dramatic gifts. But the whole range of technical graphics, which is the language of the constructive and industrial world, and a certain ability to render ordinary form by free hand can be taught to all in precisely the same degree as any of the various branches of study; the eye faculties of judgment, memory, and apprehension can be trained to a very high point, and the taste and appreciation can be developed in those in whom the artistic and creative power is lacking.

METHODS OF INSTRUCTION.

First year's course.

GEOMETRICAL AND TOPOGRAPHICAL DRAWING.

Plane geometry.—About 40 problems covering various applications from laying out of angles to plane curves and conic sections (see programme). These are done in pencil and constitute the first work of the student. The data are issued on printed sheets giving a brief general analysis of method. This refreshes the memory of plane geometry and gives the first practice in the use of instruments. Accuracy and neatness are here inculcated as primary requirements.

Conventional signs of topography.—Topography is assigned to this first year's course because surveying and trigonometry are taught in this year. The general signs are first executed in pencil and afterwards repeated in ink. The repetition impresses them upon the memory besides making the transition to ink work gradual. In these

signs there is a partial free-hand element which needs the practice in pencil before attempting ink. Clearness and neatness of finish emphasized. Examples in large maps of coast survey and foreign countries displayed for inspection upon tables.

Determination of lines of screens and sections, etc.—Lithographed sheets giving the contours of a particular region are issued. The lines of section required are indicated and the section is made by student. Position of batteries indicated and lines of screen from fire determined on different slope by student. Gradient of required road given; position of road platted by student. Maps of American battlefields displayed on tables. Students required to go to them and answer a series of hectographed questions touching topographical relation of different positions and dispositions.

Exercises in hachure work.—This work is now confined to a short exercise in the use of hachures, with an explanation of scales of shade of different methods of hachuring.

Exercise in contouring from dictation.—To familiarize the student with the function of contours and their platting, bearings and gradients are given on hectograph sheets, together with topographical features by textual description, from which the terrene is plotted by the student.

Construction of scales of distance, etc.—These scales are thoroughly explained in theory and then accurately constructed to given representative fractions and units by the student.

Platting of triangulation for completed map, etc.—The class at this point begins the final work of the first term, which is a practical application of the foregoing preliminary instruction. This consists in the actual work of platting and drawing a finished map from the triangulation sheet and field traverse notes, and demonstrates the extent to which the student has understood the principles of topography and acquired the necessary facility for the execution of a correct map. The data for establishing the triangulation points are given as if taken by observation, and a book containing all of the traverse notes as taken in the field book for the area to be mapped. The platting is carefully tested as it progresses and all errors noted. After final approval of the platting the finishing work in ink is proceeded with.

Theory of color, etc.: hues, tints, etc.—The subject of modern chromatics is taken up at the commencement of the second term. After an explanation of the modern theory of color of Young and Helmholz is taught the laying of flat tints of the primary and complementary hues, shading of cylinders and curved surfaces.

Construction of problems in descriptive geometry.—As this subject is the foundation of technical drawing, its practical application in graphical problems is given the most careful attention. In order that the difficulties of a practical grasp of the subject shall be overcome the first work deals with the simplest problems. The class receives in the course of mathematics most thorough and careful theoretical instruction, and comes to this work as fully equipped in the theory of the subject as can be desired. The problems given are selected with a view to practical bearing upon graphical work in architectural and mechanical construction. Each problem as given is carefully explained, and questions as to obscure points invited and answered. The principal problems as they are reached are then set up on the demonstration frame and the explanation repeated from the actual objects and projections in space. The students are then required to make the construction. The demonstration frame may be at any time consulted to resolve difficulties and forgotten points. Cadets are not allowed to help each other, and the signature of the cadet is held to be a guaranty of the integrity of the work. The first problems are constructed in pencil alone, and consist of the projections and revolutions in various planes of simple plane figures, cubes, and prisms, with sections and developments. These are quickly done, and give confidence and flexibility in the use of projective methods. After these the problems increase in complexity and are finished with greater care and accuracy in ink. They include determination of intersections of different solids with developments, shades and shadows of crosses, cylinders, rings, spheres, or ellipsoids; the column with abacus and base with taurus; chimney and dormer window on roof, vase, etc.; the perspective of rings, shafts, spheres, monuments, groined arches, buildings, or composed subjects. These are executed with the utmost accuracy and a high degree of finish, which will compare with anything done by students elsewhere, at home or abroad.

Topography in colors.—Water-color washes as applied to topographical maps. First, a sheet of conventional signs, followed by a completed map.

Field reconnaissance and sketching.—Careful lectures and explanation, with exhibition of implements and illustration by the lantern, precedes this most important branch of military graphics. Methods of work in this country and abroad are explained and illustrated, and preliminary practice given by dictating courses and data viva voce, requiring a topographical sketch to be platted from the description. The class is then taken into the field, formerly with prismatic compass and regulation protractor sheet, but now with the reconnaissance sketching board of Major Vernor, of the English service, as modified and greatly improved by Lieut. Charles B. Hagadorn,

first lieutenant, Twenty-third Infantry, instructor of drawing. This is a simple application of plane table methods to field topography, and vastly superior both in accuracy and rapidity of result to the older methods. A sketch is made of a portion of the military reservation, and contours are determined and platted both with levels and clinometer. Practice is also given in sketching without compass or implement of any sort. This work closes the first year's instruction.

Second year's course.

FREE-HAND DRAWING.

Outline drawings from blocks and plasters.—This work is addressed to the dormant faculties of vision and is of the simplest and most elementary character. The objects are at first white cubes which are carefully drawn "by eye," the knowledge of perspective laws acquired in the preceding year being here applied in the judgment of form. According as the student progresses other blocks are substituted, and then groups of two, three, four, and many blocks in irregular masses. Finally, rough buildings are constructed with blocks and sketched from different points of view, and, if sufficient skill is developed, plaster forms. Succeeding this a series of memory drawings are required, beginning with simple rectilinear shapes, increasing in complexity, which the student is allowed to view for a very short period and must then reproduce. More complex forms succeed these, and finally the students are sent out to examine buildings for a short time which they must then draw from memory.

Mechanical free-hand drawing.—This work is done without any implement or artificial aid whatever other than the lead pencil. This must not be used as a ruler. Beginning with simple subdivision of lines into equal parts, scales are drawn by eye showing subdivisions as high as sixtieths. The various constructions of frets, polyhedrons, stars, plotting and division of angles, etc., are gone through with, and finally scale drawings of objects giving sections and dimensions are done, concluding with isometric scale dimensioned drawings and cavalier projections of machine castings of the same kind. The class is then practiced in sketching hill forms from lantern projections on a large screen, beginning with very elementary forms and gradually leading up to views of the region of the Colorado Canyon. This work is followed with study from lithographed studies of landscape in the flat and landscape sketching in the field. The course concludes with a few figure outlines by Bargue and Gérome, and studies of figure and landscape from the flat in pen and ink as an example of good method and to afford some slight facility in execution within the very limited time and range of this course. This concludes the first term.

Project—Barrack for a company of infantry.—This begins the final course of constructive drawing. This project is a practical one and is given out to the individual members of the class by a printed sheet of specifications and two sheets giving detail dimensions. The plan, section, and one elevation of the building are then constructed to the required scale. This important piece of work gives a very thorough practice in the preparation of general drawings for a building, and is undertaken in connection with a course of explanatory lectures fully illustrated by the stereopticon. In this work the student learns to relate drawings in plan, section, and elevation, and to understand the working out of detail and shop drawings. It is a double study for the student, teaching both construction and interpretation of working drawings. The drawings are carefully figured and colored in flat wash if the progress of the individual work justifies it.

Working drawings—Steam, building construction, ordnance, civil and military engineering.—After the completion of the project above described, the class is divided into groups according to the general class standing of the men. The final work is then assigned according to the corps of the Army to which the cadets will probably be assigned. The first five men are given subjects selected from military or civil engineering data—batteries planned or in process of construction in the United States and abroad; portions of enceintes; magazines; bridge and canal work, the data for which are being constantly sought in the latest works. The next twenty men, whose probable service is to be in the Ordnance and Artillery Corps, are given subjects of ordnance and artillery construction. Working shop drawings of the principal guns and carriages of the United States Ordnance Bureau are on file in the department, together with a large amount of data from foreign countries of the latest models. The remaining members of the class, whose duties will be in the Line as quartermasters, commanders of working parties, and as commanding officers of posts and in control of Government property, are given working drawings of details of building construction, and a figured drawing of a simple direct-acting high-pressure vertical steam engine to complete to given scale. A large perfect model of a frame house to a scale of one-sixth is used for this work. Students are required to make isometric sections and projections through different parts of the barrack project showing

entire construction of windows, doors, and interior floor and roof construction—figured. A facsimile model of steam engine to one-half scale is used for the figured drawing of steam engine. Detail drawings of all the parts are also available, and the student is required to set up the engine to scale from these and the model. This work completes the course of drawing.

LECTURES.

All theoretic and explanatory instruction is given by lectures abundantly illustrated by stereopticon, blackboard, and models. Running commentary and viva voce criticism and instruction go on at all times. At any time when special explanation is needed the classes are called into the lecture room or to the models.

The course of lectures beginning with the first year's work covers: Drawing instruments—their character, quality, use, and care; methods and connections in geometrical drawing; topographical signs and conventions; methods of large surveys; triangulation and field work; contouring and hill sketching; traversing; plotting; cartography—historical sketch, styles, and methods; reading of maps; study and character of terrane; scales; the Young-Helmholz theory of color—the prismatic and normal spectrum, color constants; complementary color; nomenclature; subjective color; pigments; harmony, contrast—illustrated by the stereopticon, Maxwell's disks, and color samples; methods of field reconnaissance. Instruments—levels, odometers, pedimeters, compasses, clinometers, etc.—are shown and explained.

Lectures on form, light and shade, proportion, outline, technical and pictorial art, practical and aerial perspective, and landscape drawing are given during free-hand work, and are all illustrated with stereopticon.

During the last term of constructive and mechanical drawing a carefully prepared series of lectures accompany the work, explanatory of the details of building construction from foundations to interior finish; a historical sketch of architecture and explanation of styles; a descriptive analysis of the steam engine and its details, showing character and functions of its working parts, and of the various shop drawings. In addition, lectures giving the character and number of architectural drawings, fees and procedure in architects' offices, specifications, reproductive processes, quality and preparation of paper, tracings, enlargements.

In former years the entire course in drawing consisted in copying pictures in pen, ink, and color from engravings and lithographs. The course was devoid of lectures or theoretical instruction. No original work was undertaken. The work was largely worked over and finished by the instructor to give pictorial effect.

The work of the present course can not well be compared with that of other institutions, for the reason that it is general and comprehensive, whereas in the technical and scientific schools of the country the work is special, and in the special lines is carried further, and in the art schools the object aimed at is fine art, while the students possess special talent and have had considerable training before entering. At the Military Academy the eye and hand must be trained from a condition of entire helplessness, while at the same time a knowledge of the graphics of a wide range of arts is acquired. Notwithstanding the great disparity in the preparation of the students and the character of the aim, as well as limitation of time, I am of the opinion that the result will compare without discredit with similar work, either at home or abroad. The best drawings do not fall below the grade of expert work. This high standard of achievement is due to the methods of work of the Military Academy, the thorough preparation given by my associates, and the conscientious and enthusiastic fidelity of my assistants, without which very little could be achieved. I may also add that the interest of the cadets themselves in their work is an important factor.

I think that the count given to the subject in its present scope and treatment is too small, and is unfair both to the work itself, the range of instruction given, and the amount of knowledge and skill developed in the cadet student. At the least the recommendation of the committee appointed in 1883 to determine upon the relative value of different subjects should prevail, which gave to the course of the third-class year a value of 90, and that of the second-class year a value of 60. At that time the counts of law and ordnance and gunnery were the same as that of drawing. These subjects now count 150, although the number of hours devoted to the subjects is less than that devoted to drawing. I venture to assume that the advance in instruction has not been greater.

I believe that a great gain in practical efficiency would ensue if the course in surveying were to be incorporated with that of drawing, for the reason that the subject is essentially graphical and can not be divorced from graphical methods. It is not properly a part of pure mathematics, as all of its principles are those of geometry and trigonometry, and have already been taught in that course. I advance this suggestion here only because, after consultation with the Professor of Mathematics, I understand his views to coincide with my own.

Should the Professor of Engineering agree with my judgment, I would suggest also the consideration of the advisability of transferring the drawing now done as a class attendance in that department to the department of drawing. It would, I think, be a gain in efficiency to have all drawing done by the class in a body under the direction of one department. The theoretical instruction and the nature of the problem given out would be controlled by the department of engineering. The conditions would be precisely similar to those which obtained when the descriptive geometry drawing was transferred from the department of mathematics to this department.

Very respectfully, your obedient servant,

CHARLES W. LARNED,
Professor of Drawing, U. S. M. A.

The ADJUTANT, UNITED STATES MILITARY ACADEMY,
West Point, N. Y.

Record of number of cadets found deficient in drawing—1818 to 1896.

Year.	January.		June.		Year.	January.		June.	
	Second class.	Third class.	Second class.	Third class.		Second class.	Third class.	Second class.	Third class.
1818			1		1858		2		
1819			3		1859				
1820					1860				
1821			2		1861				
1822			2		1862				
1823		1	1		1863			1	
1824	6	6	2	2	1864				
1825					1865	1	3		
1826	1	10			1866				
1827		3			1867				
1828					1868	2	2		
1829		1			1869				
1830					1870	2	4		
1831					1871				
1832					1872				
1833					1873				
1834		5		1	1874				1
1835	1	6			1875				
1836	10	6	2		1876			1	
1837		6			1877		4		
1838					1878	1			
1839		8			1879				
1840	2	1			1880	1	1		3
1841	2	3			1881		1		1
1842		5			1882				
1843	4	2	3	2	1883				
1844	3	2			1884				
1845		6		2	1885		3		1
1846	1	1			1886				
1847	2	4			1887				
1848		3			1888				
1849	3	5			1889		7		
1850		2		1	1890				
1851		2			1891	1			
1852		8			1892				1
1853	3		2		1893		1		
1854		1			1894		1		1
1855		1			1895		3		
1856					1896	1	4		
1857									

F.

WEST POINT, N. Y., *May 31, 1896.*

SIR: In accordance with the requirements of your communication dated Headquarters United States Military Academy, West Point, N. Y., October 3, 1895, I have the honor to submit the following report of the course of studies and methods of instruction, including practical instruction, employed at the Military Academy in the department of mathematics.

Very respectfully, your obedient servant,

EDGAR W. BASS,
Professor of Mathematics, U. S. M. A.

The ADJUTANT, UNITED STATES MILITARY ACADEMY,
West Point, N. Y.

PART I.

BRIEF HISTORICAL SKETCH OF THE DEPARTMENT, GIVING DATE OF ITS ESTABLISHMENT, ITS SCOPE IN THE BEGINNING, AND IMPORTANT STEPS IN ITS DEVELOPMENT.

The following facts are taken mainly from Cullum's Register, Regulations United States Military Academy, staff records of the academic board, cadet registers, Boynton's History of West Point, American State Papers, and laws relating to the Military Academy:

1802.

The Military Academy was established by an act of Congress approved March 16, 1802.

Previous to this date a few cadets of the corps of artillerists and engineers were sent to West Point for instruction.

1801.

Mr. George Barron was appointed teacher of arts and sciences January 6, 1801, and acted as instructor in mathematics.

He was probably appointed under the act of Congress approved July 16, 1798, which authorized the President to appoint four teachers of the arts and sciences necessary for the instruction of artillerists and engineers.

[Extracts from report of Col. Jonathan Williams, dated March 14, 1808.]

"The institution was established at West Point in the year 1801, under the direction of a private citizen (George Barron), and was nothing more than a mathematical school for the few cadets that were then in the service.

"Instruction in mathematics at this period was given in the form of daily lectures on elementary mathematics."

1802.

Mr. George Barron was dismissed the service February 11, 1802.

Capt. Jared Mansfield, Corps of Engineers, acting professor of mathematics, May 3, 1802, to November 14, 1803.

Capt. W. A. Barron, Corps of Engineers, acting professor of mathematics, July 6, 1802, to February 14, 1807.

"Under Major Williams, as superintendent, the Military Academy, with 10 cadets, was formally opened for instruction July 4, 1802.

"Capts. Jared Mansfield and William A. Barron, of the Corps of Engineers, gave instruction in mathematics, the former in the line of algebraical, the latter in that of geometrical demonstrations."

[Extracts from Cullum's History.]

"Four months after the opening of the Academy the first cadet was admitted upon the following testimonial:

"'We certify that we have, agreeably to an academic order * * * examined in the elements of arithmetic (vulgar and decimal) * * * Joseph G. Totten, aged 14, * * * and find him well qualified in the aforesaid branches.

"'W. A. BARRON,
"'JARED MANSFIELD,
"'*Corps of Engineers.*'"

Major Williams gave instruction in the use of instruments.

From 1802 to 1810 cadets entered the Academy without mental or physical examination, and at any time of the year. They were of all ages, from 12 to 34.

"The term began in April and ended in November. Study hours, including recitations, after 1805, were from 8 a. m. to 1 p. m., 2 p. m. to 4 p. m., and in the evening:

"In mathematics the instruction was limited to the elements of geometry and algebra, with the use of surveying instruments.

"During the summer of 1802 a survey of West Point was made and the elevations of surrounding peaks were determined.

"Early in October the first public examination was held by the Superintendent and Captains Mansfield and Barron. Two cadets were examined in Hutton's Mathematics."

Owing to the poor condition of the quarters and the severity of the winters, instruction ceased on the 1st of December and began on the 15th of March following,

1803.

Capt. Jared Mansfield was relieved from duty at West Point on November 14, 1803. He was a graduate of Yale College and had a high reputation for learning. After important service in the surveys of the Northwestern Territory he returned to the Academy as professor of philosophy October 7, 1812.

Colonel Williams resigned June 20, 1803, when the command at West Point devolved upon Capt. W. A. Barron.

1804.

In April, 1804, the Academy opened with only Captain Barron, the teacher of French, and about 10 cadets.

1805.

Until the reappointment of Colonel Williams, April 19, 1805, as chief engineer and Superintendent of the Military Academy, no progress in instruction is recorded for the Academy.

In 1805 the hours from 8 to 11 a. m. were assigned to the study and recitations of mathematics.

Colonel Williams desired the return of Major Mansfield to West Point, stating: "There is not a man in our country, in my opinion, better calculated for a mathematical instructor, as well on account of his amiable character as his professional knowledge."

1806.

"A general examination took place October 10, 1806, lasting four days, in the presence of the Superintendent and the acting professor of mathematics. Seven cadets were examined in arithmetic and the elements of algebra and geometry for advancement; 6 cadets in arithmetic, algebra, and geometry for promotion to the artillery, and 5 cadets in algebra, geometry, including surveying, * * * for promotion to the engineers."

1807.

Capt. W. A. Barron served as acting professor of mathematics until February 14, 1807.

He was said to be "a man of social temper, fair abilities, and had a faculty for teaching." He subsequently became attached to the Quartermaster's Department.

Mr. Ferdinand R. Hassler, acting professor of mathematics, February 14, 1807, to December 31, 1809.

In 1807 the Academy closed on the 23d of November, after the annual examination, at which 5 cadets were graduated.

1808.

The academic term of 1808 began in April, with about 35 cadets.

Instruction in mathematics was given by Professor Hassler, assisted by Lieut. Alden Partridge.

1809.

In 1809 the Academy opened about the 1st of April, with about 30 cadets.

William Eustis had in the meantime been appointed Secretary of War. He began immediately to do all he could to crush the Academy by depriving it of students, teachers, and means of support.

In September, 1809, Lieut. Alden Partridge, who was in command, reported as follows:

"On Monday last there was a very thin mathematical academy. * * * Yesterday there was a still less number in the mathematical academy, and some of those who did attend did not come into the academy until about 10 o'clock."

October 24, 1809, Lieutenant Partridge proposed that "no person be appointed a cadet who is under 14 or over 18 years of age; nor unless he can produce testimony of his knowledge of the first rules of arithmetic." * * *

"Professor Hassler was born in Switzerland and studied mathematics at the University of Göttingen. He was the director of a geodetic survey of Switzerland. Although a profound mathematician, he was not a successful teacher except for those with considerable aptitude for mathematics. His methods of instruction were original and his tendency was toward analytical mathematics. With no idea of discipline, he supplied valuable information to all of his students, but made impressions on very few of them."

He was the author of a work entitled Elements of Analytic Trigonometry.

After leaving the Academy he was appointed Superintendent of the United States Coast Survey.

While not a great teacher, there is no doubt but what the country and Military Academy are much indebted to him for the introduction and practical use of mathematics. It is said that Hassler was the first one to teach analytic trigonometry in this country.

As acting professor of mathematics at the Academy his salary was $700 per year.

"With the academic term of 1809 ended the active services of all the heads of the several branches of instruction." * * *

1810.

"Professor Hassler, of the department of mathematics, resigned February 14, 1810, leaving the department of mathematics in charge of Capt. Alden Partridge, Corps of Engineers."

"Capt. Alden Partridge, Corps of Engineers, assistant professor of mathematics, November 4, 1806, to June 5, 1811, also from April 29, 1812, to April 13, 1813. Professor of mathematics, April 13, 1813, to September 1, 1813."

"In 1810 the Academy was deprived of nearly all means of instruction * * Officers and cadets were troubled about getting their pay. The disgraceful condition of the Academy at this period was due to the opposition of William Eustis, Secretary of War, who apparently did all in his power to crush the Academy."

Colonel Williams, after much effort, succeeded in securing the Secretary of War's approval to the following regulations:

[From Regulations United States Military Academy, 1810.]

"1. * * * no cadet shall be admitted into the Military Academy under the age of 15 or above that of 20. * * *

"3. * * * The qualifications for admission into the Academy * * * that the candidate is well versed in * * * and arithmetic." * * *

Vacations were granted annually from December 15 to March 15.

May 25, 1810, Colonel Williams also established the following internal regulations for the Military Academy:

* * * * * * *

"1. Every cadet attached to the Military Academy previous to his being considered a candidate for a commission shall have completed the following course of studies, viz:

"In mathematics he shall be required to be well versed in arithmetic, logarithms, the elements of algebra, geometry, trigonometry, mensuration, * * * planometry, stereometry, surveying, * * * conic sections."

1811-12.

During 1811 and part of 1812 the Academy practically ceased to exist as such. On March 31, 1812, the Academy was left without a single instructor or cadet.

Up to 1812 the library was very small, the apparatus incomplete, the buildings dilapidated, and the facilities for instruction inadequate. At this time "algebra, to include cubic equations, geometry, plane trigonometry, mensuration of planes and solids, and the use of instruments constituted the mathematical course. All cadets were required to obtain a thorough knowledge of this course, which was contained in the first volume of Hutton's Mathematics. Two years were generally devoted to the course in mathematics, but it varied somewhat, depending upon the previous attainments and capacity of the pupil."

1812.

In 1812 Congress passed a law relating to the Military Academy which in a great measure reorganized the institution.

[Extract from act of Congress approved April 29, 1812.]

"SEC. 2. *And be it further enacted*, That the Military Academy shall consist of the Corps of Engineers and the following professors: * * * one professor of mathematics, with the pay and emoluments of a major, if not an officer of the corps, and if taken from the corps, then so much, in addition to his pay and emoluments, as shall equal those of a major. * * *

"Each of the foregoing professors to have an assistant professor, which assistant professor shall be taken from the most prominent characters of the officers or cadets, and receive the pay and emoluments of captains, and no other pay or emoluments while performing those duties.

"* * * that the candidates for cadets be not under the age of 14, nor above the age of 21 years; that each cadet * * * shall be well versed in reading, writing, and arithmetic," * * *

Secretary Eustis did nothing to carry out the provisions of the above act.

On March 31, 1812, the Military Academy was without a single instructor.

In September, 1812, C. S. Merchant was the only cadet at West Point.

During the winter five others reported but were furloughed till April 15, 1813.

Captain Partridge is reported as "being an able, strong-willed, but eccentric man, who wanted to have his own way in everything pertaining to the Military Academy. He was a good mathematical instructor, but had little administrative ability."

The difficulties under which he labored render it impossible to decide whether or not he was responsible for the lack of development in mathematical instruction from 1809 to 1813. It seems to be thoroughly established, however, that during the subsequent four years his peculiar conduct rather retarded than advanced the interests of the Academy.

1813.

Andrew Ellicott, professor of mathematics, September 1, 1813, to August 29, 1820.

While the act of 1812 prescribes definite requirements for admission, no attention seems to have been paid to the law.

1816.

[Extract from report of De Witt Clinton, February 1, 1816.]

"In the Military Academy no previous examination is required for the admission of cadets; they are not divided into classes; a course of studies is not prescribed; nor is a final examination * * * essential." * * *

The first course of study which received the authority of the Secretary of War is given in the regulations of May 22, 1816.

[Extracts.]

* * * * * * *

"A complete course of mathematics will embrace the following branches, namely: The nature and construction of logarithms; the use of tables; algebra, to include the solution of cubic equations, with all preceding rules; geometry, to include plane and solid geometry; also ratios, * * * mensuration, plane trigonometry, with its application to surveying and measurements of heights and distances; spherical trigonometry; * * * conics, with applications to military and other projectiles; fluxions, to be taught and studied at the option of the professor and student."

Due to the opposition of Captain Partridge, the regulations of 1816 were not enforced.

Hutton's Mathematics, used by Professor Ellicott: "It was a sort of compendium of mathematics, embracing arithmetic, logarithms, algebra, geometry, trigonometry, land surveying, conics."

E. D. Mansfield states "that the curriculum for 1816 did not include fluxions, but that calculus was added to the course a year or two later."

During the first year, logarithms, algebra, and plane geometry, to include ratio and proportion, were studied, and during the second year geometry was continued to include that of planes and solids, the construction of geometrical problems, the application of algebra to geometry, the mensuration of planes and solids, plane and spherical trigonometry, and conic sections.

On December 1, 1816, the department of mathematics received much assistance in the appointment of Charles Davies as principal assistant professor of mathematics.

1817.

March 6, 1817, Prof. Claude Crozet, a graduate of the Polytechnic School of Paris, introduced the first instruction in descriptive geometry in the Military Academy, and, so far as I know, the first in this country. This instruction was oral in the beginning, and was given to a few pupils only. No text-book was then used, the demonstrations being made by the professor (using the blackboard) for the purpose of aiding his students in the study of engineering.

Professor Crozet greatly stimulated and advanced the study of geometrical mathematics in the United States. In 1821 he wrote a treatise on descriptive geometry and perspective.

During the period from 1809 to 1817 but little progress was made in the mathematical studies.

On July 28, 1817, Maj. Sylvanus Thayer was made Superintendent of the Academy. His appointment marks a new era in the history of the development of the Academy, including that of mathematical instruction.

"It was through Major Thayer's agency that Prof. Claude Crozet, the parent of descriptive geometry in America, became attached to the Academy."

"Major Thayer classified cadets according to proficiency in studies, divided classes into small sections, required weekly class reports, established more thorough recitations, with freer use of the blackboard, and improved the curriculum of studies."

1818.

The regulations approved July 22, 1818, established semiannual examinations, the first to commence on January 1, and the second on the 1st of June.

Entrance examinations were to be held from June to September 1, but candidates were examined as late as November. At this time, 1818, some candidates were assigned to advanced classes, and the classes were divided into two sections for instruction.

In June, 1818, the following alterations were made in the mathematical course: Analytical, plane, and spherical trigonometry were added to the second year's course, and descriptive geometry was transferred from the fourth to the second year.

Hutton's Conic Sections was substituted for Simpson's.

1819.

In January, 1819, classes were organized into sections according to gradation of merit. The examinations included all courses studied up to the time of the examination. Thus, in June, 1819, the first class was examined upon the entire course of mathematics.

The examinations at this time were quite thorough, for out of 120 examined in algebra January, 1819, 74 were pronounced proficient, 20 doubtful, and 26 deficient. The examinations appear to have been entirely oral, and about one day was devoted to a section of about 25.

1820.

In 1820 algebra and geometry were studied during the first year. Trigonometry, surveying, conics, descriptive geometry, and (provisionally) fluxions were studied during the second year.

Perspective, shades, and shadows were taught in the engineering course.

The following copy of a weekly class report, dated November 18, 1820, exhibits the method at that time. The scale of marking on daily recitations ranged from +3 to —3.

Class report for week ending November 18, 1820. a

[Class third.—Department of mathematics, second section.]

No.	Name.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.	Total.
1	D	3	2½	2	2	1	1½	12
2	R	3	2	2	1½	1	1½	11
3	G	3	2½	2½	2	1½	1½	13
4	C	3	½	3	2½	2½	3	14½
5	L	2	1½	1	1½	1	1	8
6	S	½	3	3	2½	2½	3	14½
7	B	3	3	3	2½	2	3	16½
8	M	½	—2	0	1	—1	0	— 1½
9	H	½	3	3	2½	2	3	15
10	K	1½	2	2	1½	2	1	10
11	T	—1	1½	1½	1	1½	1	5½

a Progress from articles 44 to 75, in Gregory's Mathematics (algebra).

EXPLANATION OF THE FIGURES AND SIGNS USED ABOVE.

Scale of merit used: Best, 3; very good, 2; good, 1; indifferent, 0; bad, —1; worst, —3. The intermediate marks, 2½, 1½, and —2, express intermediate merit.

Andrew Ellicott was born January 24, 1754, in Bucks County, Pa. Early in life he acquired scientific attainments and was employed frequently in the settlement of boundaries of the new States. In 1790 he laid out the city of Washington and determined the boundaries of the District of Columbia. He was the recipient of many honors, including a membership of the National Institute of France. He was one of the recognized leaders of science for a period of forty years.

He held the professorship of mathematics with credit till his death, August 29, 1820.

David B. Douglass, captain, Corps of Engineers, professor of mathematics, August 29, 1820, to May 1, 1823.

1821.

The general regulations for the Army, 1821, established the annual term from September 1 to July 1, with general examinations in June, in the presence of the board of visitors, by the academic board in all the branches of science and instruction through which the cadets had passed.

The superintendent was authorized to detail cadets to act as assistant professors, each to receive $10 per month for extra services.

The manner of giving instruction is indicated by the following extracts from the regulations of 1821.

* * * * * * *

59. For convenience of instruction in mathematics the third and fourth classes shall be divided separately into convenient sections, which sections shall be counted off from the mathematical merit roll of each class, respectively, in such manner that the first section shall consist of the first cadets on that roll, the second of those next in order, and so on. The first sections thus formed shall be under the immediate tuition of the professor, and each of the others of an assistant professor of mathematics, and will attend with them three hours every day in the recitation room of the section.

60. The instruction to be conveyed under each particular head of the specified course of mathematics will be proportioned in extent as well as in the manner of conveying it to the capacity of the different sections, and in conformity with this principle the following branches may be omitted in the instruction of the lower sections at the discretion of the academic board, viz: The summation of infinite series and figurate numbers, construction of logarithms, construction of trigonometrical tables and fluxions; those, together with the more profound and difficult investigations of the course generally, being reserved for the sections of the highest rank.

* * * * * * *

64. The professors of mathematics, natural philosophy, and engineering, in order to ascertain the proficiency of the sections intrusted immediately to their assistants and the manner in which they have performed their duty, shall occasionally, and in rotation, when there are more than two sections, instruct the sections intrusted to the assistants, the period for which will be fixed by the academical staff and reported to the War Department, and the assistant professor, when the professor has his section under his instruction, shall take charge of the section usually under the instruction of the latter. Lectures or such portions of the studies as are most suitable to them may, with the assent of the superintendent, be substituted in lieu of the usual mode of instruction.

* * * * * * *

76. Each cadet, previously to his being admitted a member of the Military Academy, must be able to read distinctly and pronounce correctly, to write a fair, legible hand, and to perform with facility and accuracy the various operations of the four ground rules of arithmetic, both simple and compound, also of reduction, of single and compound proportion, and of vulgar and decimal fractions.

The hours allotted to the study of mathematics were from sunrise to 7 a. m., 11 a. m. to 12 m., and one-half hour past sunset to 9.30 p. m. The time from 8 to 11 a. m. was employed in mathematical instruction.

The following is a detailed programme of the course in mathematics:

[Extract from staff records.]

* * * * * * *

VII. DETAIL OF INSTRUCTION, HAVING REFERENCE TO THE DIFFERENT SECTIONS.

First mathematics.

Algebra.—Fundamental operations; involutions and evolutions; reduction and conversion of practical and surd quantities; reduction and solution of equations, to include those of the third degree; ratios and proportions; summation of infinite series and figurate numbers; nature and construction of logarithms.

Geometry.—Plane and solid geometry, and the construction of geometrical problems; application of algebra to geometry; practical geometry on the ground; mensuration of planes and solids.

Trigonometry.—The solution of all the various cases of plane and spherical triangles; spherical projections; the analytical investigation of trigonometrical principles and the construction of tables.

Surveying.—The principles of common and trigonometrical surveying; measurement of heights and distances; the actual use in the field of the various instruments employed in surveying; different methods of plotting surveys, and the use of mathematical instruments.

Conic sections.

Descriptive geometry.—The solution of geometrical problems, generally by the graphical method, and the application of this method to spherical trigonometry.

Fluxions.—The direct and inverse method of fluxions; its application to maxima and minima; the drawing of tangents; rectification of curves; radii of curvatures, quadratures, cubatures, etc.

The instruction under each particular head of the course of mathematics, as thus specified, will be proportioned, in extent and in the manner of conveying it, to the rank and capacity of the different sections, the more profound investigations generally, and the following entire subjects being reserved for the higher sections only, viz: Summation of infinite series and figurate numbers, construction of logarithms, construction of trigonometrical tables, and the whole course of fluxions.

In 1821 Biot's application of algebra to geometry was introduced as a class book.

1823.

In 1823 I find that the following text-books were in use: The Cambridge Trigonometry, Legendre's Geometry (translation), Laeroix's Algebra (translation), Sganzin's Course of Construction, Garnier's Analytic Geometry. The use of Hutton's Mathematics was discontinued.

Professor Douglass was a scientist of a high order, a man of great character, and a good mathematician. His influence was always for better discipline and a high standard in educational methods. On May 1, 1823, he was appointed professor of engineering.

Charles Davies, professor of mathematics, May 1, 1823, to May 31, 1837.

1824.

In 1824 a translation of Lacroix's Trigonometry was used.

To indicate the standard of requirements at this date, we have the fact that out of 100 who entered at that date but 24 graduated.

Descriptive geometry was mainly taught by lectures; notes were taken by the pupils on one day, and drawings made before the next lecture. The work by Crozet was also in use.

In 1824 Biot's Analytical Geometry, in French, was used, and Lacroix's Calculus for the higher sections.

1825.

[From United States Army Regulations, 1825.]

* * * * * * *

Par. 1370. For instruction in mathematics the third and fourth classes shall be separately divided into convenient sections, which sections shall be counted off from the mathematical merit roll of each class, respectively, in such manner that the first section shall consist of the first cadets on that roll, the second of those next in order, and so on. The first section thus formed shall be under the immediate tuition of the professor, and each of the others of an assistant professor of mathematics.

Par. 1371. The instruction in each particular branch of the course of mathematics will be proportioned to the capacity of the different sections; the more profound and difficult investigations of the course, generally, being reserved for the higher sections.

* * * * * * *

Par. 1347. The complete course of mathematics will comprehend:

Algebra.—Fundamental operations; involutions and evolutions; reduction and conversion of fractional and surd quantities; reduction and solution of equations, to include those of the third degree; ratios and proportions; summation of infinite series and figurate numbers; nature and construction of logarithms.

Geometry.—Plane and solid geometry and the formation and construction of determinate geometrical equations.

Trigonometry.—The solution of all the various cases in plane and spherical trigonometry; spherical projections; analytical investigation of trigonometrical formulæ and the construction of tables.

Surveying.—Mensuration of planes and solids; principles and practice of common land surveying, different methods of platting and calculating such surveys, and the use of mathematical instruments. Also trigonometrical surveying and measurement of heights and distances, together with the use of the instruments usually employed therein.

Descriptive geometry.—The graphic illustration and solution of problems in solid geometry generally, and the particular application of this method to spherics and conic sections.

Perspective.—The theory and use of linear perspective, shades, and shadows.

Analytical geometry.—The construction and analysis of linear and superficial loci, particularly for equations of the first and second order.

Fluxions.—The direct and inverse methods of fluxions; its application to maxima and minima; the drawing of tangents; rectification of curves, radii of curvatures, quadratures, cubatures, etc.

The text-books in use at this time were:

First year.—Algebra: Complement des Elemens d'Algebre, par Lacroix; Lacroix's Elements of Algebra. Geometry: Legendre. Trigometry: Translation from Lacroix, from Lacroix & Bezout, by Professor Farrar.

Second year.—Descriptive geometry, conic sections: Crozet's Treatise on Descriptive Geometry and Conic Sections. Perspective, shades, and shadows: Crozet's treatise on same. Analytical geometry: Biot. Fluxions: Traité du Calcul, par Lacroix.

1828.

At the head of the graduating class of July 1, 1828, stood Cadet Albert E. Church, who was destined for a long and successful career in the department of mathematics in this Academy. From August 31, 1828, to August 28, 1831, he served as assistant professor of mathematics.

1831.

In 1831 Lieut. Edward C. Ross, then assistant professor of mathematics, translated M. Bourdon's Algebra, which was adopted as the text-book on that subject. This translation became the foundation of the subsequent Davies's Bourdon.

About this time Prof. Charles Davies began writing a series of mathematical text-books, which were adopted from time to time as they appeared. By 1839 all of the mathematical text-books in use at the Academy were works of Davies.

The relative weight given to the different subjects in forming the general merit roll of each class is represented by the following numbers:

FIRST CLASS.

Conduct	3	Infantry tactics	2
Engineering	3	Artillery	1
Mathematics	3	French	1
Natural philosophy	3	Drawing	1
Chemistry and mineralogy	2		
Rhetoric and moral and political science	2		

SECOND CLASS.

Natural philosophy	3	Drawing	1
Chemistry	1		

THIRD CLASS.

Mathematics	3	Drawing	½
French	1		

FOURTH CLASS.

Mathematics	2	French	1

MANNER OF GIVING INSTRUCTION.

[Extract from Regulations United States Military Academy, 1831.]

* * * * * * *

44. For instruction in mathematics the third and fourth classes shall be separately divided into convenient sections, which sections shall be counted off from the mathematical merit roll of each class, respectively, in such manner that the first section shall consist of the first cadets on that roll, the second of those next in order, and so on. The first section thus formed shall be under the immediate tuition of the professor, and each of the others of an assistant professor of mathematics. The instruction in each particular branch of the course of mathematics will be proportioned to the capacity of the different sections; the more profound and difficult investigations of the course generally being reserved for the higher sections.

* * * * * * *

55. Every assistant instructor or teacher having the immediate charge of one or more sections of a class shall keep daily notes of its or their progress and the relative merit, and at the end of each week shall report thereon to the head of the

department to which he belongs. The reports thus made shall be rendered to the superintendent by the head of each department with such further explanations as may be necessary to show the relative progress of the sections, and he will at the same time recommend all the transfers which are to be made from one section of the class to another.

COURSE IN MATHEMATICS AT THE MILITARY ACADEMY, 1832.

Second year, third class.—Fluxions, Lacroix; analytical geometry, Biot; perspective—shades and shadows, Davies; mensuration, Davies.

* * * * * * *

First year, fourth class.—Trigonometry, Legendre; descriptive geometry, Davies; geometry—plane and solid, Legendre; algebra, Bourdon, translated by Lieutenant Ross.

* * * * * * *

1833.

On October 28, 1833, Lieut. Albert E. Church, who had been absent from the Academy since August 28, 1831, was again placed on duty in the department of mathematics as principal assistant professor of mathematics.

On July 1, 1833, Col. Sylvanus Thayer was relieved and Maj. R. E. De Russy took command.

"Under Thayer's management mathematics advanced from Hutton's Elements to a complete course of algebra, geometry, plane and spherical trigonometry, descriptive geometry (including shades and shadows, and perspective), surveying, use of instruments, analytical geometry, and the calculus."

[Extract from report on Military Academy by Committee on Military Affairs, May 17, 1834.]

"Mathematics is the study which forms the foundation of the course. This is necessary, both to impart to the mind that combined strength and versatility, that peculiar vigor and rapidity of comparison necessary for military action, and to pave the way for progress in the higher military sciences. All experience shows that the mind, in order that it may act with efficiency, must be accustomed to exertion. It should be taught gradually to develop its own powers, and as it slowly learns their capacity and the manner of employing them, the increasing lights which are thrown upon its course will enable it to go on for an unlimited extent in the path of improvement. Algebra and geometry, and the application of algebra to geometry, form the studies of the first year. The text-books used are generally from the French mathematicians. The French claim the high honor of having introduced a revolution into all the branches of this science, and of having substituted analysis for the Newtonian method of investigation.

"Descriptive geometry is also studied during this year. This is a science peculiarly necessary in civil and military engineering, and which has been nowhere else cultivated with advantage or assiduity, save in France. The foundation for analysis is well laid by the study of that prince of algebraists, Bourdon.

"The course of the second year extends to the higher branches of mathematics, to the theory of curves, and to the differential and integral calculi. In these branches the works of those illustrious authors, Biot and Lacroix, are employed."

1835.

In 1835 paragraph 55, United States Military Academy Regulation, was changed to read practically the same as paragraph 52 of the present regulations, and I infer that previous to this time transfers from section to section were not made weekly.

1837.

Prof. Charles Davies entered the Military Academy in December, 1813, and graduated in December, 1815. From 1816 to 1821 he was principal assistant professor of mathematics, and from May 1, 1823, to May 31, 1837, he was professor of mathematics.

For a period of twenty-one years Professor Davies was closely identified with the Military Academy, and gave his best years to its advancement. In 1826 he wrote a text-book on descriptive geometry.

He did much to systematize and classify the methods of instruction in the Military Academy. Owing to the fact that no good series of mathematical text-books existed, he began, about 1830, to devote himself to their preparation.

He first wrote his geometry, which was based upon Legendre's, and followed it with his algebra, taking Bourdon as his standard. These two works, revised and modified from time to time, have been continued to the present as text-books in this Academy.

Professor Davies also wrote text-books on trigonometry, surveying, descriptive geometry, analytic geometry, calculus, and arithmetic. In all, he produced more than 20 different volumes, which were for many years the standard text-books in this country.

He was a great teacher and a pioneer author of elementary mathematics. He, more than any other of his time, influenced the development of mathematical instruction in this country.

According to Professor Church, who was closely associated with him, "Professor Davies was an enthusiastic, energetic, clear, logical demonstrator, and an admirable teacher."

Albert E. Church was professor of mathematics from June 1, 1837, to March 30, 1878.

1839.

The following detailed programme by Professor Church of the mathematical course taught and text-books in use at the Military Academy 1839 and 1840 gives a complete description of the course at that time:

Programme of the course of mathematics as taught at the United States Military Academy, 1839 and 1840.

ALGEBRA.

[Text-book, Davies' Bourdon.]

1. Preliminary definitions, explanations, and uses of the different algebraic signs symbols, and terms; mode of reducing similar algebraic expressions.

2. Addition of algebraic quantities, with numerous examples.

3. Subtraction of algebraic quantities; transformations of polynomials, with practical examples.

4. Multiplication of algebraic quantities, both monomial and polynomial, with examples; examination of the product of homogeneous polynomials; greatest and least number of terms in the product of two polynomials; formation of the square of the sum or difference of two quantities and of the product of the sum by the difference; decomposition of quantities into factors, with examples.

5. Division of algebraic quantities, both monomial and polynomial, with applications; mode of indicating the division when not possible and of reducing the result to its simplest form, with examples; value of the expression a^0; demonstration of the possibility of dividing the difference of two similar powers of two quantities by the difference of the quantities.

6. Explanation and classification of algebraic fractions; manner of reducing them to simplest form; theory and use of the greatest common divisor; rules for reduction, addition, subtraction, multiplication, and division of fractions, with examples; discussion of the result obtained by adding the same quantity to both terms of a fraction.

7. Definition and classification of equations; explanation of the different transformations of equations of the first degree, with examples; solution of equations of the first degree with one unknown quantity, with examples both literal and numerical; explanation of the manner of forming the equation of a problem from express or implied conditions, with applications to numerous questions; explanation of the three principal modes of elimination, and application to the solution of equations containing two or more unknown quantities; distinction between determinate and indeterminate quantities.

8. Theory of negative quantities discussed and illustrated by several problems; explanation of the symbols $\frac{A}{0}$, $\frac{0}{A}$, and $\frac{0}{0}$; discussion of particular examples which reduce to form $\frac{0}{0}$ without being indeterminate.

9. Of inequalities and of the different transformations which can be performed upon them, with examples.

10. Demonstration of the law of formation of the square, and thence the rule for the extraction of the square root of numbers; rules for approximating to the square roots of imperfect powers, whether entire or fractional, to within less than a given quantity, with applications; explanation of the terms incommensurable, irrational, and surd.

11. Extraction of the square root of algebraic quantities first applied to monomials; demonstration of the principle that the square root of a product is equal to the product of the square roots of the several factors; explanation of imaginary quantities; demonstration of the law of formation for the square of any polynomial, and

thence the rule for the extraction of the square root of polynomials, with applications; radicals and their classification into degrees; similar radicals; rules for adding, subtracting, multiplying, and dividing radicals of the second degree, with applications; explanation of important transformations of radicals of the second degree.

12. Equations of the second degree with one unknown quantity; their classification and mode of solution, with applications; explanation of the roots of an equation of the second degree, their properties; division of first member of an equation into factors, with the general and complete discussion of the four forms of equations of the second degree; application of this discussion to the "problem of the lights."

13. Mode of estimating the degree of equations containing two unknown quantities; solution of some equations of the second degree of this kind; explanation of, and means of solving trinomial equations.

(*o*) 14. Mode of extracting the square root of trinomials of the form of a $\pm\sqrt{O}$, with examples.

15. Application of preceding principles to the solution of many equations, and questions depending upon equations of the second degree, containing one or two unknown quantities. Remark: Some of the equations and questions referred to in this paragraph being difficult, the lower sections of the class are not required to solve them.

16. Definition and theory of arithmetical proportions and progressions. Determination of the formulas expressing any term, the sum of the terms, and the common difference in both increasing and decreasing progression. Mode of inserting any number of arithmetical means between two quantities.

17. The same with reference to geometrical proportions and progressions.

18. Demonstration of the law for the formation of the product of any number of factors of the form $(x-a)\ x-b-$, etc. Explanation of the theory of permutations, arrangements, and combinations, with its application to the demonstration of the binomial theorem for the formation of any power of a binomial; consequences of the binomial formula.

19. Demonstration of the law of formation of the cube of a number, and thence the rule for the extraction of the cube root with applications; the same extended to any power and root of a number; mode of simplifying the extraction of roots of the higher degrees; mode of approximating to the roots of imperfect powers whether entire numbers, vulgar or decimal fractions, to within less than a given quantity, with numerical examples.

20. Manner of forming the powers and extracting the roots of any degree of algebraic monomials; demonstration of the law for the formation of the cube of any polynomial and thence the rule for the extraction of the cube root of a polynomial; the same extended to any power of root of a polynomial, with examples.

21. Manner of simplifying and reducing radicals of any degree; of adding, subtracting, multiplying, and dividing them; also the formation of their powers and extraction of their roots; discussion of the different roots of a quantity and particularly of the roots of unity.

22. Theory of exponents, with rules for multiplying, dividing, formation of the powers, and extraction of the roots of quantities affected, with any exponents.

(*o*) 23. Euler's demonstration of the binomial theorem in the case of any exponent.

24. Explanation of conveying and diverging series, with the means of approximating to the sum of the former kind in certain cases.

25. Theory of indeterminate coefficients and development of functions by means of them.

(*o*) 26. Explanation and formation of recurring series.

(*o*) 27. Explanation of continued fractions, with rules for approximating to their value, and determining the degree of approximation; resolution of exponential equations.

28. Complete theory of logarithms; explanation of manner of using them in multiplying, dividing, forming the powers and extracting the roots of numbers; formation of logarithmic series and explanation of mode of calculating tables of logarithms.

(*o*) 29. General theory of equations; their properties; number and nature of their roots; division into factors of different degrees; their transformations and composition; complete theory of the common divisor and its application, elimination, and the determination of final equations; formation of derived polynomials; mode of determining, and discussion of the equal roots of equations.

(*o*) 30. Resolution of numerical equations of the higher degrees, determination of the limits of their roots; Newton's method of finding the smallest limit in active numbers; demonstration of Descarte's rule for ascertaining the greatest number of positive and negative roots, properties of and mode of determining the commensurable roots of numerical equations; Newton's method of approximating to the real incommensurable roots when they differ from each other by at least unity.

GEOMETRY.

[Text-book, Davies' Legendre.]

1. Preliminary definitions; explanation of the different kinds of plane geometrical figures, of the terms and symbols used.

2. Demonstration of the geometrical properties of the right line; the conditions of equality in angles and triangles and their properties; of the isosceles triangle; of perpendicular and parallel lines; leasure of the sum of the interior and exterior angles and triangles of polygons; properties of parallelograms.

3. Explanation of ratios and proportions, with their properties.

4. Definition of the circle and its different parts; their properties and connection; nature of a tangent to a circle; conditions that two circles intersect or be tangent; measurement of and mode of comparing angles, of inscribed angles.

5. Solution of problems relating to the right line and circle, including method of drawing perpendiculars; geometrical construction of triangles and parallelograms; division of angles; inscribing and circumscribing circles in and about triangles; construction of tangent line to the circle; determination of the numerical ratio of two right lines, arcs or angles, etc.

6. Definition and nature of similar figures; equivalent and equal figures; conditions that parallelograms contain equal arcs; relation between parallelograms and triangles of same base and altitude; proportions of different rectangles; determination of the measure of the area of the rectangle, parallelogram, triangle, and trapezoid of the square described upon the sum or difference of two lines; of the rectangle upon the sum and difference; relation of the squares described upon the sides of a scalem triangle; same with respect to the right-angled triangle; properties of similar triangles; conditions for similar triangles; general properties of the right-angled triangle; proportions of similar figures in general; properties of chords and secants.

7. Solution of problem depending upon the preceding principles, including division of right line into proportional parts; construction of mean proportions; third and fourth proportions; construction of squares which shall be equivalent to given figures; construction of similar figures.

8. Regular polygons and their properties; manner of circumscribing them about and inscribing them in a circle; measure of their angles and area when similar; relation between them when inscribed in the same circle, or circumscribed about it; measure of the area and length of the circumference of a circle; also the area of circular sectors; proportions of circles and their circumferences; calculation of the approximate ratio of the diameter to the circumference of a circle.

9. Properties of the plane; definition; condition of equality and mode of comparing solid angles; construction of perpendicular to a plane; theories relating to the intersection of planes; of parallel planes; equality of plane angles when not in the same plane; limits of the sum of the plane angles forming a solid angle.

10. Definitions of polyhedrons, different kinds; consequences of their intersection by planes; regular polyhedrons; measure of the convex surface of a regular pyramid and frustrum; measure of the solidity of any prism; relation between prisms and pyramids having same base and altitude; measure of surface of right prisms; proportions of parallelopipedons, when equivalent; measure of their solidity; measure of the solidity of pyramid and of any polyhedron; comparison of similar prisms and pyramids.

11. Definition of properties and mode of generating the three round bodies; measure of the convex surface and solidity of a cylinder; same with respect to a cone and frustrum; relation between similar cylinders and cones; intersection of spheres by planes; position of tangent plane to sphere; measure of the surface generated by a regular semipolygon revolved about a fixed axis and its application to the determination of the measure of the surface of a sphere and zone; measure of solid generated by a triangle revolving about a fixed axis, and thence of the solid generated by a regular semipolygon and the application to the determination of the measure of the solidity of a sphere; comparison of the surfaces and solidities of sphere and circumscribed cylinder; measure of the solid generated by a circular segment revolving about a fixed axis; measure of a spherical segment.

12. Definition of spherical triangles and polygons; their properties, conditions for equality; limits of the sum of their angles and the measure of their area; polar triangles and their properties; spherical lune and its measure; spherical pyramid and wedge; construction of regular polyhedrons.

13. Numerous applications of algebra to the solution of geometrical problems.

Remark: The lower sections are required to solve but a portion of these problems.

PLANE TRIGONOMETRY.

[Text-book, Davies's Legendre.]

1. Its object; manner of dividing the circumference; explanation of the different trigonometrical lines employed and discussion of their value and algebraic signs for different values of the arc.

2. Formulas expressing the value between the sine, cosine, and radius; the value of the tangent, cotangent, secant, and cosecant; the relation between the tangent, cotangent, and radius.

3. Formulas expressing the value of the sine and cosine of the sines and difference of two arcs, of the sine and cosine of a double arc, of the sine and cosine of half an arc, of the sum and difference of the sines of two arcs; the same with reference to the cosines of the product of the sine and cosine, sine and sine, etc., of two arcs, of the square of the sine, cosine, tangent, and cotangent of half an arc, of the tangent of the sum and difference of two arcs, of the tangent of a double arc, triple arc, etc.

4. Various other formulas expressing a relation between the sum and difference of the sines and cosines of two arcs, and the sine, cosine, tangent, etc., of one-half the sum or difference of the same.

5. Explanation of the mode of calculating a table of natural sines, cosines, etc.

6. Explanation of the construction and manner of using the common table of logarithms, logarithmic series, tangents, etc.

7. Demonstration of the principles for the solution of all cases of rectilineal triangles, both right-angled and oblique.

8. Explanation of the arithmetical complement of a logarithm and its use, with the calculation of numerous triangles, including examples of every case by the aid of logarithms.

SPHERICAL TRIGONOMETRY.

[Text-book, Davies's Legendre.]

1. Its object; relation of the sine of the angles to the series of the opposite sides; formulas expressing the value of R′ into the cosine of a side or angle, of the sine and cosine of half an angle in terms of the sides, of the cosine of half a side in terms of the angles, of the cotangent of one side into the sine of another; demonstration and use of Napier's analogies.

2. Napier's circular parts and demonstration of his rules for the solution of right-angled spherical triangles; application of logarithms to the solution of examples of right-angled and quadrantal triangles.

3. Explanation of the mode of solving all cases of oblique-angled triangles, with practical examples in each case.

4. Applications of the principles of geometry and trigonometry to the mensuration of the different geometrical surfaces and solids (a portion of which are not required of the lower sections).

DESCRIPTIVE GEOMETRY.

[Text-book, Davies.]

1. Its objects and its principles; manner of representing magnitudes on the planes of projection; solution of the principal problems on the right line and plane.

2. Classification of lines; definition and nature of a tangent line.

3. Mode of generation and classification of curved surfaces; of surfaces of revolution; mode of representing surfaces; definition, nature, and properties of tangent planes.

4. Construction of tangent planes to the single curved surfaces of shortest distance between two straight lines.

5. Construction of tangent planes to spheres and surfaces of revolution. Remark: Two of the most complicated methods referred to are not required of the lower sections.

6. Construction of the intersection of curved surfaces and planes applied to the intersection of cylinders and surfaces of revolution by oblique planes; construction of tangent line to the curves of intersection; development of surfaces with application to cylinder and right cone with circular base.

7. Intersection of curved surfaces in general and mode of constructing tangent line to the curve of intersection; applied to intersection of two cylinders and surfaces of revolution, to intersection of oblique cone and sphere with the development of the cone; intersection of two cones.

(*o*) 8. Application of preceding principles to the construction of several practical problems; also to the construction of spherical triangles.

9. Spherical projections; first principles of orthographic projections; mode of projecting circles; construction of the projection of the sphere on the planes of the equinoctial colure equator and horizon.

10. Principles of stenographic projections; mode of projecting circles, their poles and tangents; construction of the stenographic projection of the sphere on the equator, etc.

11. Nature, modes of generating, classification, and manner of representing warped surfaces; construction of elements; conditions that warped surfaces be tangent to each other along an element.

(*o*) 12. Properties of the conoid; hyperbolic paraboloid and hyperboloid of one nappe.

13. Construction of tangent planes to warped surfaces.

(*o*) 14. Construction of tangent plane through a right line to any surface of revolution, and of right line to a curve.

(*o*) 15. Construction of the intersection of hyperboloid of revolution of one nappe with oblique plane.

SHADES, SHADOWS, AND PERSPECTIVE.

[Text-book, Davies.]

1. First principles of shades and shadows.

2. Applications to the mathematical construction of the shades and shadows, of the right line, the abacus and pillar, the house, the cylinder, the rectangular abacus and column; shadow of cylindrical abacus on a vertical wall; shade and shadow of inverted frustrum of a cone, of a sphere, of an ellipsoid, of the niche; shade on the torus.

3. Mode of constructing the brilliant points of surfaces.

(*o*) 4. The construction of the lines of shade and shadow on a surface of revolution.

(*o*) 5. Of the properties of the helicoid and its tangent plane.

(*o*) 6. The construction of the lines of shade and shadow on the screw.

7. Object of perspective; preliminary principles; direct method of constructing the perspective of bodies, applied to a cube.

8. Method of constructing the perspective of point by means of diagonals and perpendiculars; application to the construction of the perspective of four cubes with their shadows, of four pyramids, of a circle, of a cylinder, frustrum of inverted cone; niched sphere and groined arch, with their shadows, etc.

(*o*) 9. The construction of the perspective of a house, with its shades and shadows.

10. Mode of constructing Mercator's chart; panoramic views, etc.

11. The drawing in right lines of most of the problems above referred to.

SURVEYING.

[Text-book, Davies's Surveying.]

1. Description and mode of using the different instruments for drawing and laying off lines and angles; construction of practical problems.

2. Object of surveying; plane surveying; preliminary definitions.

3. Mode of measuring and calculating lines and angles, including the description of the chain, tape, etc.; the manner of adjusting and using the theodolite.

4. Application of principles to the measurement of heights and distances.

5. Methods of determining distances with the tape or chain only.

6. Description and use of the surveying cross.

7. Mode of measuring the area of ground, of laying out and dividing land.

8. Description and use of the surveyor's compass; manner of making notes on the field; different methods of platting the survey; calculation of the area by means of the traverse table, and double meridian distances; use of effects; method of supplying errors in field notes; mode of calculating the area by the use of a table of natural sines.

9. Description of the mode of surveying the public lands.

10. Practical modes of determining the variation of the compass.

11. Description and use of the plane table.

12. Description, manner of adjusting, and use of the level; determination of the difference of level between any two points on the earth's surface.

13. Method of surveying for the purpose of showing the contour of a piece of ground; mode of representing the horizontal curve of intersection by planes.

14. General description of the object and mode of surveying a harbor; method of triangulation.

ANALYTICAL GEOMETRY.

[Text-book, Davies.]

1. Object and preliminary definitions; mode of representing quantities by algebraic symbols; construction of algebraic expressions; of the roots of the equation of the second degree.

2. Mode of solving determinate problems, applied to several examples.

(*o*) 3. Division of right line into extreme and mean ratio.

4. Object and nature of indeterminate geometry; nature of equations of lines and points; object and position of coordinate axes; construction of lines by means of their equations; determination and discussion of the equation of the right-line; measure of angle between two right lines with conditions that they be perpendicular or parallel; mode of determining the intersection of lines.

5. Object of transformation of coordinates and deduction of the formulas used in all cases for lines in a plane; nature and use of the system of polar coordinates, with the formulas for transformation.

6. Classification of lines; determination and discussion of the equations of a circle; nature and position of its supplementary chords; determination of the equations of its tangent and normal; determination and discussion of its polar equation.

7. Definition of ellipse; determination and discussion of its equations and properties; explanation of the different modes of constructing it; position, properties, and construction of its foci; properties of its supplementary chords; determination and discussion of the equations of its tangent and nomial; different modes of constructing its tangents; nature and properties of its conjugate diameters; its equation when referred to them as axes, and manner of constructing them; determination and discussion of its polar equation; measure of its area.

8. Definition of the parabola; determination and discussion of its equation; its properties and modes of construction; position and properties of its focus; the determination of the equation of its tangent and normal; modes of constructing its tangents; determination and discussion of its equation when referred to oblique axes; position, properties, and mode of constructing its diameters; determination and discussion of its polar equation; measure of its area.

9. Nature and properties of the hyperbola; determination and discussion of its equations; mode of constructing it; properties of its supplementary chords; equations of its tangent and normal; modes of constructing its tangents; determination and discussion of its equation when referred to its conjugate diameters; their properties and construction; nature and mode of constructing its asymptotes; their properties; determination and discussion of its equation when referred to them as axes; determination and discussion of its polar equation.

10. Determination and discussion of the particular equation which represents the conic sections when referred to their principal vortex.

(*o*) 11. Discussion of the general equation of the second degree between two variables; classification of and analytical conditions for the curves represented by it; determination of their limits; modes of construction, points in which they intersect the axes of coordinates; their particular cases; discussion of numerical examples.

12. Nature and properties of centers and diameters; determination of the form of the equation of the second degree when referred to them.

13. Mode of representing points and lines in space; the equations of a point; determination and discussion of the equations of a right line in space; measure of angle between two lines and conditions that they be parallel or perpendicular.

(*o*) 14. Determination of condition which causes two right lines to intersect; determination of the intersection of two curves.

15. Determination and discussion of the equations of a plane and its traces.

(*o*) 16. Mode of determining the intersection of planes and surfaces; measure of angle between two planes; conditions that they be parallel; properties of line and plane; numerical examples.

(*o*) 17. Transformation of coordinates in space; determination of the proper formulas used; nature of polar coordinates in space with formulas for transformation.

(*o*) 18. Classification of surfaces; determination and discussion of the equation of the sphere and of its tangent plane, of the cylinder and cone; equation of the intersection of the cone and plane determined and discussed; equations of surfaces of revolution.

(*o*) 19. Discussion of general equation of second degree between three variables; classification of the surfaces represented by it; their centers and center planes; equations of their tangent planes; their modes of generation.

CALCULUS.

[Text-book, Davies.]

1. Nature and classification of functions; definition of a general rule for obtaining the differential and differential coefficient of a function; demonstration of particular rules for differentiating algebraic functions and obtaining the differential coefficient of an implicit function, with examples.

2. Mode of obtaining successive differentials; demonstration and application of Taylor's and McLaurin's theorems with examination of their failing cases.

3. Particular rules for differentiating exponential, logarithmic, and circular functions and applications to examples (the more difficult of which are not required by the lower sections); developments of arcs and their functions with explanation of their use in calculating tables of natural sines. etc., and ratio of diameter to the circumference of a circle.

4. Nature of partial differentials and differential coefficients of a function of any number of variables; mode of obtaining differential equations.

(*o*) 5. Differentiation of any function of any number of variables; development into a series of any function of two variables; manner of eliminating constants from an equation and its differential equation, being the terms of an equation of exponents.

6. Demonstration of the rules for determining the value of vanishing fractions, with examples.

7. Complete discussion of the maxima and minima; states of a fraction of one variable, with rules for determining them, with applications (the more difficult of which are not required of the lower sections).

8. Application of the differential calculus to the determination of the general equations of a tangent and normal with application to particular curves; determination of the differential of an arc and area; use of the second differential coefficient in determining the position of a curve with reference to the axis of abcissas.

(*o*) 9. Mode of ascertaining and constructing the asynoptotes of curves, applied to the conic sections.

(*o*) 10. Characteristics and mode of constructing the singular points of curves.

11. Conditions and modes of ascertaining when two curves have any contact; determination of the equations of orculatory curves; properties and use of the orculatory circle; measure of the curvature of curves; properties, mode of construction, and determination of the equation of evolutes.

12. Transcendental curves; discussion of the equation and properties of the logarithmic curve; determination of the equations of the cycloid and its evolute and their properties.

(*o*) 13. Discussion of the equations and properties of spirals.

(*o*) 14. Determination of the equation of a tangent plane to any surface.

15. The object of the integral calculus; determination of rules for integrating simple monomial differentials; discussion of the arbitrary constant; integration of particular binomials and of the differentials of logarithms and circular functions.

16. Mode of integrating by series; applied to numerous examples.

17. Conditions for the integrability of binomial differentials; integration by parts, and determination of formulas for reducing binomial differentials (three of which are not required of the lower sections).

18. Integration of all cases of rational fractions with examples (the more difficult of which are not required of the lower sections).

19. Integration of irrational fractions composed of monomials; and of expressions containing $\sqrt{a\,x\,bx\,x\,cx}$ with applications (the most difficult of which are omitted for the lower sections).

20. Application of the calculus to the rectification of plane curves; to the quadrature of curves; to the determination of the area of surfaces of revolution and the cubature of solids of revolution (a portion of those applications are not required of the lower sections).

(*o*) 21. Nature of double integrals, and their application to the determination of a general expression for the cubature of any solid applied to the sphere.

General remark.—The whole course as detailed above is required of the higher sections of the third and fourth classes, while the subjects referred to in the paragraphs marked thus, (*o*) are not required of the lowest, in accordance with paragraph 45, academic regulations. The intermediate sections are required to learn such portions marked (*o*) as they can without interfering with the other more important parts.

1843.

The following is the answer of the academic board in regard to certain objections to the course of instruction made by a board of officers, of which Major-General Scott was president, appointed in 1843 to inspect and report upon the United States Military Academy: "The academic board believe that one of the most important

objects of the Academy is to subject each cadet, previous to his promotion to a higher grade in the Army, to a thorough course of mental as well as military discipline, to teach him to reason accurately, and readily to apply right principles to cases of daily occurrence in the life of a soldier. They are satisfied that a strict course of mathematical and philosophical study, with applications to the various branches of military science, is by far the best calculated to bring about this end, and that the present scientific course at the Academy, the result of the experience of many years, is in its main features such a course. They are aware that many of the cadets, as is the case with most of those who pursue a scientific course at other institutions, will have little occasion to make practical applications of the many mathematical formulæ with which they meet, and that they may have passed over particular problems without thoroughly understanding their meaning in all their points; still, if the course has been carefully taught, the reasoning faculties will have been strongly exercised and disciplined and a system and habit of thought acquired which are invaluable in the pursuit of any profession, and as desirable for the infantry or dragoon officer as for any other officer in service. The officer whose mind has thus been disciplined, and who is not forgetful of the duty which he owes to the Government that has furnished him with opportunities so valuable, will acquire facts and information in whatever station the interests of the service may place him. The discipline and system he will acquire at an early age only, and nowhere so well as during his term of service at the Academy."

While it is always possible to improve the curriculum of this or any other institution, the objection to which the above is an answer is one that is constantly raised by those who have had little or no experience in the development of the mental faculties of youth. It would be well to have the above statement printed for the information and instruction of those well-meaning but narrow-minded friends of the Military Academy who always desire a practical equivalent for each mental effort.

These same debit and credit mental protectors read of those who, hundreds of years before Christ, raised exactly the same objections to the geometrical teachings of Pythagoras and Euclid, without realizing that a hand glass would exhibit to them fair likenesses of their ancient prototypes.

The course of instruction and the text-books in mathematics remained practically the same from 1839 till 1843, when Church's Calculus was substituted for Davies's.

1852.

In 1852 Church's Analytical Geometry replaced Davies's.

1855.

In 1855 the mathematical course was arranged and distributed as follows:

First year, fifth class.—Algebra, Davies' Bourdon; geometry, Davies' Legendre; trigonometry, Davies; descriptive geometry, Davies.

Second year, fourth class.—Algebra, Davies' Bourdon; geometry, Davies' Legendre; trigonometry, Davies; descriptive geometry, Davies.

Third year, third class.—Shades, shadows, and perspective, Davies; spherical projections and warped surfaces, Davies; surveying, Davies; analytical geometry, Church; calculus, Church.

1856.

COURSE OF STUDIES IN MATHEMATICS AT THE UNITED STATES MILITARY ACADEMY.

First year, fifth class.—Same as in 1855.

Second year, fourth class.—Descriptive geometry, Davies; shade, shadows, and perspective, Davies; spherical projections and warped surfaces, Davies; surveying, Davies; analytical geometry, Church; calculus, Church.

Third year, third class.—Descriptive geometry, Davies; shades, shadows, and perspective, Davies; spherical projections and warped surfaces, Davies; surveying, Davies; analytical geometry, Church; calculus, Church.

1857.

COURSE OF STUDIES IN MATHEMATICS AT THE UNITED STATES MILITARY ACADEMY.

First year, fifth class.—Algebra, Davies' Bourdon; geometry, Davies' Legendre; Trigonometry, Davies' Legendre; descriptive geometry, Davies.

Second year, fourth class.—Descriptive geometry, Davies; shades, shadows, and perspective, Davies; spherical projections and warped surfaces, Davies; surveying, Davies; analytical geometry, Church; calculus, Church.

1860.

The following report made by Prof. Albert E. Church, in 1860, to a commission appointed to examine into the organization * * * course of instruction of the United States Military Academy at West Point, of which Hon. Jefferson Davis was president, contains a thorough description of the course in mathematics at that period and the methods employed:

UNITED STATES MILITARY ACADEMY, *July 31, 1860.*

SIR: In accordance with the request contained in your note of July 18, I have the honor to submit the following replies to the questions proposed by the commission instituted by the act of Congress of June 21, 1860:

I. The subjects taught in my department are algebra, geometry, trigonometry, mensuration; descriptive geometry, with its applications to spherical projections; shades, shadows, and perspective; analytical geometry, differential and integral calculus, and surveying.

Algebra.—The course of algebra comprehends all of the fundamental operations, involution and evolution; transformation and reduction of fractions and radical quantities; theory and solution of equations, including those of the higher degrees; ratios and proportions; summation of series; nature, computation, and use of logarithms.

This course is studied by the fifth class, and occupies the time from the 1st of September to the 1st of January.

The first section of the class is, in general, required to study all contained in the text-book now in use—Davies' Bourdon's Algebra. The lowest section omits many of the more difficult discussions and examples, the amount studied being less than two-thirds of that required of the first section.

The intermediate sections in this, as in other subjects, omit more or less, according to their capacity and progress, in accordance with paragraph 43 of academic regulations.

Geometry.—The course of geometry comprehends plane geometry, geometry of volumes, and spherical geometry—nine books, as in the text-book, Davies' Legendre. The entire course is required of every section of the fifth class, commencing after the close of the January examination, about the 10th of January.

The first section finished it about the 1st of March; the lowest about the 25th of the same month; the other sections at intermediate dates.

Trigonometry.—The course of trigonometry comprehends the deduction and analytical investigation of all the important trigonometrical formulas; the nature, construction, and use of the various trigonometrical tables; and the solution of all cases in plane and spherical triangles.

The entire course is required of every section of the fifth class. The first section commences it immediately after finishing geometry, and completes it about the 25th of March.

The lowest section commences after finishing geometry, and completes it about the 25th of April.

Mensuration.—The course of mensuration comprehends the mensuration of the various plane geometrical figures and volumes; and, with the exception of two or three problems omitted by the lower sections, is required by the entire fifth class. It is studied immediately after trigonometry, and is acquired in two or three lessons.

Descriptive geometry.—The course of descriptive geometry comprehends the representation of lines and surfaces on planes; the classification and mode of generation of lines and surfaces; the construction of their tangent lines and planes; the intersection and development of surfaces; the construction of spherical triangles, of spherical projections, of the shades and shadows of various objects and their perspectives. Each section of the fifth class commences the course immediately after finishing mensuration, and studies as much as can be well acquired by the 8th or 10th of May, when the class reviews the entire course previously studied, with the exception of algebra, which is usually reviewed by the first and second sections only, preparatory to the June examination.

The first section of the fourth class resumes this subject about the 5th of November, after completing the course of analytical geometry (see below), the lowest about the 25th of October, and both pursue it until about the 5th of December, when the whole course of the term is reviewed, preparatory to the January examination. From the close of the examination in January—about the 15th—until the 5th of February the whole class is occupied, three hours each morning, in the mathematical drawing academy, in drawing problems in shades, shadows, and perspective.

In this course, as in the algebra, many of the more difficult problems are omitted by the lowest and other sections, the lowest section studying not much more than half of that required by the first.

Analytical geometry.—The course of analytical geometry comprehends the construction of algebraic equations; solution of determinate problems; determination and

discussion of the equations of the right line, plane, and conic sections; discussion of the general equation of the second degree, involving two or three variables; determination of loci, etc.

This course is commenced by the fourth class on the 1st of September, and finished by the first section about the 5th of November and by the lowest about the 25th of October. The first section studies all the text (Church's Analytical Geometry) with the exception of ten or twelve pages; the lowest not much more than one-half.

Calculus.—The course of differential and integral calculus comprehends the elementary principles and rules, with their application to maxima and minima; the drawing of tangents, curation of curves, their rectification, quadratures, cubatures, construction, and discussion of the properties of curves and surfaces.

The fourth class commences this course about the 5th of February, and completes it about the 15th of April, the first section learning most of the text (Church's Differential and Integral Calculus); the lowest not more than one-half.

Surveying.—The course of surveying comprehends the principles and practice of common land surveying, different methods of platting and calculating the surveys, trigonometrical surveying, measurement of heights and distances, use of instruments in platting, surveying, etc.

The entire course is required as in the text (Davies's Surveying), with the exception of a small portion relating to geodetic surveying, omitted for one or two of the lower sections. The fourth class commences this course immediately after completing the differential and integral calculus, and finishes it about the 7th of May, when the mathematical course for the year is received, preparatory to the June examination.

II. The detailed programme of the course of studies in each of the branches of the mathematical course has been arranged, after long experience and with various modifications from time to time, with special regard to the objects for which the Military Academy is established. In my opinion it is not necessary to extend the teaching in any direction; neither ought there to be any curtailment.

I consider the course of mathematics as now taught to all who pass their final examination sufficient to enable the cadet to acquire a thorough knowledge of all the courses which follow it, and not more than sufficient to enable him to study with advantage the course of natural and experimental philosophy, engineering, and ordnance and gunnery. Moreover, I regard the mental training of the pupil as one of the great objects of the study of mathematics—a training particularly required by the officer of every corps of the Army, and to which many of them owe their distinguished success; and I believe that the scientific reputation of the Academy—all that distinguishes it from other institutions of learning—depends in a great degree upon the thoroughness and extent to which the mathematics and its applications to other sciences are taught, and to diminish them would seriously affect this reputation and the success of the institution.

III. For the purpose of instruction and recitation in the mathematical department, each class is divided into convenient sections of from ten to fifteen members each. Two of these sections are instructed daily by one of the assistant professors under the general supervision of the professor. Every member of each section is, if possible, required to daily explain, at the blackboard or wall slate, one or more propositions of the lesson given out on the previous day, and is thoroughly examined by questions on a portion or all of it.

Points not well understood are carefully explained by the instructor or professor. Each pupil is also expected to make known all difficulties with which he may meet, to the end that they may be at once removed, and a thorough understanding of each lesson in order thus obtained. For the purpose of testing this understanding various practical examples illustrating the principles of the course are required to be worked by the pupil at the blackboard or slate.

The head of the department is also required to pass the hours of recitation in visiting two or more of the sections, and is constantly occupied in explanations of the principles of the course and their applications, either to the entire section by a familiar conversational lecture, or in particular explanations of the more difficult points to individuals.

A uniformity of method of instruction is thus secured to all the sections, while the relative merits of each pupil are thus in detail made known to the professor, and transfers from section to section of those making the most or least progress can be made without inconvenience or injustice.

In descriptive geometry most of the elementary problems are illustrated and explained by the professor from models in the section room and also from a set of models in the mathematical room.

In surveying, the pupils, in addition to the explanations of the construction and use of the instruments, are required afterwards to use them practically on the field.

I know of no modifications in the method of instruction calculated to improve it. The method in the branches of descriptive geometry and surveying may be made more effective by the further addition of models and instruments.

IV. The only practical instruction given in my department, except the exercises in the practical solution of examples and problems before referred to, is the instruction in the drawing of problems in shades, shadows, and perspective, and the instruction on the field in surveying. In this latter branch each section of the fourth class is sent into the field, in charge of its proper instructor, during the hours of morning recitations, in the months of April and May, whenever the time can be spared and the weather will permit.

As much time is allowed as will enable every attentive pupil to become familiar with the use of each of the common surveying instruments; though it is impossible in this limited time to make anyone a practical surveyor. It is desirable that more time should be given to this practice, as well as to the instruction in drawing.

V. From three and a half to four hours should be given daily by the cadet to render him thoroughly proficient in the prescribed lessons of the mathematical course. No modifications are proposed which would affect this time.

VI. Each cadet of the fourth and fifth classes is occupied an hour and a half daily in the mathematical recitation or section room, or in the field, except during the practical instruction in drawing, when three hours in the drawing academy are required.

VII. I do not consider the amount of study required in the fifth class such as to overtax the pupil.

I was satisfied at the time of the adoption of the programme for a five years' course that more was required of the fourth class than its members could learn with that thoroughness which is absolutely necessary to make accomplished and well-trained scholars.

I am confirmed by experience in this opinion, and although the course of this class has been since somewhat modified by the omission of a portion of the course of English, I still think that more is required than it can accomplish with advantage. The difficulty is not so much in the amount of time requisite for the study and recitation of the lessons as in the mental confusion which must arise from the multiplicity of subjects.

No student should be required to prepare himself by previous study for recitation in more than two distinct subjects a day, particularly when one of them is scientific; and each lesson, as far as possible, should be recited before it is necessary to begin the study of the other.

VIII. In my own department I seldom see any indication of overwork or weariness of study. I see much more of an inclination to get along with as little study as possible. In fact, my frequent inquiries of the members of the two classes under my charge have shown me that the instances are many in which the cadet does not industriously occupy all the time which should be devoted to the study of his lessons, and which I think can and will be devoted by an ambitious student without overwork or weariness.

I have little opportunity of observing in other departments except at examinations, where I see no such indication.

IX. In my opinion the programme of the present course of studies is imperfect and has failed to answer the purposes contemplated at the time of its adoption. I think we have fallen into an error in attempting to combine too much of a thorough literary with a thorough scientific and military course of instruction. By the introduction of a multiplicity of subjects without a corresponding increase of time we have endangered the accomplishment of the latter course, to which the Military Academy owes its reputation and success, and from which its graduates have derived the systematic and thoughtful habits which have made them distinguished as effective officers or citizens.

The interests of the Academy require that the programme should be carefully revised and so modified as to make it more in accordance with what the experience of the last six years has clearly indicated. One of the greatest obstacles to a successful prosecution of the course of studies at the Academy is the want of previous proper study on the part of many of the cadets of the simple elementary branches prescribed by law as required for their admission. I do not think it proper to increase the number of these branches, instruction in which is now within the reach of every American youth (unless, perhaps, that of geography might be included), but I do think it essential that a more thorough knowledge should be required.

A hurried and by no means strict examination here results annually in the rejection of many of the candidates for admission, who have come from a long distance and been subjected to great expense. Could several candidates to fill each vacancy be carefully examined in the simple branches required in the district or State from which they are to be appointed, and the best one selected, the Academy would receive a far better material and be able to give better results.

Very respectfully,

A. E. CHURCH,
Professor of Mathematics, U. S. M. A.

Lieut. J. C. IVES,
Secretary of Committee, etc.

1862.

In 1862 the mathematical course was the same as in 1857, except that the first year's was the fourth class and the second year's was the third class.

1863.

In 1863 a pamphlet on trigonometry was substituted for Davies' Trigonometry.

1864.

In 1864 Church's Descriptive Geometry was introduced and studied by the fourth class.

1865.

In 1865 Church's Descriptive Geometry and Spherical Projections replaced Davies' in the third-class course.

1866.

In 1866 Church's Shades, Shadows, and Perspective was substituted for Davies' in the third-class course.

In 1866 the following law, approved June 16, was passed, increasing slightly the requirements for admission:

[Extract.]

SEC. 2. * * * "And in addition to the requirements necessary for admission as provided by the third section of the 'Act making further provisions for the Corps of Engineers,' approved April 29, 1812, candidates shall be required to have a knowledge of the elements of English grammar, of descriptive geography, particularly of our own country, and of the history of the United States."

From 1866 to 1878 no change of importance was made in the mathematical course.

1878.

On March 30, 1878, the long and valuable career of Professor Church was brought suddenly to an end by his death. For nearly forty-one years he had served as professor of mathematics. For forty-eight years he had taught mathematics at the Academy. From the time of his entrance to the Academy in 1824 until his death in 1878, a period of nearly fifty-four years, he was away from the Academy about two years.

[Extracts from Cullum's Register.]

* * * * * * *

"Punctual to the minute, the professor was always in his seat to hear the recitations of his pupils.

* * * * * * *

"With the utmost amiability and patient painstaking he would eliminate every knotty point by a few sagacious suggestions, and, even for the dullest, simplified them by some familiar illustration, so that none except the utterly deficient failed to be taught. Besides the mathematical instruction thus implanted, he required great precision of language in the demonstrations of the subject under discussion, thereby making the mental drill in the recitation room as exact as the parade drill in the field.

* * * * * * *

"Church, as a member of the academic board, was invaluable, not only because of his sagacious opinions, but on any doubtful question his accurate memory could always furnish a precedent in point.

* * * * * * *

"With strict fidelity and conscientious impartiality he merged all personal interests in the welfare of the Academy.

* * * * * * *

"He has left a strong impress upon the Military Academy, which will not soon be effaced.

He was the author of four text-books, which, at the time they were written, were, without exception, the best of their kind in this country.

In 1842 he wrote his Calculus; in 1851 the Analytical Geometry; in 1857 the Trigonometry, and in 1865 he published his Descriptive Geometry, including the subjects of spherical projections, shades and shadows, and perspective.

In all of these he exhibited a clearness of language which has served as a model for most modern writers of mathematical text-books.

Church was more of a geometrician than algebraist. His Descriptive Geometry was relatively his best production. His Calculus was distinguished for its clear statements of methods and rules. As a teacher and demonstrator he was distinguished to a high degree.

The philosophy of mathematics did not impress him as very important for students. Even in his preferred subject, descriptive geometry, he rather urged his pupils to follow the established rules of construction instead of trying to see the magnitudes in space. In the Calculus he ignored any attempt to define or put a differential or its coefficient in a tangible form.

Demonstrations were more to his taste than applications. He was inclined to the student who, in beautiful, clear, and concise language, could show how to obtain a result, rather than to one who merely produced the answer.

Under Church the mathematical demonstrations were more perfect and complete than at any other time in the history of the Academy.

The following extracts from a paper entitled "Personal reminiscences of the United States Military Academy," which was written and read by Professor Church at a meeting of the United States Service Institute two days before his death, will ever form a portion of the reliable history of the institution:

* * * * * * *

"The requirements for admission in 1824 were simply arithmetic, reading, and writing. In arithmetic we received daily and very thorough instruction, our instructors being generally those cadets who during the term had acted as assistant professors, receiving therefor $10 per month and many extra privileges, including the important one of keeping a waiter. In this subject these instructors were able to form an approximate opinion in regard to those who were duly qualified, and as a consequence the examination of most of us in it was hurried and slight. To many not more than one or two questions were asked, while to those who were deemed doubtful much more time was given and their proficiency fully tested. We were required to read and write in the presence of the academic board. Very few comparatively were rejected. Over 100 of my class were admitted. At the January examination 93 were examined and about 20 found deficient and discharged. June left us with only 54 and graduation with only 33, 9 of these having been turned back from the preceding class. From my recollection of my classmates and from my experience and close observation since, I am satisfied that our candidates at that time and for a number of years after were in the three branches required better prepared than those of later years. Why, I do not pretend to say, but I have strong opinions on the subject. Particularly do I think young men were better readers and spellers than now.

"I would say, moreover, that this opinion is in no way founded upon the fact that more are rejected now than then.

* * * * * * *

"The course of studies at this time was theoretically nearly the same as now. The Superintendent, Colonel Thayer, after the labor of years had succeeded in organizing a course which he deemed best fitted to an American military education—a course calculated to cultivate the powers of thought rather than store the memory. This was a problem of no little difficulty. His experience in the French military schools and his extended acquirements made it one of deep interest to him and had prepared him for its solution. His guiding principle was thoroughness in everything—thorough teaching, thorough learning—and though these could only be attained after long experience, he laid a firm foundation for them, and to him, more than any other man, does the Military Academy owe that which is now the source of its great reputation, viz, its thorough teaching of a few rather than a smattering of many things. He rightly believed that a military education must be founded on a mathematical training and knowledge, hence he gave in the course that prominence, which they have ever since retained, to mathematics, natural and experimental philosophy, and engineering.

"Limited to four years in time he could not, with his ideas of thoroughness in these important branches, and in such special military knowledge as he deemed particularly necessary to the educated soldier, do that which has been often and vainly attempted since, crowd into this time a greater part of the literary course of our colleges.

"The modes of instruction, too, were entirely new and the text-books very imperfect. The professors and teachers had themselves to learn the true use of the blackboard and the strict and detailed manner of demonstration, and in the first year or two of my time, had, with perhaps a single exception, failed to imbibe the spirit which the Superintendent was, by personal exertion, striving to instill into all. The assistants were at this time mostly cadets of the higher classes, with their own lessons to study and entirely without experience.

"In algebra, the best text-book that could be obtained in the English language was a poor translation of Lacroix. In geometry, though various editions of Euclid

were in vogue, we had a translation of Legendre, really the foundation of our present text, but filled with inaccuracies and imperfections not all of which have to this day been eliminated. In trigonometry, a translation of a work by Lacroix. In descriptive, a small work by Crozet, a French officer, graduate of the polytechnic school, and who had been professor of engineering here. This contained only the elements, without application to the intersection of surfaces or to warped surfaces. These, with the whole of shades, shadows, and perspective, stone cutting, and problems in engineering, both civil and military, were given by lectures to the whole class by the respective professors. Notes were taken by the cadets, the drawings made in our rooms before the next morning, then presented for examination, and at once recited upon, previous to the following lecture. You will understand how this could all be done when I tell you that in the departments of mathematics, philosophy, and engineering, the sections, of over 20 cadets each, were kept in three hours daily. Of course, the real teachers in these subjects were those cadets who made careful notes, finished their drawings early in the day, made the demonstrations to their classmates, and lent their drawings for copying. Great skill was acquired in making these copies. A clear and large pane of glass was placed on the top of the washstand, a lighted candle underneath the finished drawing on the glass, and the paper for the copy on top, and every point quickly marked with a pencil. Several copies of the same drawing were thus made. Of course, the number of drawings made by each cadet was much greater than now. I think I had over 50 full sheets.

"In the third class we had, in the higher sections of analytical geometry, Biot's work on this subject in French (a work scarcely surpassed since); in the lower a small English work the name of which I have forgotten. In the calculus the higher sections had, also in French, the work of Lacroix, which all my pupils know I still regard as the best model on the subject; and the lower, an inferior work by Bouchar-lat, also in French."

Edgar W. Bass was appointed professor of mathematics, United States Military Academy, April 17, 1878.

1879.

After careful consideration it was deemed best (1879) to change the order of certain branches, to transfer the accurate constructions of problems in descriptive geometry to the department of drawing, and to introduce a few lessons in the subject of least squares.

The change as made is indicated in the following resolution:

"The professor of mathematics submitted the following resolution, affecting the course of studies in his department and the department of drawing, and upon motion it was adopted:

"*Resolved*, That the following changes in the order of instruction of the several branches of the mathematical course be adopted by the academic board.

"1. That the instruction in surveying be transferred from the third-class to the fourth-class course, and to follow immediately after trigonometry.

"2. That the instruction in analytical geometry shall follow immediately after surveying in the fourth-class course, and be continued in the third-class course until finished.

"3. That the subject of descriptive geometry shall follow immediately after analytical geometry.

"4. That the accurate construction, with a right-line pen, of the various problems in shades and shadows, linear perspective and isometric projections, now under the direction of the mathematical department, be discontinued, and that the same shall hereafter form a part of the course in the department of drawing. The time for making such drawings to follow, as nearly as possible, the termination of the study of the principles relating thereto in the department of mathematics."

* * * * * * *

The academic board of the United States Military Academy respectfully recommend to the honorable Secretary of War that Chauvenet's Treatise on the Method of Least Squares be authorized as a text-book to be used in the mathematical course. The grounds for this recommendation are, that knowledge of this branch of mathematics is required in the subsequent course of philosophy in this academy, and in the reduction of observations, in general, which officers of the army are frequently required to make, especially in geodetic and astronomic measurements.

The proposed text-book is believed to be the best separate publication on the subject.

1880.

In April, 1880, a pamphlet entitled "Notes on determinants," by Lieut. J. G. D. Knight, was introduced as an essential part of algebra for the upper part of the classes, and was taught in five lessons to the first section of the third class.

The following is a detailed programme of the course in mathematics as then established.

1881.

DETAILED PROGRAMME OF THE COURSE OF MATHEMATICS.

Fourth-class course in mathematics.

[September to January.]

ALGEBRA (DAVIES' NEW BOURDON, EDITION OF 1877).

	Number of lessons.	Average number of pages.
First section:		
Advance to page 396	55	7
First review to page 396	30	12⅓
General review to page 396	17	22½
Last section:		
Advance to article 264, page 341 (omit articles 133, 199, 200, 208, 253, and 254, and exercises on page 193)	49	6
First review. Same	28	11
General review. Same	21	15

[January 10 to June.]

PLANE GEOMETRY (DAVIES' LEGENDRE, EDITION OF 1875).

First section:		
Advance to page 272 and introduction to trigonometry (12 pages)	29	9⅓
First review (omit appendix and introduction to trigonometry)	15	17½
General review (omit appendix and introduction to trigonometry)	10	25½
Last section:		
Advance to page 259 and introduction to trigonometry	29	9
First review (omit introduction to trigonometry)	15	16½
General review (omit introduction to trigonometry)	11	22½

TRIGONOMETRY, PLANE AND SPHERICAL (CHURCH).

First section:		
Omit article 41; advance	13	5
Omit article 41, first review	7	9½
Omit article 41, general review	5	13
Last section:		
Omit article 41; advance	13	5
Omit article 41, first review	7	9½
Omit article 41, general review	6	11

SURVEYING (DAVIES).

First section—From page 23 to 219 (omit 33, 34, 35, 36, 37, 38, 39, and from 40 to Book II, 137, 138, 139):		
Advance	14	12
First review	6	28
General review	4	42
Last section—Omit same as first section:		
Advance	16	10½
First review	8	21
General review	4	42

ANALYTICAL GEOMETRY (CHURCH).

First section:		
Advance to page 106	14	7½
First review to page 91	6	15
General review to page 91	4	23
Last section:		
Advance to page 78	12	6½
First review	7	11
General review	4	19½

Third-class course in mathematics.

[September to January.]

ANALYTICAL GEOMETRY (CHURCH).

	Number of lessons.	Average number of pages.
First section—From article 66 through (omit 184, 185, and from 211 to 231):		
Advance	21	8½
First review	11	16½
General review	10	18
Last section—From 66, through (omit 122, 184, 185, examples page 238, 201, and from 211 to 231):		
Advance	25	7
First review	16	11
General review	13	13⅓

DESCRIPTIVE GEOMETRY (CHURCH).

First section—To Part III (omit 134):		
Advance	30	4⅓
First review	16	8⅔
General review	11	12⅓
Last section—To Part II (omit 56, 103, 104, 133, 134, 139, 140, 141, 150, 151, 152, 175, and 179):		
Advance	27	3⅔
First review	15	6⅔
General review	9	11

[January to June.]

First section—From Part III, through:		
Advance	10	5½
First review	6	8½
General review	4	13
Last section—From Part II, through (omit 220–221, 229, 258, 259, 288):		
Advance	15	4⅔
First review	9	8
General review	7	10

CALCULUS (CHURCH).

First section—Entire book:		
Omit from page 202 to Part II (204–212, inclusive, 224–230, inclusive, and 232); advance	44	8
Omit 166, 167, from 186 to 193, 200, from 204 to 216, from 218 to 222, 224 to 231, 232, and 267, and after 271; first review	23	13
Omit 59 in addition to above; general review	17	18
Last section:		
Advance to article 261, page 351 (omit 59, 113 to 117, 128 to 131, 152 to 154, 166–167, 186–187, 192, 199, 200, 203 to 216, 218 to 231, 232); advance	45	6½
First review (in addition to above omit 188 to 192)—		
First review	24	12⅔
General review	17	16⅓

DETERMINANTS (PAMPHLET BY LIEUT. J. G. D. KNIGHT).

First section:		
Advance	3	.....
Review	2	.....

LEAST SQUARES (CHAUVENET).

First section:		
Advance	10	.....

1885.

Previous to 1885 the weekly maximum marks for the different sections of a class were generally different. This necessitated a reduction before marks given in different sections could be compared. It was then determined to make the weekly maximum the same for all sections of a class in any one subject. The maximum was determined by the greatest number of recitations made by any individual of the class, multiplied by 3.

1887.

In 1887 an elementary treatise on determinants by Prof. W. G. Peck was substituted for the pamphlet then in use.

In 1887 a pamphlet entitled, Introduction to the Calculus, by Prof. E. W. Bass, was introduced to replace the first part of Church's Calculus.

1888.

In 1888 Elements of Trigonometry, by Lieut. H. H. Ludlow, was substituted for Church's Trigonometry.

1889.

In 1889 a pamphlet entitled, Part I, Differential Calculus, by Prof. E. W. Bass, was substituted for the corresponding part of Church's Calculus.

1891.

In 1891 The Theory of Errors and Method of Least Squares, by William W. Johnson, professor of mathematics in the United States Naval Academy, was introduced to replace Chauvenet's.

1893.

In 1893 a third pamphlet entitled, Part II, Differential Calculus, was substituted for the last portion of Church's Differential.

The chair of associate professor of mathematics was established, and First Lieut. Wright P. Edgerton, Second Artillery, was appointed.

1896.

In 1896 Bass's Differential Calculus replaced the pamphlets on the same subject previously in use.

PART II.

STATEMENT OF THE PRESENT COURSE, GIVING TITLES OF TEXT-BOOKS, FULL LIST OF SUBJECTS, NUMBER OF LESSONS IN EACH SUBJECT-ADVANCE AND REVIEW, LENGTH OF LESSONS, HOURS OF STUDY, LENGTH OF RECITATIONS, TOTAL NUMBER OF HOURS DEVOTED TO EACH SUBJECT DURING THE TERM, INSIDE AND OUTSIDE THE SECTION ROOM, NUMBER OF LECTURES AND SUBJECTS OF LECTURES, DIFFERENCES IN COURSE FOR HIGHER AND LOWER SECTIONS, ETC.

For the study of each lesson in mathematics three and a half hours is arranged for.

The recitations are daily (Sundays excepted) between the hours of 8 and 11 a. m. One-half of a class recites from 8 to 9.30, and the other from 9.30 to 11.

To the subject of algebra four months is allotted, giving in general 102 recitations, arranged as follows:

	Upper sections.	Lower sections.
Advance lessons	53	50
First review	28	28
General review	19	22
Extra	1 or 2	1 or 2
Total	102	102

On advance the upper sections average about 7½ pages, and the lower about 6¼.

The first-review lessons are about double the advance, and the general-review are equivalent to about three advance lessons.

The following is a list of the daily lessons in algebra. It will be observed that the principal difference between subjects taken by the upper and lower sections is that of the theory of equations:

Fourth-class course, September 1, 1895, to January 1, 1896.

[Corrections and omissions marked in text-book.]

ALGEBRA (DAVIES' BOURDON), 1877 EDITION.

No. of lesson.	All sections.	No. of lesson.	All sections.
1	Advance to Chapter II, p. 23.	21	Advance to 100, p. 121.
2	Advance to 23, p. 31.	22	Advance to Chapter V, p. 128.
3	Advance to 31, p. 39.	23	Advance to approximate, p. 133.
4	Advance to 41, p. 46.	24	Advance to 109, p. 138.
5	Review to 25, p. 33.	25	Advance to 113, p. 144.
6	Review to 41, p. 46.	26	Advance to 119, p. 152.
7	Advance to 43, p. 52.	27	Advance to II problems, p. 160.
8	Advance to 55, p. 59.	28	Advance to 125, p. 166.
9	Advance to 61, p. 66.	29	Advance to 2°, p. 172.
10	Advance to 76, p. 74.	30	Advance to 133, p. 178.
11	Advance to 80, p. 82.	31	Advance to example 13, p. 186.
12	Advance to 90, p. 89.	32	Advance to problem 7, p. 191.
13	Advance to problem 10, p. 97.	33	Advance to 141, p. 196.
14	Advance to 92, p. 101.	34	Review to 98, p. 116.
15	Review to 55, p. 59.	35	Review to Chapter V, p. 128.
16	Review to 76, p. 74.	36	Review to 110, p. 141.
17	Review to 90, p. 89.	37	Review to 123, p. 155.
18	Review to 92, p. 101.	38	Review to 127, p. 169.
19	Advance to problem 1, p. 109.	39	Review to 134, p. 182.
20	Advance to 22, p. 114.	40	Review to 141, p. 196.

No. of lesson.	Upper sections.	Intermediate sections.	Lower sections.
41	Advance to 143, p. 203	Advance to 143, p. 203	Advance to 142, p. 201.
42	Advance to 147, p. 211	Advance to 146, p. 210	Advance to 144, p. 208.
43	Advance to 152, p. 220	Advance to 151, p. 218	Advance to 150, p. 215.
44	Advance to 159, p. 229	Advance to 157, p. 226	Advance to 154, p. 222.
45	Advance to 165, p. 237	Advance to 162, p. 233	Advance to 159, p. 229.
46	Advance to 178, p. 246	Advance to 168, p. 241	Advance to 164, p. 234.
47	Advance to 191, p. 257	Advance to 180, p. 249	Advance to 168, p. 241.
48	Advance to 199, p. 265	Advance to 191, p. 257	Advance to 178, p. 246.
49	Advance to 204, p. 274	Advance to 199, p. 265	Advance to 187, p. 252.
50	Advance to 210, p. 282	Advance to 204, p. 274	Advance to 192, p. 259.
51	Advance to 219, p. 290	Advance to 210, p. 282	Advance to 201, p. 268.
52	Advance to 227, p. 297	Advance to 219, p. 290	Advance to 203, p. 272.
53	Advance to Table II, p. 7*a*.	Advance to 227, p. 297	Advance to 209, p. 281.
54	Advance to 233, p. 304	Advance to Table II, p. 7*a*.	Advance to 215, p. 288.
55	Advance to 245, p. 315	Advance to 233, p. 304	Review to 145, p. 208.
56	Advance to 251, p. 322	Advance to 242, p. 312	Review to 151, p. 218.
57	Advance to 3°, p. 331	Advance to 249, p. 320	Review to 158, p. 227.
58	Review to 146, p. 210	Advance to 255, p. 328	Review to 165, p. 237.
59	Review to 155, p. 223	Review to 145, p. 208	Review to 178, p. 246.
60	Review to 165, p. 237	Review to 153, p. 221	Review to 191, p. 257.
61	Review to 185, p. 251	Review to 162, p. 233	Review to 201, p. 268.
62	Review to 179, p. 265	Review to 176, p. 246	Review to 206, p. 276.
63	Review to 208, p. 277	Review to 192, p. 259	Review to 215, p. 288.
64	Review to 219, p. 290	Review to 202, p. 269	Advance to 222, p. 293.
65	Review to 233, p. 304	Review to 209, p. 281	Advance to 227, p. 297.
66	Review to 247, p. 317	Review to 220, p. 291	Advance to Table II, p. 7*a*.
67	Review to 255, p. 328	Review to 233, p. 304	Advance to 232, p. 303.
68	Advance to 261, p. 337	Review to 247, p. 317	Advance to 238, p. 308.
69	Advance to 265, p. 344	Review to 255, p. 328	Advance to 245, p. 315.
70	Advance to 268, p. 352	Advance to 259, p. 334	Advance to 249, p. 320.
71	Advance to 272, p. 360	Advance to 263, p. 340	Advance to 1°, p. 329.
72	Advance to 2°, p. 367	Advance to 277, p. 365	Advance to 259, p. 334.
73	Advance to 281, p. 373	Advance to 4°, p. 369	Advance to 262, p. 339.
74	Advance to 284, p. 379	Advance to 282, p. 375	Review to 226, p. 296.
75	Advance to 289, p. 386	Advance to 284, p. 379	Review to 233, p. 304.
76	Advance to 294, p. 393	Review to 263, p. 340	Review to 242, p. 312.
77	Advance to 296, p. 396	Review to 4°, p. 369	Review to 249, p. 320.
78	Review to 265, p. 344	Review to 284, p. 379	Review to 3°, p. 331.
79	Review to 272, p. 360	Advance to 286, p. 384	Review to 262, p. 339.
80	Review to 281, p. 373	do	General review to 31, p. 39.
81	Review to 286, p. 384	do	General review to second principle, p. 54.
82	Review to 296, p. 396	do	General review to 70, p. 68.
83	General review to 42, p. 51	do	General review to 90, p. 89.
84	General review to 73, p. 71	do	General review to 92, p. 101.

Fourth-class course, September 1, 1895, to January 1, 1896—Continued.

ALGEBRA (DAVIES' BOURDON), 1877 EDITION—Continued.

No. of lesson.	Upper sections.	Intermediate sections.	Lower sections.
85	General review to problem 10, p. 97.	Advance to 286, p. 384	General review to example 25, p. 114.
86	General review to 25, p. 114.	do	General review to 104, p. 128.
87	General review to 105, p. 132.	do	General review to 113, p. 144.
88	General review to 119, p. 152.	do	General review to problems, p. 160.
89	General review to 128, p. 170.	do	General review to 128, p. 170.
90	General review to problem 9, p. 191.	do	General review to 137, p. 184.
91	General review to 147, p. 211.	do	General review to 141, p. 196.
92	General review to 162, p. 233.	do	General review to 146, p. 210.
93	General review to 189, p. 255.	do	General review to 158, p. 227.
94	General review to 204, p. 274.	do	General review to 168, p. 241.
95	General review to 220, p. 291.	do	General review to 192, p. 259.
96	General review to 240, p. 310.	do	General review to 206, p. 276.
97	General review to 255, p. 328.	do	General review to 220, p. 291.
98	General review to 266, p. 348.	do	General review to 233, p. 304.
99	General review to 277, p. 365.	do	General review to 245, p. 315.
100	General review to 285, p. 380.	do	General review to 255, p. 328.
101	General review to 296, p. 396.	do	General review to 269, p. 339.
102	Extra for instruction	do	Do.

a Mathematical tables.

From which it appears that about three hundred and six hours are devoted to the study of algebra, and one hundred and fifty-three hours to recitations and instruction in the section rooms.

To the subject of elementary geometry, eight and one-half weeks, 51 lessons, is devoted as follows:

	Number of lessons.	Average number pages.
Advance lessons	27	10½
First review	14	20
General review	10	28½
Total	51	

The difference in this course between the upper and lower parts of a class consists in giving the upper part a great many more extra problems and new propositions to prove.

The following is a list of the daily lessons in geometry, from which it will be seen about one hundred and fifty-three hours are devoted to the study and seventy-six and one-half hours to recitations and instruction in the section rooms:

Fourth class.—Plane geometry (Davies' Van Amringe), 1885 edition.—Advance and first review and general review.

January.	All sections.	February.	All sections.
	Advance to P. 2, p. 21.		Advance to 13, p. 177.
	Advance to 9, p. 28.		Advance to Book VII, p. 189.
	Advance to 18, p. 37.		Advance to P. 7, p. 199.
	Advance to 26, p. 45.		Advance to 15, p. 209.
	Advance to 5, p. 56.		Advance to regular polyhedrons, p. 219.
	Advance to 5, p. 65.		Advance to P. 5, p. 232.
	Advance to 15, p. 75.		Advance to 13, p. 242.
	Advance to 1, p. 84.		Advance to 2, p. 252.
	Advance to 16, p. 93.		Advance to 9, p. 261.
	Advance to 6, p. 104.		Advance to 17, p. 271.
	Advance to 15, p. 114.		Advance to appendix, p. 279 (wedge and prismoid).
	Advance to 23, p. 123.		Review from 2, p. 167, to Book VII, p. 189.
	Advance to 1, p. 133.		Review to P. 15, p. 209.
	Advance to 3, p. 145.		Review to 3, p. 230.
	Advance to 11, p. 155, paper and limits.		Review to Book IX, 250.
	Advance to 2, p. 167.		Review to P. 15, p. 268.
	Review to P. 15, p. 34.		Review to appendix, p. 279 (wedge and prismoid).
	Review to 3, p. 55.		
	Review to 14, p. 74.		
	Review to 16, p. 93.		

Fourth class.—Plane geometry (Davies' Van Amringe), 1885 editions.—Advance and first review and general review—Continued.

January.	All sections.	February.	All sections.
	Review to 12, p. 111. Review to 26, p. 128. Review to 7, p. 149. Review to 2, p. 167.		General review to 26, p. 45. General review to 15, p. 75. General review to 6, p. 104. General review to 28, p. 130. General review to 11, p. 155. General review to 18, p. 181. General review to 14, p. 208. General review to 7, p. 234. General review to 6, p. 257. General review to appendix, p. 279 (wedge and prismoid).

Remarks.—270 pages; 27 advance lessons, average 10 pages; 14 first review lessons, average 19$\frac{3}{4}$ pages; 10 general review lessons, average 27 pages; total, 51 lessons; 8$\frac{1}{2}$ weeks for plane geometry. Extra exercises with each lesson graded according to section.

In trigonometry thirty lessons are taken, requiring five weeks, as follows:

	Number of lessons.	Average pages.
Advance lessons	16	9$\frac{3}{8}$
First review	7	21$\frac{3}{7}$
General review	7	21$\frac{3}{7}$
Total	30	

The upper sections, on advance, take a chapter on trigonometric developments and a chapter on solution of trigonometric equations, which are omitted by the lower part of the class.

About ninety hours are devoted to the study of this subject and forty-five hours to recitations and instruction in the section rooms.

The daily lessons are as follows:

Fourth class.—Trigonometry (Ludlow), third edition.

Upper sections.	March.	Lower sections.
Advance to 17, p. 18. Advance to 40, p. 31. Advance to 54, p. 43. Review to 54, p. 43, from 10, p. 13. Advance to 62, p. 54. Advance to 69, p. 65. Advance to 73, p. 73. Mathematical tables and use (10, p. 8 to 21, p. 24). Advance to 81, p. 89. Advance to 92, p. 99. Advance to 105, p. 111; read 100. Advance to Part II, p. 123. Review to 69, p. 65; from 81, p. 89. Review to 101, p. 106 (omit 99–100). Review to Part II, p. 123 (omit 104). Advance to 117, p. 131; read 114. Advance to 126, p. 141; read 119, 123, 125. Advance to 133, p. 149. Advance to VII, p. 157. Advance to 143, p. 165. Advance to end, p. 174. From Part II, p. 123— Review to 124, p. 140 (omit 114, 119, 123). Review to VII, p. 159 (omit 125 and 136). Review to end, p. 174. General review to 51, p. 37. General review to 62, p. 54. General review to 92, p. 99 (omit Chapters V and VI). General review to Part II, p. 123 (omit 99, 100, 104, 108). General review to 124, p. 140 (omit 114, 119, 123). General review to VII, p. 157 (omit 125 and 136). General review to end, p. 174.		Advance to 14, p. 16. Advance to 31, p. 26. Advance to 51, p. 37. Review to 51, p. 37; from 10, p. 13. Advance to 56, p. 45. Advance to 62, p. 54. Advance to 69, p. 65; Note, p. 61, standard. Mathematical tables and use (10 p., 8 to 21, p. 24); read 16, 17, 20. Advance to 92, p. 99 (omit Chapters V and VI). Advance to 105, p. 111 (omit 99, 100, and 104). Advance to Part II, p. 123 (omit examples, pp. 121, 122). Review to 62, p. 54. Review to 92, p. 99. Review to Part II, p. 123. } From 51, p. 37 (omit as on advance). Advance to 117, p. 131 (omit 114). Advance to 124, p. 140 (omit 119 and 123). Advance to 129, p. 146 (omit 125). Advance to 136, p. 153. Advance to 140, p. 159. Advance to 144, p. 167. Advance to end, p. 174. From Part II, p. 123— Review to 124, p. 140 (omit 114, 119, and 123). Review to VII, p. 157 (omit 125 and 136). Review to end, p. 174. General review same as upper sections.

From twenty-five to twenty-eight lessons are assigned to surveying, as follows:

	Upper sections.	Lower sections.
Advance lessons	14	16
First review lessons	7	8
General review lessons	4	4
Total	25	28

Nearly half of the recitation hours in this subject are devoted to the use of the ordinary surveying instruments in the field.

In the general review quite a number of subjects relating to tables and adjustment of instruments are omitted.

The upper sections devote about seventy-five hours to the study of this subject and the lower sections about eighty-four. From thirty-seven and a half to forty-two hours are devoted to recitations and instruction, about half of which is outside the section room and in the field with instruments.

The advance lessons average from 16+ to 14+ pages, the first review from 32 to 28, and the general review 70.

The daily lessons are as follows:

Surveying (Davies' Van Amringe).—Omissions marked in text-book.

UPPER SECTIONS.

Advance to 79, p. 53.
Advance to 108, p. 74.
Advance to 125, p. 90.
Advance to 9, p. 108.
Advance to 165, p. 145.
Advance to 180, p. 157.
Advance to 193, p. 168.
Advance to 210, p. 190.
Advance to 233, p. 205.
Advance to 254, p. 221.
Advance to 268, p. 234.
Advance to 285, p. 249.
Advance to 298, p. 263.
Advance to 349, p. 217.
Review to 108, p. 74.
Review to 9, p. 108.
Review to 180, p. 157.
Review to 210, p. 190.
Review to 254, p. 221.
Review to 285, p. 249.
Review to 349, p. 317.
General review to 125, p. 90.
General review to 204, p. 184.
General review to 267, p. 233.
General review to 349, p. 317.

LOWER SECTIONS.

Advance to 76, p. 51.
Advance to 97, p. 71.
Advance to 123, p. 84.
Advance to 134, p. 97.
Advance to 149, p. 131.
Advance to 165, p. 145.
Advance to 179, p. 156.
Advance to 190, p. 166.
Advance to 210, p. 190.
Advance to 225, p. 203.
Advance to 250, p. 217.
Advance to 267, p. 233.
Advance to 280, p. 246.
Advance to 291, p. 256.
Advance to 335, p. 301.
Advance to 349, p. 317.
Review to 97, p. 71.
Review to 134, p. 97.
Review to 165, p. 145.
Review to 190, p. 166.
Review to 225, p. 203.
Review to 267, p. 233.
Review to 291, p. 256.
Review to 349, p. 317.
General review to 125, p. 90.
General review to 204, p. 184.
General review to 267, p. 233.
General review to 349, p. 317.

Sixty-six recitations, requiring eleven weeks, are allotted to the study of analytic geometry.

All sections take very nearly the same course, the upper sections gaining about three recitations.

	Upper sections.	Lower sections.
Advance lessons	34	37
First review lessons	17	17
General review lessons	12	12
Total	63	66

The fourth class begins this subject in April and takes 12 lessons.

In September the third class takes it up with a review lesson of the part already studied and continues the subject until finished about the 1st of November.

From one hundred and eighty-nine to one hundred and ninety-eight hours are devoted to the study of this subject and from ninety-four and one-half to ninety-nine are taken up in the section room with recitations and instruction. The first review lessons average 15 pages and the general review average 20 pages.

The lessons are as follows:

Analytic Geometry (Church).

Upper sections.	April.	Lower sections.
Advance to "the second," top p. 9. Advance to 9, p. 16. Advance to 14, p. 24, Part II. Advance to 26, p. 34. Advance to 31, p. 40; paper. Advance to 41, p. 48. Advance to 48, p. 56; paper. Advance to 54, p. 64. Advance to 62, p. 72; papers. Advance to 66, p. 78. From 14, p. 24— Review to 31, p. 40. Review to 48, p. 56.		Advance to "the second," top p. 9. Advance to 9, p. 16. Advance to 14, p. 24, Part II. Advance to 23, p. 31. Advance to 27, p. 36, and paper. Advance to 32, p. 41. Advance to 39, p. 46. From 14, p. 24, Part II— Review to 27, p. 36, with paper. Review to 39, p. 46. Review to 39, p. 46 (give out corrections for future). Advance to 46, p. 54; paper. Advance to 50, p. 60.
Upper sections.	**September.**	**Lower sections.**
Review to 48, p. 56 (give out corrections). Review to 58, p. 68. Review to 66, p. 78. Advance to 71, p. 87. Advance to 77, p. 93. Advance to 83, p. 102. Advance to 91, p. 110. From 48, p. 56— Review to 66, p. 78. Review to 77, p. 93. Review to 91, p. 110. Advance to 96, p. 116. Advance to 103, p. 124. Advance to 106, p. 131. Advance to 118, p. 139. Advance to 126, p. 147 (omit 122). Advance to "first," p. 154. Advance to 138, p. 162. Advance to equation *e*, p. 170. Advance to 154, p. 177. Advance to 161, p. 184. Advance to 166, p. 192. Advance to 167, p. 199. From 90, p. 108— Review to 103, p. 124. Review to 118, p. 139. Review to 134, p. 156 (omit 122). Review to equation *e'*, p. 170. Review to 161, p. 184. Review to 167, p. 199.		Advance to 57, p. 67. Advance to 63, p. 74 (take formula, § 62½; omit deduction of same). Advance to 68, p. 82. Advance to 74, p. 91 (omit as marked in standard). From 39, p. 46— Review to 50, p. 60. Review to 63, p. 74. Review to 74, p. 91. Advance to 81, p. 97. Advance to 84, p. 103. Advance to 91, p. 110. Advance to 96, p. 116. Advance to 103, p. 124. Advance to 106, p. 131. Advance to 117, p. 139. Advance to 126, p. 147 (omit 122). Advance to "first," p. 154. Advance to 137, p. 161. From 74, p. 91— Review to 84, p. 103. Review to 96, p. 116. Review to 106, p. 131. Review to 126, p. 147 (omit 122). Review to 137, p. 161. Advance to equation *e'*, p. 170 (omit 139 and 140). Advance to 153, p. 177. Advance to 159, p. 183. Advance to 164, p. 189. Advance to "third," p. 196. Advance to 169, p. 201.
Upper sections.	**October.**	**Lower sections.**
Advance to 171, p. 207. Advance to 175, p. 213. Advance to 179, p. 220. Advance to 192, p. 235 (omit 184–186). Advance to 3, p. 243. Advance to 204, p. 250. Advance to 220, p. 268 (omit 211–219). Advance to 237, p. 285 (omit 220–231 except 225–226). From 167, p. 199— Review to 175, p. 213. Review to 192, p. 235 (omit 184–186). Review to 208, p. 252. Review to 237, p. 285 (omit as before). Descriptive geometry: Advance to 20, p. 10. Advance to 29, p. 15.		Advance to 172, p. 209. Advance to 177, p. 217. Advance to 182, p. 223. Advance to 193, p. 236 (omit 184–186). Advance to 4, p. 243 (omit problems 12 and 13, p. 238). Advance to 206, p. 251 (omit 201 except italics). Advance to 220, p. 268 (omit 211–219). Advance to 237, p. 285 (omit 220–231 except 225–226). From 137, p. 161— Review to 153, p. 177 (omit 139–140). Review to 164, p. 189. Review to 169, p. 201. Review to 177, p. 217. Review to 193, p. 236 (omit 184–186).

Analytic Geometry (Church)—Continued.

Upper sections.	October.	Lower sections.
Descriptive geometry—Continued. Advance to 36, p. 19. Advance to 40, p. 21. Advance to 44, p. 24. Advance to 48, p. 26. General review same as lower sections.		From 137, p. 161—Continued. Review to 208, p. 252 (omit as before). Review to 237, p. 285 (omit as before). From 39, p. 46— General review to 57, p. 67. General review to 74, p. 91. General review to 91, p. 110. General review to 106, p. 131. General review to "first," bottom of p. 154 (omit 122). General review to 153, p. 177 (omit 139 and 140). General review to "third," p. 196. General review to 177, p. 217. General review to 4, p. 243 (omit 184–186 and problems 12 and 13, p. 238). General review to 237, p. 285 (omit as before).

Descriptive geometry is taken up by the third class immediately after the conclusion of analytic geometry. Forty-five lessons are taken before the examination in January and 28 after, making in all 73.

	Number of lessons.	Average number of pages daily.
Advance lessons	40	4 to 5
First review	20	8 to 10
General review	13	14 to 15
Total	73	

The lower sections omit several subjects relating to warped surfaces which the upper sections take, and the upper sections only take five lessons in determinants.

About two hundred and nineteen hours are devoted to the study of this subject, and one hundred and nine and one-half hours are taken up with recitations and instruction in the section rooms.

The lessons are as follows:

Third class.—Descriptive Geometry.

Upper and second sections.	November.	Lower sections.
Review to 29, p. 15. Review to 40, p. 21. Review to 48, p. 26. Advance to 52, p. 29. Advance to 55, p. 31; papers. Advance to 60, p. 36. Advance to 70, p. 40. Advance to 82, p. 47. Advance to 90, p. 51. Advance to 99, p. 56. Advance to 108, p. 61. From 48, p. 26— Review to 55, p. 31. Review to 70, p. 40. Review to 90, p. 51. Review to 108, p. 61. Advance to 122, p. 66. Advance to 131, p. 71. Advance to 140, p. 76 (omit 134). Advance to 150, p. 81. Advance to 160, p. 88. Advance to 166, p. 94. Advance to 172, p. 99. Advance to 177, p. 103. Advance to 184, p. 109. Advance to 191, p. 113. From 108, p. 61— Review to 131, p. 71. Review to 150, p. 81. Review to 166, p. 94.		Advance to 18, p. 8. Advance to 28, p. 15. Advance to 34, p. 18. Advance to 39, p. 21; paper. Advance to 43, p. 23. Advance to 46, p. 25. Review to 28, p. 15. Review to 39, p. 21. Review to 46, p. 25. Advance to 49, p. 27. Advance to 52, p. 29. Advance to 55, p. 31. Advance to 60, p. 36 (omit 56; paper). Advance to 70, p. 40. Advance to 80, p. 46. Advance to 89, p. 50. Advance to 98, p. 55. From 46, p. 23— Review to 52, p. 29. Review to 60, p. 36 (omit 56). Review to 80, p. 46. Review to 98, p. 55. Advance to 105, p. 59. Advance to 121, p. 65 (omit 118, 119). Advance to 130, p. 71. Advance to 142, p. 77 (omit 132, 133, 134, 137, 140, 141). Advance to 154, p. 85 (omit 149, 150, 152). Advance to 162, p. 91. Advance to 169, p. 96.

Third class.—Descriptive Geometry—Continued.

Upper sections.	December.	Lower sections.
Review to 177, p. 103. Review to Part II, p. 113. Advance to 12, p. 11 (determinants). Advance to 15, p. 20. Advance to 19, p. 28. Advance to 23, p. 37. Advance to 27, p. 45. Review to 27, p. 45. General review same as lower sections.	31	Advance to 176, p. 102 (omit 175 and top p. 98). Advance to 184, p. 109 (omit 179). Part II, p. 113 (omit 187). From 93, p. 55— Review to 121, p. 65 (omit 118, 119). Review to 147, p. 77 (omit 132, 133, 134, 139, 140, 141). Review to 162, p. 91 (omit 149, 150, 152). Review to 176, p. 102 (omit 175 and top p. 98). Part II, p. 113. General review to 37, p. 19. General review to 46, p. 25. General review to 55, p. 31. General review to 80, p. 46 (omit 56). General review to 105, p. 59. General review to 142, p. 77 (omit 118, 119, 132, 133, 134, 139, 140, 141). General review to 169, p. 96 (omit 149, 150, 152). Part II, p. 113 (omit 175, 179, and top p. 98).

Upper sections.	January.	Lower sections.
Advance to equinoxial colure, p. 118. Advance to 204, p. 121. From Part II, p. 113— Review to 204, p. 121. Advance to 215, p. 127. Advance to 222, p. 132. Advance to Part III, p. 140. From 204, p. 121— Review to 222, p. 132. Review to Part III, p. 140. Advance to 248, p. 146. Advance to 252, p. 149. Advance to 258, p. 153. Advance to Part IV, p. 157. From Part III, p. 140— Review to 252, p. 149. Review to Part IV, p. 157. Advance to 276, p. 164. Advance to 284, p. 169. From Part IV, p. 157— Review to 284, p. 169. Advance to 287, p. 174. Advance to curve of shadow, p. 178 Advance to Part V, p. 186. Advance to end, p. 192.	10	Advance to equinoxial colure, p. 118. Advance to 204, p. 121. From Part II, p. 113— Review to 204, p. 121. Advance to 215, p. 127. Advance to 220, p. 130. Part III, p. 140 (omit 220, 221, 227, 229). From 204, p. 121— Review to 220, p. 130. Review to Part III, p. 140 (omit 220, 221, 227, 229). Advance to 247, p. 145. Advance to 251, p. 148. Advance to 254, p. 150. Advance to Part IV, p. 157 (omit 258–259). From Part III, p. 140— Review to 251, p. 148. Review to Part IV, p. 157 (omit 258, 259). Advance to 274, p. 163. Advance to 283, p. 168. From Part IV, p. 157— Review to 283, p. 168. Advance to 286, p. 172. Advance to 289, p. 180 (omit 288). Advance to 295, p. 188. Advance to end, p. 192.

Upper sections.	February.	Lower sections.
From 284, p. 169— Review to curve of shadow, p. 178. Review to end, p. 192. From Part II, p. 113— General review to 215, p. 127. General review to 248, p. 146. General review to Part IV, p. 157. General review to 287, p. 174. General review to end, p. 192. Intermediate examination.	11	From 284, p. 169— Review to 289, p. 180 (omit 288). Review to end, p. 192. From Part II, p. 113— General review to 215, p. 127. General review to 247, p. 145 (as before). General review to Part IV, p. 157 (as before). General review to 286, p. 172. General review to end, p. 192. Descriptive Geometry, Part II, p. 113 to end.

The third class begins the Calculus about the middle of February and finishes it at the end of May.

The lower sections take 93 lessons and the upper 83, as follows:

	Upper sections.	Lower sections.
Advance lessons	46	49
First review lessons	22	25
General review lessons	15	19
Total	83	93

The daily lessons are as follows, including 10 lessons which the upper sections take in least squares: The upper sections take in all 467 pages, and the lower take 413 pages. On advance the upper sections average 10 pages and the lower sections about 8½ pages.

On the first review the advance sections omit several subjects, and the average is 20 pages. The lower sections average on the first review about 17 pages. On the general review the upper sections take about 28 pages daily and the lower about 22.

The upper sections devote two hundred and forty-nine hours to the study of this subject and one hundred and twenty-four and one-half hours to recitations and instruction in the section room. The lower sections devote two hundred and seventy-nine hours to study and one hundred and thirty-nine and one-half hours to recitations.

Third class.—Calculus.

Upper sections.	February.	Lower sections.
Advance to 17, p. 15.		Advance to 17, p. 15 (omit 12 and 13).
Advance to 33, p. 27.		Advance to 32, p. 25.
Advance to 50, p. 38.		Advance to 47, p. 35.
Advance to 62, p. 49.		Advance to 57, p. 44.
Advance to 69, p. 62.		Advance to 63, p. 52.
Advance to 78, p. 72.		Advance to 67, p. 59.
Review to 33, p. 27.		Review to 32, p. 25.
Review to 62, p. 49.		Review to 57, p. 44.
Review to 78, p. 72.		Review to 67, p. 59.
Advance to "In order," middle p. 82.		Advance to 75, p. 68.
Advance to 85, p. 92.		Advance to 80, p. 76.
Advance to 92, p. 102.		Advance to example 36, p. 85.
Advance to 13, p. 113.		Advance to 87, p. 95 (omit 85 and 86).
Advance to 103, p. 121.		Advance to 93, p. 104 (omission, p. 104).
Advance to 106, p. 131.		Advance to 13, p. 113.
Advance to 110, p. 141.		Advance to 103, p. 121.
Advance to 115, p. 154.		Advance to 106, p. 131 (omit 104).
Advance to 118, p. 162.		Advance to 110, p. 141.
Advance to 123, p. 170.		Advance to 115, p. 154 (omit 111).
From 78, p. 72—		Review to 80, p. 76 (from 67, p. 59).
Review to 85, p. 92.		Review to 87, p. 95 (omit 85, 86).
Review to 13, p. 113.		Review to 13, p. 113 (omission, p. 104).
Review to 106, p. 131.		Review to 106, p. 131 (omit 104).
Review to 115, p. 154.		Review to 115, p. 154 (omit 111).
Review to 123, p. 170.		Advance to 118, p. 162.
Advance to example 6, p. 177.		Advance to 123, p. 170 (omit as in Standard; on advance omit pp. 168, 169).
Advance to 16, p. 187.		Advance to 126, p. 179 (omit as in Standard).
Advance to 129, p. 196 (read example 60, p. 192).		Advance to example 25, p. 190 (omit as in Standard).
Advance to 131, p. 206 (read 130).		Advance to 131, p. 206.
Advance to 137, p. 217.		Advance to 136, p. 213.
Advance to 139, p. 230.		Advance to problems, p. 221.
Advance to bottom, p. 242.		Advance to 139, p. 230.
From 123, p. 170—		From 115 to p. 154—
Review to example 16, p. 187.		Review to 123, p. 170 (omit as in Standard).
Review to 137, p. 217 (omission in standard).		Review to example 25, p. 190.
Review to bottom, p. 242 (in red).		Review to 136, p. 213.
Advance to 163, p. 234 (old pamphlet).		Review to 139, p. 230.
Advance to 167, p. 245.		Advance to bottom, p. 242 (omit as in Standard, old text).
Advance to 173, p. 258.		Advance to 161, p. 229.
Advance to top, p. 268 (omit 177).		Advance to 167, p. 245 (omit 162, 165, 166).
Advance to 193, p. 278 (omit 187).		Advance to example 3, p. 254.
Advance to 204, p. 289.		Advance to 185, p. 267 (omit 173, 176, 177).
Advance to example 5, p. 299.		Advance to 193, p. 278 (omit 187; read 192).
Advance to example 8, p. 309.		Advance to 204, p. 289 (omit 198, 200 to 204).
Advance to end, p. 319.		Advance to 211, p. 304 (omit Chapter XVIII, except read 208, 209).
Review to 169, p. 247 (omit 162, 165, and 166.		Advance to example 4, p. 312.
Review to 187, p. 271 (omit 173, 176, and 177.		Advance to end, p. 319.
Review to examples, p. 297 (omit 187, 188 to 193, 198, 200 to 204).		
Review to end, p. 319.		

Taird class.—Calculus—Continued.

Upper sections.	March.	Lower sections.
Advance to 160, p. 217 (Church, integral calculus). Advance to 165, p. 227. Advance to 169, p. 234. Advance to 174, p. 242. Advance to 178, p. 250. Advance to 186, p. 258 (omit 184). Advance to examples, p. 266; paper. Advance to 197, p. 273. Advance to 203, p. 282 (omit 199, 200). Advance to 231, p. 314 (omit 204 to 213, 214–215, 220–221, and 224 to 311). Advance to 239, p. 326 (omit 232). Advance to bottom, p. 335. Advance to 253, p. 342. Advance to 259, p. 349. Review to 166, p. 229 (integral). Review to 175, p. 245 (omit 166, 167). Review to 188, p. 260 (omit 184, 186, 187). Review to 197, p. 273. Review to 233, p. 320 (omit as on advance). Review to 246, p. 333. Review to 259, p. 349. Advance to 23, p. 14 (least squares, Johnson). Advance to 38, p. 25 (omit 27, 28, and 30). Advance to 51, p. 34. Advance to 61, p. 44. Advance to 69, p. 53. Advance to 84, p. 68 (omit 76, 79, 81–83). Advance to 113, p. 91 (omit 96 to 113). Advance to 128, p. 100 (omit 122). Advance to 138, p. 108. Advance to end (omit 139, 142–145).		From 139, p. 230 (new)— Review to 161, p. 229 (new) (omit as on advance). Review to example 3, p. 254 (omit as on advance; also 181 to 193). Review to 193, p. 278 (omit as on advance). Review to 211, p. 304 (omit as on advance). Review to end, p. 319 Advance to 159, p. 216 (integral, Church). Advance to 163, p. 223. Advance to 166, p. 229. Advance to example 2, p. 240 (read 166, 167). Advance to 177, p. 248. Advance to 185, p. 254 (omit 184). Advance to 189, p. 263 (omit 186–187; paper). Advance to 194, p. 271 (omit 189–192.) Advance to 201, p. 279 (omit 199 and 200). Advance to 233, p. 320 (omit 203 to 216, 218 to 231, and 232). Advance to 239, p. 326. Advance to 244, p. 331. Advance to 247, p. 337. Advance to 255, p. 343. Advance to 259, p. 349. Review to 164, p. 224 (integral). Review to 172, p. 238 (omit 166, 167). Review to 178, p. 250. Review to 191, p. 266 (omit 184, 186–189). Review to 201, p. 279 (omit 192, 199, and 200). Review to 239, p. 326 (omit 203 to 216, 218 to 231). Review to 247, p. 337. Review to 259, p. 349. General review to 44, p. 33 (omit as on advance and first review; differential calculus). General review to 57, p. 44. General review to 67, p. 59. General review to 83, p. 81.

[Extract from Regulations U. S. M. A., 1894.]

MATHEMATICS.

32. This course shall comprise—

Algebra.—Fundamental operations; algebraic fractions; involution and evolution; imaginary quantities; series and principles of limits; logarithms; interest; combinations; probabilities; elements of determinants and general theory of equations.

Geometry.—Geometry of lines, planes, and volumes, and spherical geometry; and the formation and construction of determinate geometrical equations.

Trigonometry.—The solution of all the cases in plain and spherical trigonometry; analytical investigation of trigonometrical formulas, and the construction of trigonometrical tables.

Mensuration and surveying.—Mensuration of lines, angles, surfaces, and volumes; principles and practice of common land and maritime surveying; methods of platting and computing surveys; trigonometrical surveys; leveling; description and use of all the instruments used in ordinary surveying and platting.

Analytical geometry.—Construction of algebraic expressions; solution of determinate problems; systems of coordinates; determination and discussion of the equations of lines, planes, surfaces, and volumes; deduction of the properties, relations, and principles of curves, surfaces, and volumes, especially of the conic sections; methods of constructing curves and determination of loci.

Descriptive geometry.—The graphic illustration and solution of geometrical problems in space, and the particular application of this method to spherical projections; construction of maps, shades, and shadows; perspective and isometric projections.

Differential and integral calculus.—Differentiation of functions; determination of the rates of change of functions; development of functions into series; evolution of indeterminate forms; maxima and minima of functions; determination of tangents,

normals, asymptotes, order of contact of lines, curvature, involutes, evolutes, envelopes; curve tracing; spirals, formulas, and rules for integration; discussion and use of the arbitrary constant; integration between limits; rectification of curves; quadrature of curves, and cubature of volumes.

Method of least squares.—Errors to which observations are liable; correction of observations; probability curve and its equation; measure of precision; deduction and application of the various formulas for probable and mean error; weights of observations; formation of equations of condition and normal equations.

COURSE OF STUDY, TEXT-BOOKS, AND BOOKS OF REFERENCE.

The course of study and books used at the Military Academy 1895–96 are as follows:

DEPARTMENT OF MATHEMATICS.

First year, fourth class.—Davies' Elements of Algebra; Davies' Legendre's Geometry; Ludlow's Elements of Trigonometry; Davies' Surveying; Church's Analytical Geometry; Ludlow's Logarithmic Tables.

* * * * * * *

Second year, third class.—Church's Analytical Geometry; Church's Descriptive Geometry, Spherical Projections, Shades and Shadows, and Perspective; Peck's Determinants; Bass's Differential Calculus; Church's Integral Calculus; Johnson's Least Squares.

* * * * * * *

So far comparatively few lectures are given in mathematics. One is given early in September to the fourth class, explaining to them the course of study, the requirements of the Academy in mathematical studies, and the necessary methods of study essential for success.

Toward the end of the first year's course a lecture on the history and early development of geometry and algebra is given to the fourth class.

At the conclusion of the subject of descriptive geometry a lecture is given to the third class describing its origin and progress, together with a comparison of algebraic and geometric mathematics, including an outline of modern projective geometry which is not taught at the Academy.

After a few lessons in the calculus a lecture is given to the third class with a view of explaining the difficulties to be encountered and overcome at the beginning of the study of calculus.

At the conclusion of the calculus an account is given of its origin and early development, including the controversy between its discoverers, Newton and Leibnitz.

From time to time, especially on the advance, instruction is given to the sections or portions of a class having the same lesson, which may occupy the entire or a large portion of the recitation hour, but these explanations of lessons are not considered as lectures.

PART III.

ORGANIZATION OF THE DEPARTMENT.

[Description by Associate Prof. Wright P. Edgerton.]

The following is the present staff of the department of mathematics, and is a fair example of its usual organization:

Professor: Edgar W. Bass, head of the department. Associate professor: Wright P. Edgerton. Assistant professor: Daniel B. Devore, first lieutenant Twenty-third Infantry Instructors: John D. Barrette, first lieutenant Third Artillery; Charles D. Palmer, first lieutenant Third Artillery; John S. Winn, first lieutenant First Cavalry; Charles P. Echols, first lieutenant Corps of Engineers; William O. Johnson, second lieutenant Nineteenth Infantry; William M. Cruikshank, second lieutenant First Artillery; John H. Rice, second lieutenant Third Cavalry.

The organization of the classes under instruction is as shown in Appendixes F_1 and F_2.

DIVISION OF DUTIES.

The head of the department, as the title implies, has control of the entire department, apportions its work among the instructors, exercises a general supervision of both classes under instruction, prepares and conducts the examinations of these classes, is responsible for all property belonging to the department, and is the channel through which must pass all reports and official communications relating to departmental affairs.

The associate and assistant professors perform such duties as are assigned to them by the head of the department. During the present academic year the former has supervised the work of the third class, especially that pertaining to written recitations. He usually teaches the first section of that class and is available as a substitute for any absent instructor. During the same period the assistant professor has supervised in a similar way the work of the fourth class. From September 1 to December 31 he taught two sections of that class; since then he has had but one section, and, like the associate professor, has been available as a substitute for an absent instructor.

Each instructor teaches two sections of the class to which he is assigned.

PART IV.

The following is a full description of a recitation, including a description of the section room, number of cadets in a section, assignment of seats, questions and explanatory answers, assignment of subjects for recitations, use of the blackboard, apparatus, merit marks, visits of head of department, etc.:[1]

DESCRIPTION OF SECTION ROOM.

The section rooms occupied by the department of mathematics are on the second and third floors of the curtain of the academy building. All are practically of the same dimensions, 22 by 23 feet, height of ceiling 11 feet, and each is lighted by two large windows. Upon the walls in oak frames, their surfaces flush with the face of the frames, are twelve or fourteen slates, usually 4 feet by 3 feet 6 inches. When the wall spaces are long and unbroken four or five of these slates are in a single frame; elsewhere they are framed singly or in pairs. They are all known by the generic name of blackboards. From the lower part of each frame projects a shallow chalk tray, having at its bottom still shallower drawers, and above each drawer a galvanized wire grating. The chalk crayons and erasers, when not in use, are kept on the grating in the tray, while the dust which these implements always generate falls into the drawers below and is removed periodically. Still below the chalk trays are brass racks to support rulers and pointers. On the side of each room next the hall large ventilators are placed above and below the blackboards and above the door. In other parts of the walls are found still more ventilators and the register of the hot-air flue through which, in winter, air is forced, ranging in temperature from hot to cold at the option of the occupants of the room. Consequently the rooms may be said to have almost perfect ventilation, a matter of extreme importance where the air is for the common use of from 10 to 14 persons.

On a platform, usually between the windows, is the instructor's flat-topped desk, with a blackboard for his use behind it. Each member of a section is provided with a separate desk and chair, the latter of oak, the former having a sloping oak top, with a shallow receptacle beneath for books, resting on iron supports similar to those of a sewing machine. In section rooms occupied by the fourth class these desks are placed side by side in two rows, facing each other, parallel to, and equally distant from, the central line of the room through the instructor's desk. In the section rooms of the third class the desks face the blackboard on the side next the hall, and are arranged in four rows of three desks each, the desks of each row having intervals between them of about 3 feet. This permits the cadets to work at their seats, as is the constant custom in the third-class course, with slight danger of mutual assistance or interference.

ASSIGNMENT OF SEATS.

Seats are assigned by the instructor to members of a section in the order of their rank in the section, and usually in such manner that the section marcher shall be placed nearest the door.

NUMBER OF CADETS IN A SECTION.

Sections belonging to the upper parts of a class generally comprise 11 or 12 members, while the lower sections have but 8 or 10. This difference in size between the upper and lower sections is to enable the instructor having the latter to devote to each member a larger share of his personal attention.

In each section room is posted a copy of the regulations given below, and these are strictly observed:

"The following revised regulations for recitation rooms are published for the information and guidance of all concerned:

"1. The instructor shall be present when the section enters the room.

[1] I am indebted to Associate Prof. Wright P. Edgerton for description.

"2. On entering the recitation room, each cadet shall proceed to the seat assigned to him, and stand 'attention' until the section marcher makes his report.

"3. The section marcher shall enter the recitation room after the section, closing the door if the instructor be present; but in case he be absent, the section shall be seated, the section marcher shall keep the door open, preserve order in the section, and at the end of two minutes report to the senior officer of the department present for instructions.

"4. As soon as the report is made each member shall be seated, and immediately record the next lesson, which shall be written on a blackboard, or otherwise indicated, by the instructor.

"5. Each cadet shall bring to the recitation room a lead pencil, and only such books as may be indicated by the head of the department. Before anyone is called up for recitation the members of the section should ask for any information concerning points in the lesson which they have not been able to comprehend after diligent application, or should make any pertinent statement respecting lack of preparation.

"6. The members of the section called up shall take boards in order as directed, and write their names on the right-hand upper corner.

"7. When prepared to recite, each cadet shall provide himself with a pointer (in case one be needed), face the instructor, and stand 'attention' on that side of his board farthest away from the central line of the room, unless otherwise directed. The pointer shall be held in the hand nearest the board, and with the point down, except when used to indicate work on the board.

"8. Instructors shall require each cadet to keep an upright soldierly position of attention, and to recite with deliberation, clearness, and correct language. Each cadet while reciting, shall, as far as practicable, face his instructor.

"9. Instructors shall see that cadets do not use their hands or pointers improperly, and shall endeavor to prevent them from acquiring any peculiar or nervous habits while reciting; they shall report any want of neatness in dress or appearance.

"10. At the proper signal for dismissal the instructor shall cause all recitations to cease, and immediately dismiss the section. For recitations terminating at 10.55 a. m., 12. 53 p. m., and 3.59 p. m., the signal for dismissal is the recall sounded in the hall of the academy building. For recitations terminating at 9.30 a. m., 12 m., and 3 p. m. the signal for dismissal is the assembly sounded in the area of barracks.

"11. Upon the dismissal of the section the section marcher shall leave the room first and supervise the formation of the section outside.

"12. Instructors shall report daily to the adjutant of the Academy, through the head of the department, all cadets who have reported themselves as excused from recitation and any violations of regulations which may have come to their notice in the academy building. Absences will be noted on the weekly class reports.

"13. When an officer enters the section room, the section shall rise and remain at 'attention' until the officer be seated or otherwise indicate his pleasure. The instructor shall rise when the officer is senior to himself. At the discretion of a head of a department, the compliment may be omitted when the officer leaves the room, or reenters during the same recitation hour.

"14. Instructors should bear in mind that the proper discipline of their sections is largely determined by their own example and military bearing. Also, that the success of their instruction will depend in a great measure upon their patience, forbearance, and judicious assistance.

"By order of Colonel Ernst:

"W. E. WILDER,
"*Captain Fourth Cavalry, Adjutant.*"

DESCRIPTION OF A RECITATION.

The 8 o'clock assembly having been sounded in the area of the barracks by the trumpeter, and the sections duly formed, each is marched by its section marcher to the proper room in the academy building, where ranks are broken, caps hung on the hooks in the hall outside the door, and the members enter the section room. The last to enter is the section marcher, who stands in the open door until the members of his section have passed to their desks, where each stands "attention." He then closes the door, faces his instructor, salutes, and reports "All are present, sir," or "Cadet Blank is absent, sir," as the case may be. Occasionally this will be followed by a salute from some member of the section accompanied by the report "I am excused from recitation, sir." The instructor returns the salute and the cadets take their seats while he notes in his section book, a sheet of which is appended, marked F, the absence of Cadet Blank, or the fact that Cadet Dash is excused from recitation. In the latter event he prepares later a report, "Cadet Dash, reporting himself excused from recitation in mathematics," signs his name as reporting officer and submits it to the head of the department, who in turn forwards it to the adjutant, in

whose office the fact involved is verified by inspection of the morning report of the post surgeon. The members of the section open their text-books, glance at the board behind the instructor, where the limits of the next lesson are recorded, make a note of its extent, and of such corrections of, and additions to, the text as the instructor may now give them. The instructor then asks, "Are there any questions on the day's lesson?" At this time any member of the section is at liberty to ask for an explanation of such part of the lesson as he has been unable to comprehend, for the method of solving problems that may involve its principles, or to inquire into any development or extension of these principles.

For the purpose of making clear to the section the points thus brought up for explanation the instructor uses his judgment as to the time he should consume. When going over the text for the first time great latitude is permitted the section. Its members are encouraged to bring before the instructor the difficulties they encounter in the text of whatever nature they may be, and, moreover, the instructor voluntarily elucidates such important features of the lesson as to his mind may prove stumbling-blocks to his pupils. In this way it is customary to consume at least half an hour each morning, and frequently the whole recitation period of one and one-half hours is occupied for purposes of instruction only. On the other hand, when reviewing the text the time given to explanation is reduced to a minimum. Only such questions are answered as pertain to subjects overlooked or neglected when passing over the text before. The cadets at this period are expected to recite upon the subjects in the lesson, or to show their knowledge of its principles by applying them in the solution of examples and problems. Having cleared up all doubtful points of the lesson the instructor calls upon Mr. Asterisk, who takes his place at attention in front of the instructor's desk. The instructor then formally enunciates for him a subject in the lesson, as, for example, if in algebra, "Deduce a rule for extracting the n^{th} root of polynomials," or "Discuss the four forms of the quadratic equation." If in the calculus, "Define a point of inflexion; explain how to obtain critical values of the variables and how to test these values." Having heard the enunciation of his subject Mr. Asterisk goes to the board, known as the first front board, generally the one on the left hand opposite the instructor, writes his name on the upper right-hand corner of it, and proceeds to place upon it the formulas, equations, and intermediate mathematical work necessary for a clear and complete demonstration or deduction of the subject assigned to him. No writing is permitted upon the board. No erasure is allowed except by permission of the instructor. Tables of logarithms must be used for all computations.

In the meantime three other members of the section are called upon in turn and in a similar manner sent to the next three boards, in order, on the right of the one already occupied, each to discuss a subject in the lesson of the day. Following these, other members are called, each is given a card or slip of paper containing the data of certain problems or examples involving applications of the principles of the lesson, and each takes his place at one of the boards still remaining vacant, known as side boards, and proceeds to the solution of the problem given. Having sent to the boards as many members of the section as desirable, and this is usually all but one, the instructor then calls upon one of the remaining members whom he questions upon topics of the lesson of the day. As soon as any cadet at the board has completed his work, he takes a pointer in his hand, faces his instructor, and stands attention until called upon to recite. The instructor finishes questioning the cadet on the floor, permits him to take his seat, and marks opposite his name in the proper column of the section book (see Appendix F_3) his estimate, computed to a scale of 3, of the value of the recitation just completed. He then calls upon Mr. Asterisk, who, in response, enunciates the subject given him as follows: "I am required to deduce a rule for extracting the n^{th} root of polynomials," or "I am required to discuss the four forms of the quadratic equation," etc., and after giving any necessary preliminary definitions and explaining the significance of the quantities entering assumed formulæ or equations, passes step by step from this assumed data to the required conclusion. Ordinarily the work is placed upon the board in the same order it has in the text and the recitation follows quite closely the lines of the text, yet this is not required; but any correct demonstration is accepted, provided it is made in clear and logical form. The recitation ended, the instructor usually asks Mr. Asterisk a few questions relating to the salient points of his subject, in order to test the thoroughness of his knowledge of it, or he leads the cadet, by questions, to contemplate some development or application of the subject not indicated in the text. A similar process is followed with each of the other cadets at the front boards and then the instructor turns to those having problems at the side boards. When the instructor is satisfied that the problem or example given is one of which the answer is unknown to the pupil, it is customary to require merely a statement of the problem and the result; although, when time permits, the solution is explained from beginning to end. If errors are committed, they are traced to their source. As each cadet finishes his recitation the instructor marks its value in the section book, as has been described.

When the trumpet sounds recall in the academy building, the instructor dismisses the section as the last note ceases. It is then formed in the hall by the section marcher and marched by him to the area of barracks, where it is finally dismissed.

The foregoing description applies to a recitation in algebra, trigonometry, analytical geometry, or the calculus, and, in its main features, to a recitation in any other branch of the mathematical curriculum.

When teaching plane and solid geometry, each cadet is sent to the board to establish one or more propositions in the day's lesson and, in addition, is given a so-called extra—a problem or application depending upon the principles included in the lesson. This extra usually occupies about one-half hour of the cadet's time, and a failure to solve it is not allowed to affect his mark more than 0.5. In the event of failure, the instructor is required to explain its solution. A book of exercises, containing 422 of these extras, covering the ground embraced by the first four books of Davies's Legendre, has been compiled for the use of the instructors. Each morning the same set of extras is used in each section throughout the class, with the object of testing all parts of the class uniformly. Figures illustrative of principles or used for purposes of deduction must be drawn free hand—that is, without aid of ruler or string—but when a construction is required from given data, the ruler and string must be used and the figure must be as accurately drawn as is admissible with the implements at hand.

In the course of descriptive geometry the data for constructions at the side boards are given out in the form shown in Appendix F_4 and the problems are drawn to the scale marked upon the rulers and on the upper edges of the chalk trays. Colored crayons are largely used, but always in accordance with the scheme appended, marked F_5. Frequently the instructor allows all or the greater portion of his section to remain seated, gives them the data of certain problems, and requires their construction upon sheets similar to that of Appendix F_4. With this contingency in view each cadet is required to appear in the section room provided with a properly sharpened drawing pencil and a pair of dividers. Each desk is supplied with a ruler and triangle for the use of the cadet occupying it. Cadets at the front boards who are employed in the deduction of the principles, or in the explanation of the problems embraced in the lesson, are not permitted to place letters or figures upon their constructions; but must make them clear to the instructor by the proper use of the pointer. Occasionally in the course of descriptive geometry proper, and much more frequently in its application to shades and shadows and to perspective, the data for the construction of problems at the desks are hectographed upon a sheet (see appended samples marked F_6, F_7, and F_8), thus saving the time that would otherwise be lost in assuming the given magnitudes and enabling the cadet to concentrate his attention upon the portions of the construction requiring the application of the principles of the lesson.

VISIT OF HEAD OF DEPARTMENT.

At intervals the head of the department visits each section, the frequency of these visits depending largely upon the class under instruction and the subject being taught. For example, the fourth class, when studying algebra, receives his constant attention, not only for the purpose of watching the progress of its members, but to see that they acquire the proper methods of recitation. This same class when studying plane geometry or surveying, is visited less frequently, while the third class, which is then devoting its efforts to the calculus, demands a large share of supervision. As a rule a portion of each morning is consumed by visits to the section rooms, where the professor listens to recitations, questions the pupils, and gives such nstruction as he deems proper.

APPARATUS.

Of apparatus, the department of mathematics has, for use in the course of surveying, 5 transits, 5 compasses, and 4 levels, with the necessary accompaniments of chains, pins, rods, etc.; and the cadets of the fourth class are given as much practical work with these instruments as time will permit. The department possesses also 26 models of geometrical surfaces, some of which are of marked value to the members of the third class when studying descriptive geometry. Those showing the forms and methods of generation of certain warped surfaces seem to be of especial assistance to them.

PART V.

WEEKLY CLASS REPORTS, TRANSFERS, EXHIBITION OF MARKS.

The following description is by Associate Prof. Wright P. Edgerton:

WEEKLY CLASS REPORTS.

Saturday morning, after the recitation hour, each instructor submits to the head of the department a weekly class report (samples appended marked F_9 and F_{10}) on which is recorded the daily mark of each member of his sections, the total weekly mark, what portion of the text has been studied during the week, and what recitations have been written instead of oral. The initials at the foot of each daily column indicate the name of the instructor, while a B placed below implies a visit from the head of the department. The instructor also enters the weekly mark of each cadet upon the form appended, marked F_{11}, and computes the total mark to date.

TRANSFERS.

The head of the department, by comparing the total marks of cadets standing respectively at the bottom and top of adjacent sections, determines whether they shall retain their positions in these sections or be interchanged. In the latter case he recommends the transfers on the weekly class report. (See Appendices F_{10} and F_{12}).

EXHIBITION OF MARKS.

These weekly reports are submitted by the head of the department to the superintendent, who causes them to be posted in the lower halls of the academy building for the information of the cadets.

PART VI.

EXAMINATIONS, WRITTEN, ORAL, WEIGHT OF, DEFICIENCY OR PROFICIENCY OF CADETS, STANDARD REQUIRED.

From the organization of the Academy in 1802, until 1875, the arithmetical examinations were oral so far as I can learn. Since 1875 these examinations have been written.

The following is a detailed description of the requirements in arithmetic for admission in 1875 with the exception of paragraph 7, which was added in 1879. In 1884 the samples of examples and questions were added.

ARITHMETIC.

In arithmetic, they must be able—

1. To explain accurately and clearly its objects and the manner of writing and reading numbers, entire, fractional, compound, or denominate.
2. To perform with facility and accuracy the various operations of addition, subtraction, multiplication, and division of whole numbers, abstract and compound or denominate, giving the rule for each operation, with its reasons, and also for the different methods of proving the accuracy of the work.
3. To explain the meaning of reduction, its different kinds, its application to denominate numbers in reducing them from a higher to a lower denomination and the reverse, and to equivalent decimals; to give the rule for each case, with its reasons, and to apply readily these rules to practical examples of each kind.
4. To explain the nature of prime numbers and factors of a number, of a common divisor of two or more numbers, particularly of their greatest common divisor, with its use, and to give the rule, with its reasons, for obtaining it; also the meaning of a common multiple of several numbers, particularly of their least common multiple and its use, and to give the rule, with its reasons, for obtaining it, and to apply each of these rules to examples.
5. To explain the nature of fractions, common or vulgar and decimal; to define the various kinds of fractions, with the distinguishing properties of each; to give all the rules for their reduction, particularly from mixed to improper and the reverse, from compound or complex to simple, to their lowest terms, to a common denominator, from common to decimal and the reverse; for their addition, subtraction, multiplication, and division, with the reason for each change of rule, and to apply each rule to examples.

6. To define the terms ratio and proportion, to give the properties of proportion and the rules and their reasons, for stating and solving questions in both simple and compound proportion, or single and double rule of three, and to apply these rules to examples.

7. The candidates must not only know the principles and rules referred to above, but they are required to possess such a thorough understanding of all the fundamental operations of arithmetic as will enable them to combine the various principles in the solution of any complex problem which can be solved by the methods of arithmetic. In other words, they must possess such a complete knowledge of arithmetic as will enable them to take up at once the higher branches of mathematics without further study of arithmetic.

8. It is to be understood that the examination in these branches may be either written or oral, or partly written and partly oral; that the definitions and rules must be given fully and accurately, and that the work of all examples, whether upon the blackboard, slate, or paper, must be written plainly and in full, and in such manner as to show clearly the mode of solution.

The following examples and questions in arithmetic are a few of those which have been used at past examinations. They are given in order to indicate more clearly whatis required, but it should be distinctly understood that entirely different ones are used each year.

Multiply 4.32 by .00012.

Explain the reason for placing the decimal point in the answer. (The rule for so doing is not the reason.)

Reduce $\frac{5\frac{1}{2}+\frac{7\frac{1}{4}}{05}-0.725}{\frac{4+3.45}{2\frac{1}{2}}}$ to an equivalent decimal.

Divide 3,380,321 by MDCCXCIX, and express the quotient by the Roman system of notation.

Change .013 to an equivalent fraction whose denominator is 135.

Find the greatest common divisor of $26\frac{1}{2}$, $28\frac{7}{8}$, $29\frac{1}{16}$.

How many men would be required to cultivate a field of $2\frac{5}{8}$ acres in $5\frac{1}{2}$ days of 10 hours each if each man completed 77 square yards in 9 hours?

Separate $772\frac{3}{8}$ into three numbers which shall be in the same proportion as $2\frac{1}{2}$, $\frac{7}{10}$, $\frac{6}{10}$.

If 5 cubic feet of gold weigh 98.20 times as much as a cubic foot of water, and 2 cubic feet of copper weigh 18 times as much as a cubic foot of water, how many cubic inches of copper will weigh as much as $\frac{7}{9}$ of a cubic inch of gold?

Find the least common multiple for the numbers $\frac{4}{5}$, 2.1, 5.25, $\frac{7}{4}$.

A wins 9 games out of 15 when playing against B, and 16 out of 25 when playing against C. How many games out of 118 should C win when playing against B?

A and B run a race, their rates of running being as 17 to 18. A runs $2\frac{1}{2}$ miles in 16 minutes and 48 seconds and B runs the entire distance in 34 minutes. What was the entire distance?

A and B can do a piece of work in 4 hours, A and C in $3\frac{3}{4}$ hours, B and C in $5\frac{1}{7}$ hours. In what time can A do it alone?

English shillings are coined from a metal which contains 37 parts of silver to 3 parts of alloy; 1 pound of their metal is coined into 66 shillings. The United States silver dollar weighs 412.5 grains, and consists of 9 parts silver to 1 part alloy. What fraction of the United States dollar will contain the same amount of silver as 1 English shilling?

Give the rules for reducing a decimal of a given denomination to integers of lower denominations.

What is the effect of dividing the denominator of a fraction by a whole number, and why?

Explain the difference between a common fraction and a decimal.

What is the effect of annexing a cipher to a decimal, and why?

If the same number be subtracted from both terms of an improper fraction, what will be the effect? Why?

Give the rule for reducing a common fraction to an equivalent decimal, and explain why the resulting decimal will be equal to the common fraction from which it is obtained.

Give the rule for dividing one decimal by another, and explain why the decimal point in the quotient is placed where the rule directs.

Define reduction, and state the different kinds.

No change has been made in the above requirements since 1884. The following is the paper, with weight, used in March, 1896. A copy of the arithmetic paper used in August, 1878, is submitted for comparison.

PAPER USED IN MARCH, 1896.

[Write your number and the place and date in the spaces provided.]

No. ———. Place, ——— ———, *March* —, *1896.*

EXAMINATION IN ARITHMETIC.

[Time allotted, three and one-half hours.]

DIRECTIONS.

Arithmetical solutions are required, but due credit will be given for any correct solution.
Sufficient arithmetical work to indicate clearly the method and operations is required in all examples.
Answers to examples without the solution will not receive credit.
Work to include four decimal places, when necessary, is sufficiently accurate.
Reduce all fractional results to simplest form.
A rule is not received as a reason for a principle or in place of a solution.
Do not attempt to solve examples upon extra paper with a view of copying.
In case a question or example is ambiguous, answer or solve it as you understand it.
Be careful to put your work in each case in the proper space. There is ample room, but if necessary use the extra sheet, indicating clearly in each case the number of the example.
Draw a line with your pen through erroneous work, and begin again. Do not erase with a knife or eraser.
You are advised to take the examples in order as given. Should any one delay you too long, pass on to the others. After trying all you can, return to the unsolved ones, in case there is time.
You will receive credit for all correct work done; therefore do what you can in each case, even though you may not be able to complete the solution or obtain a correct result.
Numerical errors do not count as much against you as errors in methods.
Indicate your answer in each example by writing "Ans." near it.

ASSUME THE FOLLOWING DATA.

1 pound avoirdupois = 7,000 grains troy.
The weight of 27.7015 cubic inches of distilled water is 1 pound avoirdupois.
1 gallon beer measure contains 282.0 cubic inches.
1 bushel contains 2,150.42 cubic inches.
1 United States gallon wine measure contains 231 cubic inches.
25 pounds avoirdupois = one quarter.
1 fathom = 6 feet.
1 hand = 4 inches.
40 square rods = 1 rood. *R.*
The ratio of a to b is $\frac{a}{b}$.
1 ounce troy = 31.1 grammes.
1 English Imperial gallon contains 277.24 cubic inches.

No. 1.—How many sixteenths are there in $\frac{2\frac{3}{8}}{8}$?
[Wt. 5.]

No. 2.—What is the difference in grains between 42⅜ lbs. Av. and 42.375 lbs. T. ?
[Wt. 8.]

No. 3.—A bought 10 pears and 20 apples for 11 cents; at another time, when the
[Wt. 8.] prices were the same, he bought 20 pears and 10 apples for 13 cents. What did he pay for each apple and pear?

No. 4.—A is 49 years old at the time his three sons are 25, 20, and 16 years old,
[Wt. 11.] respectively. Find A's age at the time it is equal to the sum of the ages of his three sons.

No. 5.—472 is the greatest common divisor of two numbers, and ⅞ is their ratio in its
[Wt. 11.] simplest form. What are the numbers?

No. 6.—A wheel with 35 cogs works into a smaller wheel with 26 cogs; in how many
Wt. 12.] revolutions of the larger wheel will the smaller one gain 10 revolutions?

No. 7.—A gun is fired 36 times before a second gun begins, after which the first is
[Wt. 15.] fired 8 times while the second is fired 7 times; but the second requires the same amount of powder for 3 shots that the first requires for 4. When both guns have used up the same amount of powder, how many shots have been fired from each?

No. 8.—A, B, C, and D, working one at a time, do a certain work in 130 days. A
[Wt. 15.] gets 42 cents, B gets 45 cents, C gets 48 cents, and D gets 50 cents for each day's work. Each received the same amount. How many days did each work?

No. 9.—Having 300 barrels of flour worth $7.50 per barrel, and 800 barrels worth
[Wt. 15.] $7.80 per barrel, and 400 barrels worth $7.65 per barrel, how many more barrels of flour at $8.00 and $8.50 per barrel will make 2,000 barrels worth $7.85 a barrel?

State the arithmetics you have studied.

PAPER USED IN AUGUST, 1896.

No. ———. AUGUST —, 1878.

EXAMINATION IN ARITHMETIC.

[Time allotted, four hours.]

DIVISION I.

1. Express 1666 by the Roman system of notation.

2. Multiply four million twenty-five thousand and one by one hundred thousand and twenty.

3. What are the prime factors of 2772?

4. Find the least common multiple for the numbers 270, 189, 297, 243.

5. Divide $\frac{3\frac{1}{2} - \frac{0.45}{\frac{6}{5}}}{\frac{7}{9} + \frac{11}{8}}$ by $\frac{1.05 \times 2\frac{1}{3}}{\frac{6}{52} \div 0.3}$

6. Change 0.4 to an equivalent fraction whose denominator is 28.

7. Reduce 3 mi., 8 fur., 15 rds., 4 yds., 2 ft., 7 in., to rods.

8. A railroad has three tracks, of the following lengths: 3013, 2231, and 2047 feet; what is the length of the longest rail that will exactly lay each track?

9. If $37\frac{1}{5}$ yards of cloth 4 feet wide cost $4.25, what will $104\frac{1}{7}$ feet $1\frac{1}{2}$ yards wide cost at $\frac{4}{5}$ the price?

10. A and B together can do a piece of work in $15\frac{1}{2}$ days; A can do $\frac{3}{5}$ as much as B. In how many days can each do it alone?

DIVISION II.

1. Give the rule for reducing two or more fractions to their least common denominator.

2. What is the effect of dividing the denominator of a fraction by a whole number, and why?

3. Give the rule for changing a decimal to an equivalent common fraction.

4. Give the rule for dividing one decimal by another.

5. Give the rule for reducing a decimal of a given denominator to integers of lower denominations.

The candidate will state the text-books in this subject that he has studied, and write his number in a legible hand.

Sixty-six per cent was required on the above paper for 1896, except in certain cases where candidates were excellent in all other branches required for admission. The standard was lowered to include some with 64 per cent, 62 per cent, and one with only 60 per cent. This is the general practice of the academic board at present. One hundred and eighty-nine were examined; 129 passed and 60 failed.

Previous to the year 1892 candidates were examined at West Point. In March, 1892, examinations were held at various convenient places, army officers being detailed to supervise them.

The papers were prepared by the academic board, and after the candidates had finished their work all papers were returned to the academic board for correction and decision. A subsequent examination was held in June at the Academy. This method has continued up to the present time, and promises to be better than the old, provided army officers will prevent candidates from communicating with each other at such examinations.

Up to and including the June examination, 1881, the examinations of cadets were in general oral. In December, 1881, a new method was established, which included written as well as oral examinations. The following rules, which were adopted at that time, explain fully the methods subsequently used:

* * * * * * *

"1. For examination in all branches of study of cadets of all classes, both in January and in June, the academic board shall be divided into two committees, as nearly equal in numbers as may be convenient. These committees shall be arranged and the order and method of examination shall be determined by the academic board.

"Examinations at any other time shall be conducted as the academic board may in the case direct.

"2. Each committee shall examine the cadets in the branches of study assigned to it according to the method prescribed, and after examination shall arrange in a proposed order of merit in each branch of study a roll of the cadets of each class pursuing that branch, indicating upon the roll the proficiency, doubtful proficiency, or deficiency of each cadet. No cadet shall be reported by the committee as proficient or deficient except by unanimous vote; in all other other cases the cadet shall be reported as of doubtful proficiency.

"3. After completing its allotted part of the examination, each committee shall submit to the academic board a report of its proceedings, including the several rolls of cadets in order of merit, all written examination papers forming any part of the examination, and such notes and remarks as may be necessary to give the board satisfactory information upon which to base its decision.

"4. Upon receiving the reports of the committees, the academic board shall carefully consider the same, including rolls, marks, notes, remarks, and written examination papers, with especial attention to cases of doubtful proficiency, and shall then arrange each class in order of merit in each branch of study and decide upon the proficiency or deficiency of each cadet.

"The board may also order such further examination as it may think proper.

"General merit rolls shall be arranged by committees appointed by the academic board.

"5. * * * In all branches of study except drawing the examination shall be oral, written, or partly oral and partly written, as the board shall direct; but after an oral examination in any branch of study every cadet who is not, in the unanimous opinion of the committee, proficient shall be subjected to a written examination upon a paper prepared by the head of the department of study under consideration and approved by the committee, such examination to be conducted by the head of the department and his instructors.

"6. At any oral examination the subject of examination shall be so limited for each cadet as to make not exceeding one hour a reasonable allowance of time to prepare to recite, and after the expiration of the allotted time the cadet may be called upon in his proper turn to recite.

"7. In cases of examination wholly or partly written for the whole class the heads of departments shall prepare, at least one week before the examination, examination papers, to be submitted to a committee of two other members of the board, the committee to be appointed by the board and to be as permanent as practicable.

"8. All written examination papers shall, as soon as possible after the cadet's work upon them is completed, be carefully examined, the errors indicated, and proper marks given, both by the head of the department of instruction and by the instructor of the section. These papers and marks shall be submitted to the committee in case of a written or partly written examination for the whole class, but to the academic board in all other cases."

* * * * * * *

In the autumn of 1895, after careful consideration, the academic board recommended that the following paragraph be added to the regulations for the United States Military Academy:

"72½. Upon the completion by any class of any branch of a course of study before the end of an academic term, the class may, by a vote of the academic board, be examined immediately, and the names of all cadets who are declared deficient shall be submitted to the War Department in the manner prescribed by paragraph 82."

This change was approved by the honorable Secretary of War, and upon the completion of analytical geometry the third class was examined upon that subject. Those who failed to pass were conditioned to make up their deficiency by January 1, 1896.

Upon completing the subject of descriptive geometry in February, 1896, the third class was immediately examined, and those who failed were granted until June to make up their deficiency.

At the annual examination in June only one member of the third class failed to pass.

On March 10, 1896, the fourth class was examined upon plane geometry, and those who failed were permitted to go on until June, 1896. All but three made up their deficiency in that subject, and five only failed upon the course from January to June.

These results, as compared with those of previous years, are remarkable, and while they are almost too good to continue always, they show beyond a doubt the advantage of the method of intermediate examinations.

I submit herewith copies of examination papers which have been used at the times indicated, with a complete set of those used from September 1, 1895, to June 2, 1896, for the entire classes. The weights are indicated thereon. Each paper, with its weights, is examined and approved by a standing committee of the academic board, appointed for that purpose.

Oral examinations in mathematics, being less extended, usually have a weight of five advance recitations, i e., a maximum of 15.

The standard of proficiency is generally about two-thirds of the maximum mark after examination, due weights having been assigned to the advance, first review, and general review recitations.

[Written for doubtful cases after oral.—Weight, 18.]

EXAMINATION IN ALGEBRA.

PART I.

[Time allotted, two hours.—January, 1885.]

1. Factor the expression $bx^3 - 7ax^2 - 20a^2x$.

2. Simplify $\dfrac{\left[\left(a^m\right)^{\frac{1}{r}}\left(a^q\right)^{\frac{1}{r}}\right]^{nr}}{\left[\sqrt[q]{b^n}\left(\sqrt[r]{b}\right)^r\right]^{mq}} \div \left[\left(\dfrac{a}{b}\right)^q\right]^r$.

3. Find the value of -0.0357^{-5} by means of logarithms.

4. In the expression $a^{-\frac{7}{9}}\left[\left(a - a^2x\right)^{\frac{1.47}{1.89}}\right]^{\frac{2m}{6}}$ introduce $a^{-\frac{7}{9}}$ into the brackets and parentheses and simplify.

PART II.

[Time, two and one-half hours.]

5. A cask contains a gallons of water and b gallons of alcohol. Another cask contains m gallons of water and n of alcohol. If h gallons be drawn from each cask and mixed, how many gallons of each fluid will the mixture contain?

6. The base of a system of logarithms is 82,134. Find the modulus of the system.

7. Find three numbers such that their sum shall be 14, the sum of their squares 84, and the product of the first and third equal to the square of the second.

WRITTEN EXAMINATION, ALGEBRA (FOR DOUBTFUL CASES).

[January, 1895. Total weight, 18.]

PART I.

[Time allotted, two hours.]

No. 1. Show that the form $\left[\dfrac{x^m - y^m}{x - y}\right)_{x=y} = \left(mx^{m-1}\right)$ holds true when m is fractional and equal to $\frac{r}{s}$; also when m is equal to $-p$.

No. 2. Find the number expressed by three digits such that the sum of the squares of the digits shall be 104, the square of the middle digit to exceed twice the product of the other two by 4, and if 594 be subtracted from the number the remainder will be expressed by the same digits reversed.

No. 3. Develop $\sqrt[3]{\frac{c^2}{(c^2-x^2)^2}}$ into a series, 5 terms required.

PART II.

[Time allowed, two hours.]

No. 4. Assume the ordinary logarithmic series and deduce the converging logarithmic series used in computing a table of Napierian logarithms.

No. 5. Divide $\left(\frac{27}{4}+\frac{8}{7}\sqrt{42}\right)$ by $\left(\frac{1}{3}\sqrt{21}+2\sqrt{\frac{1}{2}}\right)$ and reduce the quotient to its simplest form.

No. 6. A vessel contains a mixture of 16 gallons of brandy and 2 gallons of water. If $1\frac{1}{2}$ gallons be drawn off each day, and $1\frac{1}{2}$ gallons of brandy be poured in each day, how much brandy will the vessel contain at the end of seven days?

[Written for the entire class.]

EXAMINATION FOURTH CLASS, MATHEMATICS, JUNE, 1891.

1. *Geometry.*—Show the relation between similar triangles and their homologous sides. [Weight, 4.]

2. *Geometry.*—Assume two similar unequal pentagons, and construct a third similar pentagon equal to their difference. [Weight, 3.]

3. *Geometry.*—Find a side and the altitude of an equilateral triangle in terms of the radius of the inscribed circle. [Weight, 4.]

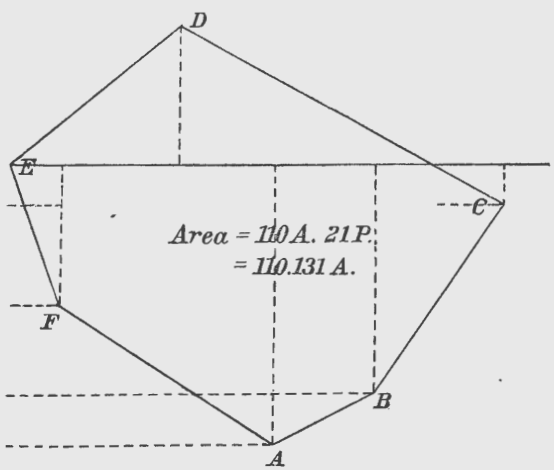
4. *Geometry.*—Find the area of the circular sector whose angle is 147° 29′, the radius of the circle being 25 feet. [Weight, 3.]

5. *Geometry.*—The sum of the angles of a spherical octagon is 1140°, and the radius of the sphere is 12 feet. Find the area of the octagon and the volume of the corresponding spherical pyramid. [Weight, 4.]

6. *Surveying, etc.*—See problem (page —). [Weight, 12.]

Station.	Bearing.	Course.	Latitude.	Dep.
A	N. $67\frac{3}{4}$ E.	11.15	+ 4.23	+10.32
B	N. $27\frac{1}{2}$ E.	22.40	+19.85	+10.33
C	N. $57\frac{1}{2}$ W.	33.75	+18.12	−28.47
D	S. $46\frac{1}{4}$ W.	21.85	−15.12	−15.79
E	S. $20\frac{1}{4}$ E.	15.50	−14.54	+ 5.36
F	S. $55\frac{1}{2}$ E.	22.15	−12.54	+18.25

Run a line from D dividing the field into two parts equal in area.



1. *Analytical geometry.*—Find the shortest distance from the point $\left\{\begin{matrix} x'= & 5 \\ y'= & -7 \end{matrix}\right\}$ to the right line $3x-4y$. [Weight, 2.]

2. *Analytical geometry.*—Find the equation of a straight line which passes through the point $\left\{\begin{matrix} x'=5 \\ y'=3 \end{matrix}\right\}$ and is parallel to the straight line which passes through the points $\left\{\begin{matrix} x''=-2 \\ y''=7 \end{matrix}\right\}$ and $\left\{\begin{matrix} x'''=-4 \\ y'''=-5 \end{matrix}\right\}$. [Weight, 3.]

3. *Analytical geometry.*—Find the equation of a straight line which passes through the center of the circle $x^2+y^2-6x-8y=-21$ and makes an angle of 60° with the straight line $x-2y=-1$. [Weight, 5.]

1. *Trigonometry.*—Find log. sec. —(430° 22′). [Weight, 2.]

2. *Trigonometry.*—Having log. cosec Q=0.02610, find all positive value of Q <360°. [Weight, 2.]

3. *Trigonometry.*—Assume formula for sin (x + b) and deduce formulas for following: Sin (x—b), cos (x + b) (cos x—b), tan (x + b), cot (x—b). [Weight, 5.]

4. *Trigonometry.*—Having a=109.4321 mi., A=50° 12′, C=58° 08′, radius=100 mi , solve the oblique spherical triangle (log. $\frac{\pi}{180}$=2.24188). [Weight, 11.]

[Written for the entire class. Weight, 60.]

EXAMINATION FOURTH-CLASS MATHEMATICS, JUNE 1, 1895.

PART I.—8 to 10.30 a. m.

1. *Geometry.*—Show that triangles which have corresponding sides proportional are similar. Scholium. [Weight, 5.]

2. *Geometry.*—Show that any side of a spherical triangle is less than the sum of and greater than the difference between the other two sides. (1) Any side of a spherical polygon ——. (2) The arc of a small circle on the surface of a sphere ——. (3) The shortest distance from one point to another on the surface of a sphere ——. [Weight, 6.]

3. *Geometry.*—Find the volume of the frustrum of a right triangular pyramid, with each side of the lower base = 6 feet and each side of the upper base = 4 feet. The altitude = 5 feet. [Weight, 4.]

4. *Geometry.*—Find the volume generated by a regular semihexagon revolving about its axis which is 12 feet in length. [Weight, 4.]

5. *Geometry.*—Through two given points draw a circle tangent to a given right line, take points and line as indicated C———D. [Weight, 4.]

6. *Geometry.*—Show that the rectangle of the two sides of a triangle is equal to the rectangle of its altitude and the diameter of the circumscribed circle. [Weight, 4.]

PART II.—10.45 a. m. to 1 p. m.

7. *Trigonometry.*—Assume the formulas for sin $(x \pm b)$ and cos $(x \pm b)$ and deduce formulas for sin $\frac{Q}{2}$, cos $\frac{Q}{2}$, tan $\frac{Q}{2}$, cot $\frac{Q}{2}$, in terms of cos Q. [Weight, 3.]

8. *Trigonometry.*—In an oblique plane triangle $a = 273.960$, $b = 198.632$, $c = 236.914$. Compute A, B, and C. [Weight, 4.]

9. *Trigonometry.*—In a right trihedral $\alpha = 69° 13′ 40″$, B = 99° 40′ 30″, A = 90. Solve the trihedral. [Weight, 4.]

10. *Trigonometry.*—In an oblique trihedral $\alpha = 68° 46′ 2″$, $\beta = 37° 10′$, C = 39° 23′. Solve the trihedral. [Weight, 7.]

PART III.—2 to 4 p. m.

11. *Trigonometry.*—Express sin Q in terms of each of the other trigonometric functions of Q. (Assume formulas in Table B.) [Weight, 3.]

12. *Analytical geometry.*—Find the shortest distance between the right lines whose equations are $9x+3y=7.7$ and $y=-3x+9$. [Weight, 2.]

13. *Analytical geometry.*—Find the equation of a right line which passes through the point $(x'\ y')$ and makes with the line $Ax+By+C=0$ an angle = Q. [Weight, 3.5.]

14. *Analytical geometry.*—Find the equation of a right line which passes through the point $x'=5y'=-3$ and is perpendicular to the right line which passes through the two points $\left\{\begin{matrix} x''=-2 \\ y''=7 \end{matrix}\right\}$, $\left\{\begin{matrix} x'''=-4 \\ y'''=-5 \end{matrix}\right\}$. [Weight, 3.5.]

15. *Analytical geometry.*—Deduce the general equation of a circle referred to rectangular axes in its own plane, and determine formulas for finding the center and radius from the general equation. [Weight, 3.]

[Written for the entire class. Total weight, 45.]

EXAMINATION THIRD CLASS MATHEMATICS, JANUARY, 1895.

PART I.

ANALYTICAL GEOMETRY, TWO AND ONE-HALF HOURS.

1. Find the equation of a plane which contains the point $(-2, 3, 4)$, is parallel to the right line $\left\{\begin{matrix} x = & 3z+2 \\ y = & -6z-3 \end{matrix}\right\}$, and makes an angle of 60° with plane $z = -2/3\,x - \frac{y}{2} + 2$. [Weight, 4.]

2. Show what the area of a portion of a parabola is equal to, in terms of the rectangle described on the ordinate and abscissa of the extreme point. [Weight, 6.]

3. If a circle be described on the conjugate axis of an ellipse, show the relation existing between any abscissa of the circle and the corresponding abscissa of the ellipse. Show the construction that depends upon the relation. [Weight, 5.]

4. $r = \dfrac{-b^2}{a + c\cos v}$ and $r = \dfrac{b^2}{a - c\cos v}$, in which $c = \sqrt{a^2 + b^2}$ are the polar equations of the hyperbola pole at the right-hand focus. Discuss them with respect to v, show which points of curve are determined by each, and the corresponding values of cos V. Determine values of r for the vertices of curve. [Weight, 6.]

5. Construct with accuracy the curve $144y^2 - 120xy + 25x^2 - 2x - 29y - 1 = 0$. [Weight, 6.]

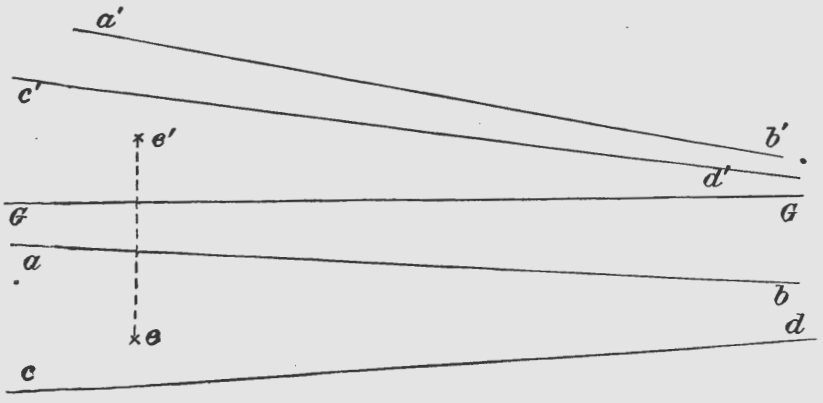
DESCRIPTIVE GEOMETRY.

1. Prove that if lines are tangent in space their projections on the same plane will be tangent to each other. Show when the converse is true and why. [Weight, 1.]

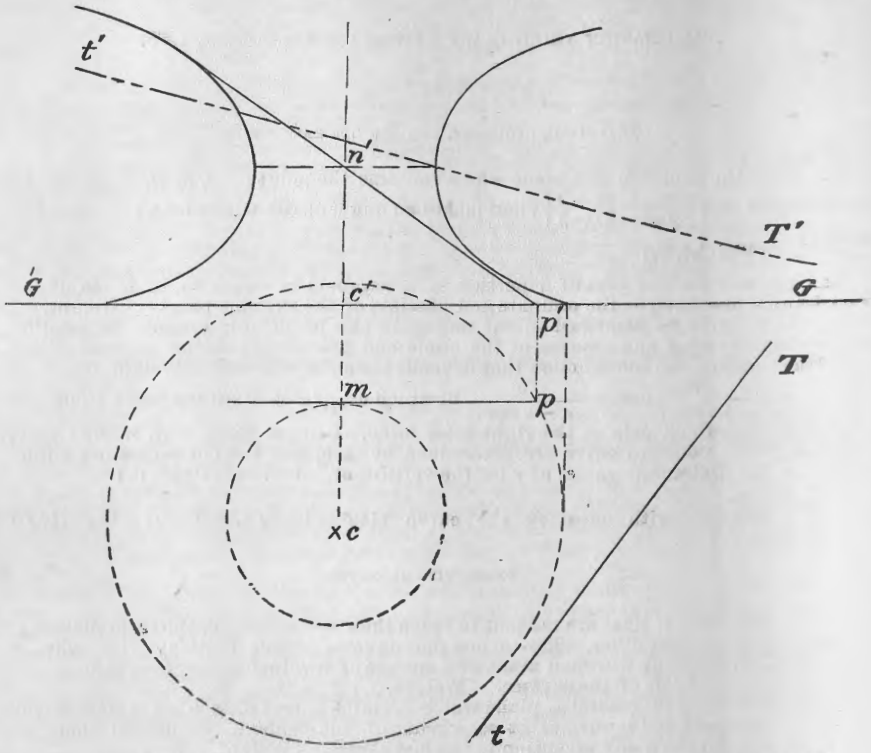
2. Show that any meridian plane of a surface of revolution bisects at right angles a system of chords of the surface. [Weight, 1.]

3. Prove that in general a plane which contains a rect element of a warped surface is tangent to the surface at some point of this element, but not all along the element. Mention any exception to the last clause. [Weight, 2.]

4. Find the length of the perpendicular from the point E to the plane of the two right lines AB and CD. [Weight, 5.]



5. To find the intersection of any surface of revolution by a plane. [Weight, 9.]



Let the surface be a hyperboloid of revolution of one nappe given below, and $t\,T\,t'$ be the cutting plane. Construct the curve of intersection and an axis of it. Points of tangency of projections of curve to corresponding projection of important limiting lines of surface required, with reasons for the tangency.

[Written for the entire class. Total weight, 3.]

INTERMEDIATE EXAMINATION, THIRD CLASS, ANALYTICAL GEOMETRY, NOVEMBER 6, 1896.

PART I.—8 to 9.25 a. m.

1. Given $\left.\begin{matrix}3z-2x=17\\5z+4y=\ 9\end{matrix}\right\}$.. (1) and $\left.\begin{matrix}\frac{2}{3}z+\frac{x}{4}\ =\ 3\\7-z6y=-2\end{matrix}\right\}$.. (2). Find the angle they make with each other. Find the angle that (1) makes with axis of X. Find the angle that (2) makes with the plane YZ. [Weight, 6.]

2. Find the axes, eccentricity, and parameter of the curve $3y^2+4x^2=18$. [Weight, 4.]

3. Deduce a general polar equation of the ellipse. Determine form of same when pole is at center of ellipse; 1° in terms of a and b, 2° in terms of b and e, 3° in terms of a and e. [Weight, 5.]

PART II.—9.30 to 10.55 a. m.

4. Having ellipse referred to its center and axes, deduce an expression for the subtangent corresponding to (x'', y'') and explain the consequent construction. Will a similar construction apply when ellipse is referred to its center and a set of conjugate diameters? Why? [Weight, 4.5.]

5. Deduce the formulas for coordinates of the center of conics, and show which have centers and which have not. [Weight, 4.5.)

6. Find the equation of the surface generated by revolving the curve $y^2=8x-16$,

about the axis of Y; its meridian curve, and its intersection by a plane perpendicular to Y. [Weight, 4.]

7. (a') Give the equation of an ellipsoid referred to center and axes. (b') Give equation of tangent plane to same at (x'' y'' z''). (c') What kind of curves may be cut out of an ellipsoid by planes? (d') When $a > b > c$ describe the position of planes that cut out circles. (e') What kind of a conic is the line of contact of a cone tangent to an ellipsoid? Why? [Weight, 2.]

[For the entire class. Weight, 21. Time, one and one-half hours.]

EXAMINATION PAPER, DESCRIPTIVE GEOMETRY, JANUARY, 1896, FIRST PERIOD.

1. Give the analysis of the problem: "To find the shortest line which can be drawn, terminating in two right lines, not in the same plane." [Weight, 1.5.]

2. If a right line is perpendicular to a plane, prove that its projections will be respectively perpendicular to the traces of the plane. [Weight, 1.5.]

3. Surfaces.. (Weight, 3.)
- First..
  - First....
  - Second.. — First. / Second.
  - Third...
- Second.

Complete the above diagram so that it shall exhibit the classification of surfaces, and define each class and subclass.

Find the angle x made by the right line AB (5a, 3, 4) (8, 1.5, 4.5) with the plane of the two right lines CD (6.5, 4, 2) (2, 2, 4) and CE (6, 5, 4, 2) (4, 1, 0). No traces of planes to be found or used. [Weight, 5.]

Total weight for first period, 11.

THIRD CLASS, JANUARY, 1896, SECOND PERIOD.

[Time, one and one-half hours.]

52. Construct the cylinder whose base, in H, is a circle having for its radius 1.5 and for its center the point C (8.0, 3.0, 0.0), the rectilinear elements of the cylinder being parallel to the right line CB (8, 3, 0) (6, 0, 1.5). [Weight, 1.]

Intersect the cylinder by the plane, perpendicular to CB, passing through the point of that line one unit above H, find the curve of intersection by this plane and develop the portion of the cylinder lying between the intersecting plane and H.

NOTE.—Place the development on the left of the drawing, the rectified right section coincident with the left edge of the paper and the center of this rectified arc on GG.

[For the entire class. Weight, 15.]

INTERMEDIATE EXAMINATION, THIRD CLASS, DESCRIPTIVE GEOMETRY, FEBRUARY 12, 1896.

FIRST PERIOD.—8 to 9.20 a. m.

1. Show what the stereographic projection of any circle on the surface of a sphere is and where the extremities of a diameter of the projection of any such circle are to be found. [Weight, 2.5.]

2. Describe the conic projection. State (1) when the exaggeration is the greatest; (2) how it may be lessened; (3) the manner of using it to advantage when a small portion of the surface between two given parallels is to be represented. [Weight, 1.5.]

3. Construct the shade and shadow of a sphere. (Model given.) [Weight, 3.5.]

Total weight for first period, 7.5.

SECOND PERIOD.—9.30 to 10.55 a. m.

4. (1) The perspectives of what sets of parallel lines are parallel? Why?

(2) Rule for constructing the vanishing line of any plane.

(3) Rule for constructing a set of conjugate diameters of an ellipse which is the perspective of any given circle.

(4) Rule for constructing the vanishing point of the projections of rays on any plane. [Weight, 3.3.]

(5) Perspective of shade and shadow of a cylindrical column with square pedestal and abacus. (Model with perspective of pedestal, abacus, and one circle of column given.) [Weight, 4.2.]

[Written for the entire class. Total weight, 25.]

INTERMEDIATE EXAMINATION, FOURTH CLASS, IN GEOMETRY, MARCH 10, 1896.

PART I.—8 to 9.30 a. m. [Weight, 13.]

1. If two angles of a triangle are equal, the sides opposite to them are also equal. [Weight, 2.]

2. If from a point without a circle a tangent and a secant are drawn, the secant terminating in the concave arc, the tangent is a mean proportional between the secant and its external segment. [Weight, 2.]

3. If a straight line is perpendicular to two straight lines at their point of intersection it is perpendicular to the plane of those lines. [Weight, 4.]

4. Given an equilateral triangle inscribed in a circle, and a similar circumscribed triangle; determine the ratio of the two triangles to each other. [Weight, 3.]

5. Find a point within a triangle such that the angles formed by drawing lines from it to the three vertices of the triangle shall be equal to each other. [Weight, 2.]

PART II.—9.30 to 11 a. m. [Weight, 12.]

6. Show what the volume of the frustrum of any cone is equal to. [Weight, 3.]

7. The area of a spherical triangle = ? [Weight, 3.]

8. The area of a lune = 33.55 sq. ft.; the angle of the lune = 60°. Surface of sphere = ? Volume of sphere = ? [Weight, 2.]

9. What is the surface of a zone on a hemisphere whose radius is 5 feet, the radii of the bases being 4 and 3; and what is the volume of the corresponding segment? [Weight, 3.]

10. Given A———B = base of a triangle $<$A, "a" angle at base, and C———D = side opposite angle "a" minus unknown side adjacent to "a," construct the triangle. [Weight, 1.]

WRITTEN EXAMINATION PAPER FOR THE FOURTH CLASS, JUNE 2, 1896. TRIGONOMETRY, SURVEYING, AND PART OF ANALYTICAL GEOMETRY.

[Time, four and one-half hours.]

1. *Trigonometry.*—Paper with constructions, etc., functions to be determined. [Weight, 2.]

2. *Trigonometry.*—From a point 108 feet above a horizontal plane the angles of depression of the top and bottom of a tower standing on the plane are 30° and 60°, respectively. Find the height of the tower. [Weight, 3.]

3. *Trigonometry.*—Assume the square of any side of a triangle in terms of the other two sides and their included angle, and deduce values for sin ½ A, cos ½ A, and tan ½ A in terms of the sides. [Weight, 4.]

4. *Trigonometry.*—The distance between two points on a horizontal plane is 940 feet. From a balloon in the same vertical plane the angles of depression to these points are 22° 15′ and 30° 46′, respectively. Find the height of the balloon above the plane. [Weight, 4.]

5. *Trigonometry.*—In a right trihedral prove = 1° — each oblique dihedral is of the same species as its opposite face angle, and if one is 90° the other is 90°; 2° — An oblique dihedral if not equal to its opposite face angle is nearer to it than 90°. [Weight, 3.]

6. *Trigonometry.*—Given B = 82° 58′ 10″, C = 43° 27′ 36″; y = 29° 32′ 29″. Solve the oblique trihedral. [Weight, 8.]

7. *Analytical geometry.*—Find the equation of a right line through the point (−4, 3), such that the portion between the axes is divided by the given point in the ratio of 5:3. (One line only required.) [Weight, 2.]

8. *Analytical geometry.*—Find the distance from the point of intersection of the lines $y=3x-4$ and $5x-y+2=0$ to the line $7x-y=0$. [Weight, 1.5.]

9. *Analytical geometry.*—Find the angle between the lines $x+y\sqrt{3}-3$ and $x-y\sqrt{3}=2$. Also the coordinates of the point of intersection. [Weight, 2.]

10. *Analytical geometry.*—Find the equation of the lines bisecting the angles between $4y=3x+7$ and $3y=4x+17$. [Weight, 2.]

11. *Analytical geometry.*—Determine the coordinates of the center and the radius of the circle $2x+2y^2-14x+6y-3=0$. [Weight, 1.5.]

12. *Surveying.*—Deduce the rule for determining the double meridian distance of any course. [Weight, 2.]

PART VII.

CRITICAL REVIEW OF PRESENT COURSE AND METHOD OF INSTRUCTION, COMPARISON WITH FORMER YEARS AND WITH OTHER INSTITUTIONS, ADVANTAGES, DEFECTS, ETC.

Previous to 1881 the recitations and examinations in mathematics were almost entirely oral. Demonstrations predominated largely over applications. Believing that both were essential, I introduced more examples and exercises into the course with improved results.

About the same time I became convinced that oral examinations alone, in which each student had as a rule a single subject, were very unsatisfactory. The academic board received insufficient data from the examination, and the student regarded it largely as a matter of luck. Furthermore, there was no record of the examination work, for after consideration in cases where questions as to facts and fairness subsequently arose.

The present method of requiring in all cases of doubtful proficiency, after an oral examination, a written one, embracing subjects and applications throughout the course, was then adopted, obviating to a great extent the defects of the former method. Written examinations, however, soon developed the fact that the method of exclusive oral recitations was faulty. Written recitations were then introduced, especially during reviews, so that the necessary instruction upon advance should not be interrupted. The result has been extremely satisfactory, and I believe that the present system of combining written recitations and examinations with the oral compares favorably with that employed in any other similar institution. I am convinced that the successful students acquire a better understanding of the principles than formerly, and the percentage of failures has of late years diminished.

I have endeavored to sustain the high standard established by my distinguished predecessor, Prof. A. E. Church, and to introduce such improvements as time and experience naturally suggest. For the future, I have several important plans and propositions to submit.

In the first place, I believe that for a four year's course too much time is employed in learning the course in pure mathematics. The course for the lower sections has not been increased during the last fourteen years, and is considered the minimum necessary for the proper study of philosophy, engineering, ordnance and gunnery, and drawing. The greater portion of the first two years is now employed in the study of mathematics. In order to diminish the time required daily for lessons in mathematics, I purpose recommending that the present method of going three times over such subjects as trigonometry and integral calculus, which consists mainly of formulas, be reduced to two—that is, an advance and one review only. The daily lessons could thus be shortened, and ample time secured for such applications as would instruct the student in the use of formulas not important for training the mind, and which, as a rule, are soon forgotten.

I recommend that the instruction in surveying be made almost entirely practical. The principles employed are those of geometry and trigonometry. The data should be taken by the pupil in the field and plotted by him. The latter requires drawing instruments and facilities only to be found in the department of drawing, and the best methods of delineation are more readily and thoroughly taught in that department. I would, therefore, go once over some good treatise, as Johnson's or Gillespie's, using it more as a book of reference than a text-book. Afterwards I would turn the subject over to the department of drawing for the practical work. With no mathematical lesson to study, two or three hours in the morning could be devoted to field work, and the data could be plotted in the drawing academy in the afternoon. The instructors of the class in mathematics would, of course, be available for the field work. The graduate would then obtain a better knowledge of surveying instruments and methods, and the student would have to devote less time daily to the study of the subject.

With the increased facilities which the new academy building affords for lectures and explanations to large portions of a class together, I am able to give more students the benefit of my knowledge and experience upon the more important points, especially during the advance. These changes, with a little knowledge of algebra at admission to the Academy, which I am convinced must soon be required, will enable me to shorten the lessons throughout the two years, thus affording more time daily for other purposes.

The advantages of the methods of instruction employed here are numerous. The classes are divided into small sections of 10 or 12 each, so that each cadet is generally called upon daily to recite or receive instruction. Generally two or three subjects only are studied at the same time.

The student is cut off from those pleasures and outside attractions which divert his mind and prevent concentration of thought. Regular hours of study and recreation, combined with wholesome food, promote good health and enable the pupil to acquire the best mental results from his efforts. He is also surrounded by studious associates and has little or no temptation to idleness.

Correct habits of study are continuously impressed upon him.

Instruction is always freely given when necessary, but the importance of self-reliance in acquiring knowledge is inculcated from the day of admission to the day of graduation.

Among the advantages must be mentioned the stimulus for study which is due to the desire to graduate and enter the Army, combined with the fear of disgrace which is usually attached to a failure. This may also be considered a defect in another way, for it leads in some cases to a habit of studying for a mark, with a hope of obtaining the reward of a commission at the end, instead of studying for knowledge.

The most serious and only defect in the present organization of the Academy which is important to mention is the low standard of admission. Through it many enter who are not qualified to master the subsequent course. Many therefore fail, thus diminishing the number of graduates.

Sympathy for the weak, and a desire to assist them, naturally impels a professor to give much of his time and instruction to pupils who are really doomed from the first to disappointment and failure.

At least half of my instruction is devoted to pupils who do not graduate. If valuable, it seems as though the graduate should have the benefit of more of a professor's experience.

For many years this Academy has been the model for other scientific institutions. Astronomy in this country was nurtured here. Trigonometrical and topographical surveying, methods of triangulation, magnetic declination, and the systems of locating, surveying, and dividing the public lands of the United States, are some of the branches which emanated from this Academy. Methods of field astronomy and some of the most valuable instruments of precision have been developed and invented by graduates of West Point.

The object of this Academy is to furnish to the country a number of young men qualified in the fundamental principles of the science of war and fortification. While this science has advanced materially during the past quarter of a century, and the mathematical instruction has of necessity been extended to keep pace with the times, yet the necessary mathematics has a limit. The time available for its study is also fixed. Hence the mathematical instruction at West Point has assumed a conservative and moderate form of development.

The object of the mathematical instruction in this Academy is primarily to prepare the pupil for the study of mechanics, wave motion, astronomy, electricity, ordnance and gunnery, and engineering. In addition the study of mathematics develops the reasoning faculties and establishes a mental foundation upon which any branch of knowledge may safely and rapidly be constructed.

For many years this Academy was one of the leading scientific institutions in this country. It was among the first to import high mathematical talent from Europe. Several mathematical branches were first introduced into this country through this Academy, and were originally studied from text-books in French.

The first complete course of elementary mathematical text books published in this country was written by Prof. Charles Davies, and for forty years his works were the standard through the United States. Even to-day they are extensively used and serve as the basis for other books.

Other scientific institutions have arisen unlimited by corresponding considerations, and, in fact, by anything except knowledge itself. Higher and more advanced subjects in mathematics have been introduced elsewhere for the benefit of the specialist preparing for some particular branch of science. Therefore, to-day, the United States Military Academy does not occupy the preeminent position among scientific institutions that it enjoyed for so long a period in the early development and growth of this country, nor is it desirable that it should compete with institutions established for a special purpose. The science of war in its broadest sense should form, direct, and fix the curriculum of this Academy.

On the other hand, I believe that for thoroughness of instruction upon the branches taught, for methods of imparting information, for instruction that sustains the interest of the student, for methods of developing correct habits of study and for acquiring knowledge quickly and accurately, there is no institution in any country which is superior to the United States Military Academy.

APPENDIX F_1.

Organization of third class, department of mathematics.

Section.	Number of members.	Attendance.	Time.	Room.	Instructor.
First	12	Daily except Sunday	9.30 to 11	214	Lieutenant Palmer.
Second	12	do	8 to 9.30	214	Do.
Third	11	do	do	210	Lieutenant Winn.
Fourth	11	do	do	213	Lieutenant Johnson.
Fifth	11	do	9.30 to 11	210	Lieutenant Winn.
Sixth	11	do	do	213	Lieutenant Johnson.

Generally the associate professor of mathematics instructs the first section. From September 1 to December 31, 1895, the associate professor instructed the first section.

E. W. BASS,
Professor of Mathematics.

WEST POINT, N. Y., *May 27, 1896.*

APPENDIX F_2.

Organization of fourth class, department of mathematics.

Section.	Number of members.	Attendance.	Time.	Room.	Instructor.
First	11	Daily except Sunday	9.30 to 11	215	Lieutenant Echols.
Second	11	do	8 to 9.30	215	Do.
Third	11	do	do	308	Lieutenant Cruikshank.
Fourth	11	do	do	306	Lieutenant Rice.
Fifth	10	do	do	312	Lieutenant Barrette.
Sixth	10	do	9.30 to 11	308	Lieutenant Cruikshank.
Seventh	10	do	do	306	Lieutenant Rice.
Eighth	10	do	do	312	Lieutenant Barrette.
Ninth	10	do	do	314	Lieutenant Devore.

From September 1 to December 31, 1895, Lieutenant Devore instructed two sections.

E. W. BASS,
Professor of Mathematics.

WEST POINT, N. Y., *May 27, 1896.*

APPENDIX F_3.

[Third class, second section, 1896. Department of mathematics.]

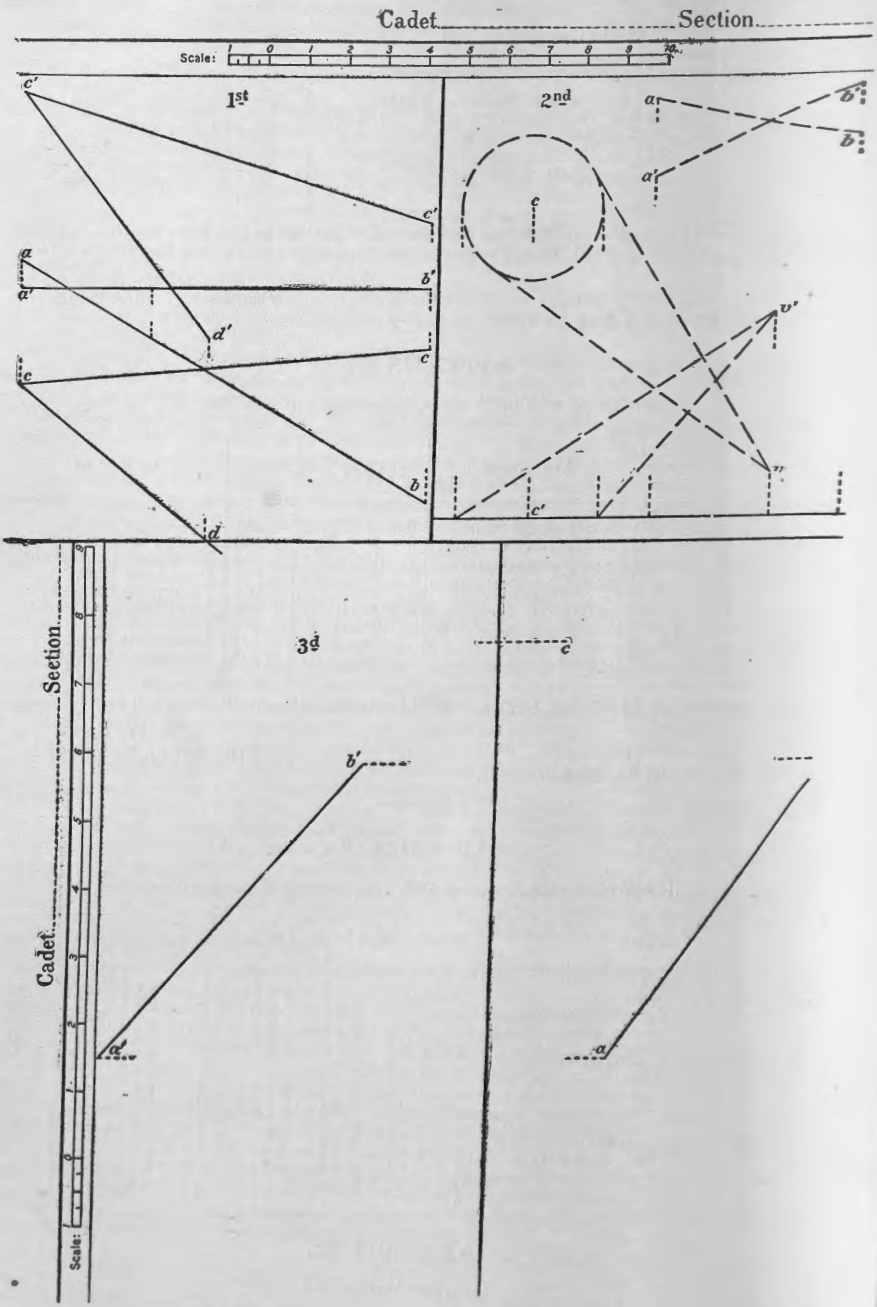
Name.	May 11.	May 12.	May 13.	May 14.	May 15.	May 16.	Total.
Otwell	.....	2.5	2.9	2.5	2.6	2.5	13.0
Munton	3.0	2.3	2.9	2.8	2.6	.....	13.6
Spinks	3.0	3.0	2.9	3.0	2.9	.....	14.8
Fries	3.0	3.0	3.0	2.9	3.0	.....	14.9
Hamilton	2.8	.....	2.8	2.7	2.9	A	14.0
Woodyard	A	A	2.7	2.8	2.7	2.4	13.3
Bricker	.....	A	2.7	2.9	2.9	3.0	14.4
Cole	2.9	3.0	2.7	2.9	3.0	.....	14.5
Nugent	3.0	.....	3.0	3.0	2.3	2.5	13.8
Hammond	2.6	2.9	2.8	3.0	2.8	.....	14.1
Conner, F	2.9	3.0	2.9	3.0	2.5	.....	14.3
Newbold	2.8	3.0	2.9	.....	3.0	2.7	14.4
	P	P	P	P	W & J		

APPENDIX F_4.

Data for blackboard.

1. Project AB [(3.25, 00, 1.25) (10, 4, 1.25)] upon the plane of CD [(0, 1.25, 6) (4.75, 5, 0)] and CE [(0, 1.25, 6) (10, 0.25, 2.75)].

2. Ground line 0.5 above lower edge. Parallel to AB [(5.5, —10.125, 8.25) (10, — 9.25, 10.25)] construct *a* plane tangent to cone having vertex V (8.5, —1, 4.875) and base in H, circle, center at C (2.5, —75, 0), radius=1.875.



3. Revolve C (9.375, 10, 6) about AB [(3.25, 1.875, 60) (7.625, 5, 2)] through an angle whose sine is $\frac{3}{5}$.

APPENDIX F_5.

Scheme for the use of colored crayons.

DESCRIPTIVE GEOMETRY.

Given magnitudes.....Yellow, supplemented with brown when desirable.
Construction lines .....White.
Required magnitudes .....Red.

SHADES AND SHADOWS.

Assumed figures.....Yellow.
Construction lines.....White.
Shades .....Red.
Shadows.....Brown, supplemented with blue when desirable.

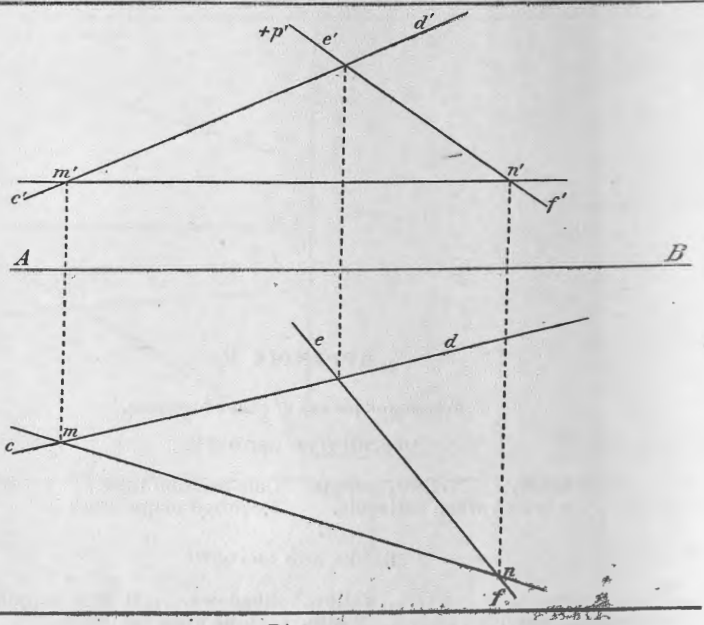
PERSPECTIVE.

Projections of figures.....White.
Construction lines .....White.
Perspectives of figures.....Yellow.
Shades .....Red.
Shadows.....Brown, supplemented with blue when desirable.

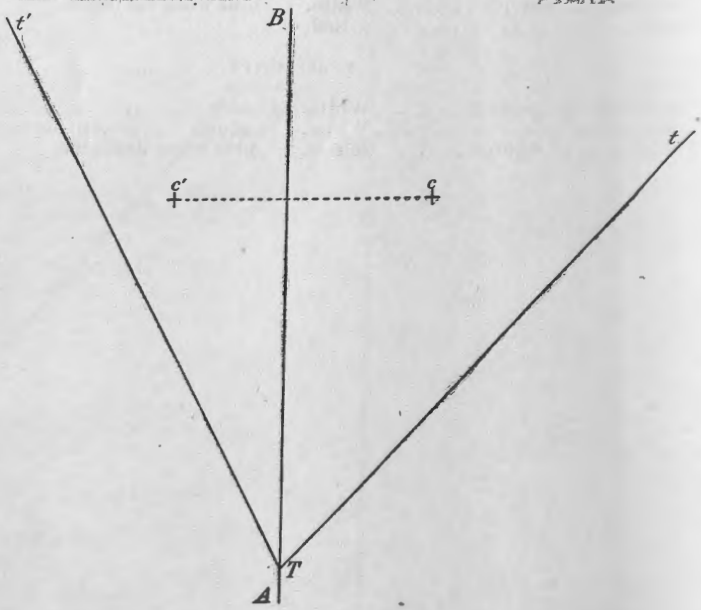
APPENDIX F6.

Cadet..... Section.....

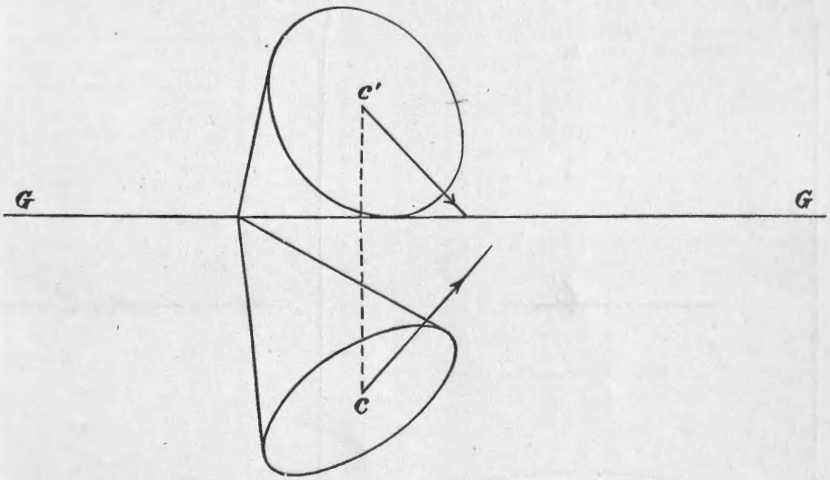
844. *Revolve the plane of lines CD and EF about MN until it is parallel to H, and find the H and V projections of that point of the plane whose V projection, in true position, is p'.*



845. *Construct the H and V projections of the circle in the plane t,T,t', whose centre is at C, and radius equal to* _____

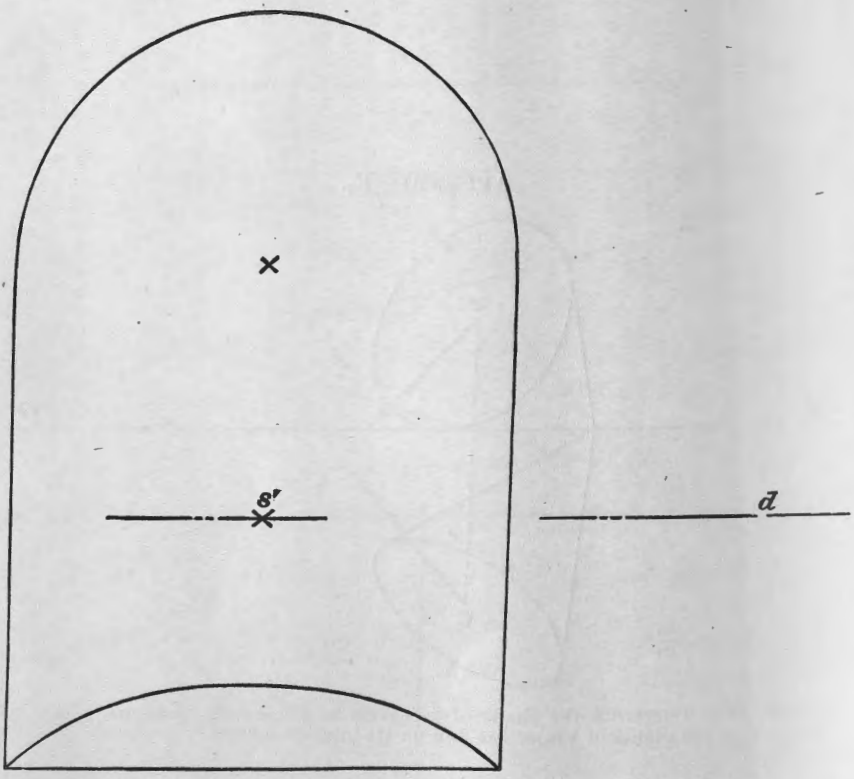


APPENDIX F_7.



ART. 253.—Construct the shade of the cone of revolution, assumed above, its shadow on the planes of projection and on its interior surface.

APPENDIX F_8.



Cadet , Section .

1. Complete the perspective.
   Upper base of cylinder to be constructed by conj. diameters..... 0.8
2. Construct shadows—
   On lower base..... 0.2
   On cylinder, ... of rectilinear part of line of shade..... 0.3
   circular part of line of shade..... 0.7
   On spherical surface, ... point in V..... 0.3
   upper base of cylinder..... 0.7

APPENDIX F9.

UNITED STATES MILITARY ACADEMY, THIRD CLASS, FIRST AND SECOND SECTIONS, DEPARTMENT OF MATHEMATICS.

Report for the week ending May 16, 1896.

[Scale of daily merit: Thorough, 3; good, 2.5; indifferent, 2; bad, 1.5; very imperfect, 1; complete failure, 0; maximum for the week, 15.]

No.	Name.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturd	Total.	Progress during the week.
	FIRST SECTION.								
1	Boggs	3.0	3.0	3.0	3.0	3.0	.....	15.0	Johnson's Least Squares advanced to end.
2	Brown, L. (first)	3.0	3.0	3.0	3.0	2.9	.....	14.9	Bass's Differential Calculus.
3	Wooten	3.0	3.0	3.0	2.8	3.0	2.0	14.9	
4	Kerr, R. D.	2.8	3.0	3.0	2.8	.....	3.0	14.6	General review to 92, p. 102, from beginning.
5	Smith, C. S.	A	A	A	3.0	2.9	3.0	14.9	
6	Stephens, J. E.	2.7	3.0	3.0	2.5	2.9	.....	14.1	
7	Butner	2.7	3.0	3.0	2.7	.....	3.0	14.4	
8	Meade	2.7	3.0	3.0	2.9	3.0	.....	14.6	
9	Nicholls	2.8	3.0	3.0	3.0	3.0	.....	14.8	
10	Kerth	2.6	3.0	3.0	3.0	3.0	.....	14.6	
11	Brown, E. I.	2.7	3.0	3.0	2.6	2.5	.....	13.8	
12	Merrill	3.0	3.0	3.0	3.0	2.9	.....	14.9	
		E	E	E	P	P	P		
	SECOND SECTION.								
1	Otwell	.....	2.5	2.9	2.5	2.6	2.5	13.0	Bass's Differential Calculus.
2	Munton	3.0	2.3	2.9	2.8	2.6	.....	13.6	General review to 115, p. 154.
3	Spinks	3.0	3.0	2.9	3.0	2.9	.....	14.8	Written recitation Friday.
4	Fries	3.0	3.0	3.0	2.9	3.0	.....	14.9	
5	Hamilton	2.8	.....	2.8	2.7	2.9	A	14.0	
6	Woodyard	A	A	2.7	2.8	2.7	2.4	13.3	
7	Bricker	.....	A	2.7	2.9	2.9	3.0	14.4	
8	Cole	2.9	3.0	2.7	2.9	3.0	.....	14.5	
9	Nugent	3.0	.....	3.0	3.0	2.3	2.5	13.8	
10	Hammond	2.6	2.9	2.8	3.0	2.8	.....	14.1	
11	Conner, F.	2.9	3.0	2.9	3.0	2.5	.....	14.3	
12	Newbold	2.8	3.0	2.9	.....	3.0	2.7	14.4	
		P	P	P	P	WJ	P		

Respectfully submitted.

CHAS. D. PALMER,
First Lieutenant, Third Artillery, Instructor.

To Prof. EDGAR W. BASS,
Department of Mathematics, U. S. Military Academy,

APPENDIX F_{10}.

UNITED STATES MILITARY ACADEMY, FOURTH CLASS, FIFTH AND EIGHTH SECTIONS, DEPARTMENT OF MATHEMATICS.

Report for the week ending May 16, 1896.

[Scale of daily merit: Thorough, 3; good, 2.5; indifferent, 2; bad, 1.5; very imperfect, 1; complete failure, 0; maximum for week, 9.0.]

No.	Names.	Monday. *a*	Tuesday.	Wednesday. *a*	Thursday. *b*	Friday.	Saturday.	Total.	Progress during the week.
	FIFTH SECTION.								
1	Marshall	.....	1.5	.....	.....	2.2	2.9	6.6	Davies' Surveying.
2	Hanson	.....	2.7	.....	.....	2.8	2.9	8.4	Review from 165, p. 145, to 349, p. 317.
3	Brown, W. S	.....	1.7	.....	.....	2.0	.....	5.6	
4	Burtt, W. B	.....	2.4	.....	.....	2.9	2.8	8.1	Written recitation on Tuesday.
5	Yates, H. E	.....	2.6	.....	.....	1.6	2.7	7.9	
6	Rhea, J. C	.....	2.8	.....	.....	1.5	1.0	5.3	Transfers recommended: Cadet Hanson to fourth section. Cadets Brown, W. S., and Justice to sixth section. E. W. Bass, Professor of Mathematics.
7	Minus	.....	2.5	.....	.....	2.4	3.0	7.9	
8	Justice	.....	2.0	.....	.....	1.0	3.0	6.0	
9	Merry	.....	1.6	.....	.....	2.2	2.5	6.3	
10	Watson, J	.....	2.3	.....	.....	2.3	2.2	6.7	
			B	B	B	B	B B		
	EIGHTH SECTION.								
1	Way	.....	A	A	.....	1.0	2.2	4.3	Same as above.
2	Begle	.....	0.7	.....	.....	2.9	2.7	6.3	
3	Oldenburg	.....	1.2	.....	.....	1.8	2.5	5.5	
4	McClure, A. N	.....	1.2	.....	.....	2.8	3.0	7.0	
5	Game	.....	0.8	.....	.....	2.0	2.4	5.2	
6	Burke	.....	1.3	.....	.....	1.0	2.0	4.3	
7	Kerr, T. B	.....	1.2	.....	.....	2.8	2.5	6.5	
8	Brown, F. R	.....	1.0	.....	.....	2.4	2.4	5.8	
9	Watson, F. V	.....	0.6	.....	.....	2.0	.....	3.9	
10	Major	.....	2.6	.....	.....	2.4	.....	7.5	
		B	B	B	B	B	B		

a Field work, transit. *b* Field work, level.

Respectfully submitted,

J. D. BARRETTE,
First Lieutenant, Third Artillery, Instructor.

To E. W. BASS,
Professor of Mathematics, U. S. M. A.

APPENDIX F_{11}.

Cadet Blank, third class.

Week ending—	Section.	Weekly maximum.	Weekly mark.	Total mark.	Total maximum.	Week weighted.	Total weighted.	Instructor.	Weighted maximum.
January 11	4	6	4.2	4.2	6	.....	.....	W.	.....
January 18	4	15	8.0	12.2	21	.....	.....	W.	.....
January 25	4	15	10.4	22.6	36	.....	.....	W.	.....
February 1	4	12	7.7	30.3	48	.....	.....	W.	.....
February 5	4	9	6.7	37.0	57	.....	.....	W.	.....
February 8	4	9	4.0	41.0	66	10.0	47.0	W.	79.5
February 11	6	6	5.4	46.4	72	13.5	60.5	W.	94.5
February 12*a*	6	15	.....	.....	.....	13.2	73.7	.....	109.5
February 15	6	6	4.9	51.3	78	4.9	78.6	W.	115.5
February 22	6	15	*b* 10.5	61.8	93	10.5	89.1	W.	130.5
February 29	6	15	*b* 10.5	72.3	108	10.5	99.6	W.	145.5
March 7	5	15	8.0	80.3	123	8.0	107.6	W.	160.5

a Examination. *b* Absent.

APPENDIX F_{12}.

[Extract from Regulations United States Military Academy, 1894.]

* * * * * * *

52. Every professor, assistant professor, or instructor, having the immediate charge of one or more sections of a class, shall keep daily notes of the progress of each, and of the relative merit of the members, and at the end of each week shall report the result to the Superintendent, in all cases through the head of the department, with such additional explanations as may be necessary to show the relative progress of the members of the respective sections. The head of the department shall at the same time recommend such transfers from section to section as he may consider expedient.

G.

REPORT ON COURSE OF STUDIES AND METHOD OF INSTRUCTION IN THE DEPARTMENT OF CHEMISTRY, MINERALOGY, AND GEOLOGY, UNITED STATES MILITARY ACADEMY, WITH HISTORICAL SKETCH OF THE DEPARTMENT.

The earliest information that I have been able to find relating to the introduction at the Military Academy of the studies pertaining to the department of chemistry, etc., is embodied in the following memoranda:

1815.

Extract from letter of A. J. Dallas, Acting Secretary of War, to General Swift, dated April 28, 1815, on the subject of instruction at the Military Academy. * * *

"In a school of engineering I should think a professor of chemistry would be important."

* * * * * * *

Plan for the organization of three military academies (including the one at West Point), agreed to by the staff at West Point and forwarded by Captain Partridge, May 9, 1815.

* * * * * * *

5. Let there be allowed at each of the academies the following professors and teachers, viz, a professor of chemistry and mineralogy.

* * * * * * *

Circular dated West Point, October 30, 1815. "Captain Douglass, superintendent, requests the professors, assistant professors, and teachers of the Military Academy as a body to deliberate on the propriety of arranging a course of study for the Academy, and of casting the cadets into grades according to their progress in that course." * * *

"The academic staff assembled on the same evening at Colonel Mansfield's quarters, and having elected Colonel Mansfield president and Lieut. S. H. Long secretary, proceeded to the consideration of the subjects proposed." * * *

With respect to the course of study it was unanimously agreed that the following ought to be included, viz, * * * natural philosophy and chemistry, astronomy.

* * * * * * *

1816.

Dated United States Military Academy, West Point, May 22, 1816. A course of studies and instruction submitted to the Secretary of War. "The following branches of science and instruction shall be considered as comprising a complete course of education at the Military Academy at West Point, N. Y.: Philosophy: A complete course of philosophy shall embrace the following branches, viz: * * * The elements of chemistry, electricity, magnetism, and astronomy."

1818.

"A plan for a new organization of the Military Academy," dated at West Point, January 20, 1818. * * * "A professor of chemistry and mineralogy. Chemistry and mineralogy have not heretofore constituted a part of the instruction at the Military Academy. They are, however, a necessary supplement to the course of science now taught, and when a professor shall be provided he shall give lectures to the two senior classes of the institution." * * *

1819.

Propositions and observations on the course of instruction necessary for the officers of the different arms of the Army, submitted to the Secretary of War January 7, 1819, by Brig. Gen. S. Bernard and Maj. William McKee. * * *

"The subjoined table exhibits the two principal divisions of the instruction; the first part includes the branches of knowledge that are necessary to all who are destined for any arm of the military establishment, either as officers in the exercise of their professional duties or as men of information liable in the course of their military career to be intrusted with other interests. It is therefore that mathematics, for instance, is extended further than is strictly necessary to the officer of infantry; that natural and experimental philosophy and chemistry are inserted under the elementary division, rather as forming a part of a liberal education, than of mere military utility." * * *

Table of course of instruction, etc. * * * "Chemistry, animal, vegetable, and mineralogy, 1 professor."

* * * * * * *

J. Du Commun, teacher of French at West Point, by letter dated February 1, 1819, states that, "Having been informed of a bill for the better organization of the Military Academy, submitted to the Congress by Mr. Williams, of Tennessee, from the Committee on Military Affairs, and this bill making provisions for a professor of chemistry, * * * I immediately determined to make this application to your excellency for the professorship of chemistry." * * *

REPORT OF BOARD OF VISITORS, 1819.

"As chemistry and mineralogy are now universally acknowledged to be essential parts of a scientific education, the board would suggest the propriety of employing a well-qualified teacher of those two kindred branches of science."

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1820.

[Military Academy Regulations (printed with Army Regulations), 1820.]

COURSE OF INSTRUCTION AND STUDIES.

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"*Philosophy.*—A complete course of philosophy shall embrace the following branches: The principles of mechanics, with their general application, hydrostatics; hydraulics, pneumatics; the elements of chemistry; electricity; magnetism and astronomy."

* * * * * * *

MILITARY ACADEMY,
West Point, April 26, 1820.

DEAR SIR: I have just received your letter of the 20th instant and hasten to say in reply that I am highly pleased with your proposition to appoint Dr. Cutbush a post surgeon and to station him at West Point, with instructions to deliver each year a course of lectures on chemistry. The cadets of the first and second classes (about 100) would be permitted to attend, and it is probable that few would decline the opportunity. I am of opinion that $5 from each cadet for a single course would be a reasonable compensation.

The sum of $500, if necessary, may be spared from the appropriation of the present year to be applied to the purchase of chemical apparatus.

I am, sir, with great respect and esteem, your obedient and humble servant,

S. THAYER,
Brevet Major, Superintendent Military Academy.

Dr. JOSEPH LOVELL,
Surgeon-General United States Army.

The above extracts and letter were supplied me by the Adjutant-General of the Army, Gen. George D. Ruggles.

It thus appears that the detail of Dr. Cutbush and consequent beginning of instruction in the department was immediately due to the suggestion of the Surgeon-General, Dr. Joseph Lovell. Dr. Cutbush was appointed post surgeon May 16, 1820, and his name appears on the Academic Register of June, 1820, as acting professor of chemistry. Instruction in the department was begun October 9, 1820, as shown by the following order:

UNITED STATES MILITARY ACADEMY,
West Point, N. Y., October 8, 1820.

POST ORDERS.]

Dr. Cutbush, having completed his arrangements for a course of lectures in chemistry and mineralogy, will deliver the introductory lecture to-morrow at 12 o'clock.

The course will be attended by the cadets of the first and second classes, which

will be formed into one squad and marched to the lecture room at 12 o'clock every week day by the adjutant of the battalion or, in his absence, by the squad marcher of the first section of the first class. Seats will be assigned to the cadets in such manner as to enable the whole to see the experiments to the best advantage, after which they are not to change seats. All officers of the post are permitted to attend the lectures. * * *

To enable Cadet Triste, acting assistant teacher of French, to attend the chemical lectures with his class, the fourth French section of the fourth class is to recite for the future in the evening, and will assemble for that purpose at the signal to return to quarters after supper.

By order:

GEO. BLANEY,
Lieutenant and Post Adjutant.

These lectures to both classes at the same hour did not long continue, for the regulations of the Academy, adopted in March, 1821, provided separate hours. I have hereto appended (marked G_1, G_2, G_3, and G_4) those extracts from the Academic Regulations, from the year 1821 to the present time, which have special reference to this department. These extracts show the manner prescribed for giving instruction, the scope of the studies and the time allotted for lecture or recitation at the respective dates. The early regulations were not strictly adhered to, and accordingly can not be taken as giving a precise history of the department. The historical statements given below, when not in accordance with the provisions of regulations, are based upon other records preserved at the Academy.

Both the first and second classes were examined in chemistry at the January and June examinations of 1821, and although there is no record of an examination in mineralogy, the first class was given a standing in this subject after the June examination, 1821, and it is inferred that it was also taught to the first class during the academic year 1820 and 1821. The regulations of 1821 provided that chemistry and mineralogy should be taught in a course of lectures and experiments to the first and second classes at the rate of three lectures per week to each class, accompanied with suitable interrogatories. These lectures from the beginning must have partaken largely of the nature of recitations, for the classes were divided into sections. One hour (12 to 1) every other day was devoted to lecture and interrogatory and the same hour on the other days to the study of the subject.

The instruction to the first class was at first given both in mineralogy and applied chemistry; to the second class in chemistry only. Geology is first mentioned as one of the subjects upon which the first class was examined in June, 1823. An important departure from the provisions of the regulations was made in December, 1822, when the hour from 11 to 12 was allowed for instruction of the first class in mineralogy, and in the spring of 1823 the same hour was allowed for the recitations of the second class in chemistry. [1]

The regulations of 1825 (approved March 1 of that year) contained substantially the same provisions as those of 1821, in regard to the instruction to be given in the department.

The first class was required to recite three times a week and attend three lectures a week, the recitations and lectures alternating in days. The recitations were from 11 to 12 and the lectures from 12 to 1. One hour each day was prescribed for the study of the subject of recitation or lecture for the following day. The records show that the schedule of the regulations was not strictly followed. In November, 1828, certain members of the first class were permitted to attend lectures in geology from 3 to 4, and this is the first mention of the afternoon hour being devoted to this subject.

In September, 1830, is found the first mention of the suspension of the study of mineralogy for the purpose of taking up that of artillery; the alternation of mineralogy and drill studies soon became permanently established in the routine of instruction. Chemistry was not taught to the first class after June, 1829.

The regulations of the Academy of 1832, approved December 5, 1831, prescribed three lectures each week for the first class in mineralogy and geology, and provided for recitations in the afternoon. It appears that the lectures and recitations replaced each other and did not alternate on days, so that the section-room work involved only three days each week. The regulations, however, were not followed in this respect. The orders published to the corps of cadets show that from June, 1832, to 1841 the recitations in these branches were held for only about half the academic

[1] By Military Academy Order from Engineer Department, dated October 9, 1820, Dr. Cutbush was allowed $10 per month for extra services as chemical lecturer to date from September 1. On November 18, 1820, he was relieved from his duties as post surgeon. The order announcing the death of Dr. Cutbush was published to the cadets on December 10, 1823, which shows that the date of his death given in Cullum's Register (December 15), is erroneous.

year; during the other half of the academic year the same hours were devoted to artillery and infantry recitation. After 1832 the recitations in these branches were fixed for the afternoon hours, 2 to 4 p. m. In the regulations of 1839, in the table for the employment of time, is embodied a recognition of the practice which had prevailed since 1832 of dividing the afternoon hours for recitation between mineralogy, geology, and infantry and artillery studies. From 1841 to 1852 the instruction in mineralogy and geology was had for about half the academic year, recitations being on alternate days from 2 to 4. The subjects were studied from September 1 to about December 10, and from about May 10 to June 1. During the reorganization of the courses between 1854 and 1861, to meet the requirements of a five years' course, the subjects continued to receive the same time. The academic regulations of 1853 retained the provision that three lectures per week should be given to the first class in mineralogy and geology, though these lectures had long been almost entirely replaced by recitations and the number per week was adhered to for only about half the year. In the regulations of 1857 this provision was omitted.

From 1852 to 1872 these subjects received the same amount of time as from 1841 to 1852. From 1841 to 1872 this course commenced September 1 and continued approximately through the first quarter of December; it was then suspended and resumed approximately at the end of the first quarter of May and continued to June 1. From 1831 to 1841 about the same time was given the subjects, but the time was not so definitely limited to the same portions of the academic year. From June, 1872, to June, 1880, these subjects were taught entirely in the term after January in the first class, recitations being had from 2 to 4 every week day, except Saturday, from January to June. After June, 1879, this instruction was transferred to the second-class year, and since then the recitations have been from 11 to 1 daily on all week days except in April, when they are on alternate week days, the portion of the academic year devoted to it being that from the completion of the course in chemistry after January 1, to June 1 of the second-class year.

The history of the instruction to the first class in this department may be summarized as follows:

From 1820 to 1830, when instruction was given in both mineralogy and applied chemistry, an hour each day in the week was allowed for the section-room exercises during the entire year, but instruction was not always continuously given. From 1830 to 1853 the regulations of the Academy prescribe three section-room exercises per week in mineralogy and geology, but this number was actually held for only about one-half the academic year upon alternate week days, except Saturdays. The actual number of recitations or lectures permitted in mineralogy and geology since 1830 has been very nearly the same up to the present. There was a slight increase in the number at the time of the changes in 1872 and 1879 (referred to above), but the number has varied between 45 and 55. Prior to 1830 a greater number of days was given to the instruction of the first class in this department, but the class then devoted time to applied chemistry as well as to mineralogy and geology. The exact time devoted by this department to the instruction of the first class between 1820 and 1830 can not be determined; the regulation schedule was interferred with in many ways.

From June, 1834, to June, 1838, the study of mineralogy appears to have been suspended for lack of a suitable text-book, though that of geology was kept up. In the autumn of 1838 the study of mineralogy was resumed, and with geology has been annually taught since. Although but little time was devoted to these subjects during the second term of the academic year between 1841 and 1872 (about three weeks in May), the class was examined in the branches both in January and June; since 1872 there has been only one examination (in June), all the study of the subjects pertaining to the second term. The previous study given the subject in May (between 1841 and 1872) was merely a review for the June examination.

The text-books used in mineralogy and geology since 1820 are as follows:

Cleveland's Treatise on Mineralogy and Geology, 1820 to 1833 or 1834.
Bakewell's Geology, 1833 or 1834 to June, 1841.
Lyell's Geology, 1841 to 1842.
Dana's Mineralogy (manual), first to fifth editions, September, 1839, to January, 1894.
Elementary Geology, E. Hitchcock, 1842 to June, 1872.
Text-book of Geology, Dana, 1872 to 1882.
Elements of Geology, Le Conte, 1882 to 1896.
Elementary Lesson in Mineralogy, Tillman, 1894 to 1896.
A Description of the Common Rocks (brochure), Tillman, used with Le Conte's Geology.

The study of chemistry in the second class was introduced at the same time as that of mineralogy and geology, October 9, 1820. The schedule for this branch of study in this class assumed definite shape very soon after introduction, and with only a few temporary interruptions has continued almost unchanged to the present time. The instruction in general chemistry has always been given to the second class. For a

year or two after the introduction of the subject one hour (12 to 1) a day was devoted to this subject, but in 1823 the hour from 11 to 12 was also given. From 1823 to June, 1880, with the exception of short intervals between 1823 and 1830, recitations in chemistry, or lectures on that subject, have been held on alternate week days throughout the year—half the class reciting one day and the other half the next—each section attending one hour, the first hour being from 11 to 12 and the second from 12 to 1 o'clock. In the reorganization of the course for a five years' term (1854 to 1861) this arrangement was not disturbed. After June, 1879, when instruction in mineralogy and geology was transferred to the second-class year, recitations in chemistry were made daily between November 1 and January 1, and from the close of the January examination to the end of the course in chemistry. The recitations were on alternate days during September and October. When the course in chemistry was completed, after the January examination, the other subjects, transferred to this year from the first-class year, were continued until June, recitations being daily, except during the month of April. In May, 1882, the schedule which appears in the regulations of 1883 was established and is still in operation, except that the additional subject of physiology and hygiene was introduced for the first time in 1887, a law to that effect having been passed in 1886. From 1823 to 1880, approximately, the same allowance of time was given to the chemical recitations and instruction of the second class. Since 1880 there has been a slight increase, due to the changes resulting from the transfer of mineralogy and geology to the second-class year. In this connection it should be remembered that the term chemistry included electricity from 1858 to 1880. The time devoted to the subjects of the department may be summarized as follows:

From 1820 to 1880 instruction was given to two classes—mineralogy and geology to the first class, and chemistry to the second class. From 1820 to 1829 instruction in applied chemistry was also given to the first class. From 1830 to 1880 the first class had, approximately, fifty lesson days in mineralogy and geology, and the second class one hundred and eleven in chemistry, making a total of one hundred and sixty-one days in both classes to the subjects of the department. When the transfer of the first-class instruction to the second-class year was made in 1880, this number was increased to one hundred and eighty-three. In the slight change made in 1882, establishing the schedule now existing, the number was brought to one hundred and eighty-five.

The text-books used in the chemical studies of the department were the following: Henry's Chemistry, from 1820 to June, 1829; Turner's Chemistry, from 1829 to June, 1840; Webster's Chemistry, from 1840 to June, 1843; Kane's Chemistry, from 1843 to June, 1858. During the years 1859 and 1860 both Fowne's and Regnault's Chemistries were used. Fowne's Chemistry from February, 1858, to June, 1884 (seventh to thirteenth editions); Bloxam's Chemistry from June, 1884, to 1896 (fifth to eighth editions).

Principles of Chemical Philosophy or Essential Principles of Chemistry (Tillman) has been used in conjunction with Bloxam. The subject of electricity and magnetism was first taught in this department during the year ending June, 1858. Miller's Physics of Chemistry was the text-book in this subject from that time until January, 1883. In January, 1883, Miller was replaced by S. P. Thompson's Elementary Lessons in Electricity and Magnetism. This book is still used, having passed through several editions, the latest being that of 1895.

Dr. James Cutbush, assistant surgeon, U. S. A., was the first head of the department and acting professor of chemistry at the Academy. He served from the creation of the department until his death, December 10, 1823. Asst. Surg. James G. Percival succeeded Dr. Cutbush, and was acting professor of chemistry, etc., from March 4 to July 6, 1824. Asst. Surg. John Torrey was the acting professor from August 25, 1824, to June 15, 1827. Dr. Torrey afterwards filled many distinguished positions, among which may be mentioned that of professor of chemistry and botany in the College of Physicians and Surgeons in New York City; professor of chemistry at Princeton College, New Jersey; professor of chemistry, mineralogy, and botany at the University of the City of New York.

Lieut. W. F. Hopkins, Fourth Artillery, was acting professor of chemistry, etc., from June 15, 1827, to August 31, 1835. Among the positions subsequently filled by Professor Hopkins may be mentioned that of professor of chemistry and natural philosophy, William and Mary College, 1849–50; professor of natural and experimental philosophy, United States Naval Academy, 1850 to 1859. Lieut. J. W. Bailey, First Artillery, was the acting professor of chemistry, etc., from August 31, 1835, to July 8, 1838. At this latter date he was appointed professor of chemistry, mineralogy, and geology, and occupied the position until his death, February 26, 1857. Capt. H. L. Kendrick, Second Artillery, was appointed professor of chemistry, etc., March 3, 1857, and served until December 13, 1880. Professor Kendrick, prior to his appointment as professor, had served from September, 1835, to January, 1847, as assistant, in the department, to Professor Bailey. Lieut. S. E. Tillman, Corps of Engineers, was appointed to the professorship to succeed Professor Kendrick January 1, 1881.

The foregoing account, together with appended extracts from the Academic Regulations, shows the general development of the department. There has been but little variation in the time devoted to the subjects of the department. The list of text-books given shows that constant effort was made to keep abreast with the advances in the branches taught.

The most important single and distinct change in the department since 1830 was made when all the instruction in the department was transferred to the second class year and the whole placed in the morning hour, from 11 to 1 for recitations. This change first took effect with the second class 1879 and 1880. It allowed twenty-five more lesson days to the department, gave the morning hour for all recitations, and relieved the department from the necessity of conducting simultaneously instruction in two branches, occupying both morning and afternoon, with the same set of instructors, an arrangement which prevented sufficient attention to either branch.

PRESENT COURSE.

Since the changes as to time, made in 1879 and 1882, already referred to, the department has had one hundred and eighty-six recitation days; of this number eighty-one come before January and one hundred and five after.

The course before January embraces the subjects heat and chemistry; after January, physiology and hygiene, electricity, mineralogy and geology. The text-books used before January are, Elementary Lessons in Heat, Tillman; Essential Principles of Chemistry (brochure), Tillman; Chemistry, Inorganic and Organic, Bloxam.

The two subjects first named had both been included in the text-books used prior to Bloxam (Fowne), and their appearance as separate texts was made necessary by the deficiency which existed in Bloxam when it was adopted. In the separate treatment the matter considered was somewhat extended and was susceptible to more appropriate discussion. The subject-matter of the brochure is in every respect a fundamental part of the chemical course, and the term "chemistry" will hereafter include the matter of this brochure.

The number of recitations before the January examinations is—

	Advance.	First review.	General review.
Heat	10	5	3
Chemistry	23	17	10

Making a total of 68 recitations.

There are given four lectures on heat, and nine on chemistry. Each lecture occupies the recitation hours for the day. On the day of a lecture the lesson for that day is increased by an amount equal to half that of a full lesson. The total number of lessons of full length in the course is therefore equal to the total number of recitations increased by one-half the number of lectures. In other words, 74 lessons of full length would cover the course.

The text-books used after January are Anatomy, Physiology, and Hygiene, Tracey; Elementary Lessons in Electricity and Magnetism, S. P. Thompson; Elementary Text-book of Mineralogy, S. E. Tillman; Elements of Geology, Joseph Le Conte; Brochure—Description of Common Rocks, to accompany Le Conte's Geology, S. E. Tillman.

The number of recitations after January is :

	Advance.	First review.	General review.
Anatomy, physiology, and hygiene	6	2	1
Electricity	18	8	8
Mineralogy	7	3	3
Geology	18	4	8

There are also five days' practical work in the electrical laboratory, making 91 section-room exercises not including the lectures, of which there are 14 in this term; in all, 105.

As in the previous term, upon the day of a lecture, the lesson of that day is generally increased by an amount equal to one-half the usual length of lesson, so that the total number of lessons of full length in this term is 98. The lessons, of necessity, vary in length with the difficulty of the subjects.

On the advance, the first time over the subject, the lessons vary in length, from 2,500 words, in the most difficult parts of the course, to 6,000 words in the most easy

parts. The average length over the entire course (the first time over) is about 4,100 words. The lessons upon the two reviews are, of course, longer, but for the majority of the cadets are less difficult than the advance lessons. The lengths of the lessons in advance and review can not be compared by the relative numbers of each, for certain parts studied in advance are omitted on the reviews. The hours devoted to the study of different subjects is different with different cadets, varying greatly with tastes, ability, and inclination. The Academic Regulations up to 1853 prescribed that "the daily allowance of time for the class studies shall not be less than nine hours, nor more than ten." The present regulations of the Academy make about the same amount of time available for class studies, as will be seen from the following considerations: The working day of the cadets begins at reveille (5.45 a. m.) and ends at taps (10 p. m.), embracing 16¼ hours. One hour of this time may be considered as unavailable for purely personal reasons, leaving 15¼ hours. Of this time each day, except Saturdays and Sundays, the class is in the section room 3½ hours, which must be classed as study time, 2 hours of the day are devoted to meals, which leaves 9¾ hours of the day. Assuming 2 hours for military exercises and 1½ hours for other recreation, exercise, or rest, there is left 6¼ hours for application to the studies of the second class outside the section room.

It is my belief that the average of time devoted to the study of the subjects of my department, outside the section room, is less than 2½ hours for each recitation. This average arises from the employment of a much smaller amount at some times and a much larger at others. The time in section room above given includes 1½ hours in philosophy and 1 hour in drawing.

The recitations in this department are 1 hour in length; the lectures average about 1⅞ hours in length. The number of hours in section room for term before January is 89⅜, and the time devoted to the study of the subjects outside the section room is 202½ hours, or a total of 292½ hours. In the term after January the time in the section room is 114½ hours, and the time devoted to the subjects outside the section room is 262½ hours, making a total of 376⅞. This estimate of hours assumes that the cadets study for the lecture days the same as for days of recitation. It is also based upon an average of 2½ hours' study for each recitation, which estimate is somewhat too great, especially in the term after January.

The number of lectures during the year is not always the same. The number (27) above given (13 before and 14 after January) was that of the past academic year. In some years there have been a few more than this number, and in others a smaller number. The subjects for instructive lectures are very numerous, and when the progress of the class is such that a lecture seems more desirable than a recitation, the former replaces the latter. The routine instruction, however, usually permits only the number given.

The difference in the amounts of matter studied by the upper and lower sections is slight. Such difference as exists is made between the two halves of the class and depends almost entirely upon the difference in the problems required to be solved. The entire difference does not amount to 5 per cent of the course. This statement refers to the difference in the amounts studied and not in the amounts learned.

ORGANIZATION OF THE DEPARTMENT AND DUTIES OF THE PERSONNEL.

The personnel of the department consists of the professor and the requisite number of instructors, a civilian employee, and an enlisted attendant. The number of instructors at the present time is four.

The professor is, by the academic regulations, made responsible for the mode of conveying instruction in his department. He prepares and delivers the lectures that pertain to the course, and with the aid of the instructors and employee he arranges for the illustrations and experiments that accompany them. He arranges and prescribes all the lessons during each term, this tedious duty being often necessary owing to a change of text-books or the date of lectures. He constantly supervises and assists in the instruction by frequent visits to the section rooms, and is always ready to replace any instructor who may be sick or detailed to other duty. He makes constant effort to have the aims and objects of the department thoroughly understood by the instructors, has frequent interviews with them as the course progresses to this end; invites suggestions and discussion from them, individually and collectively, toward the accomplishment of better results. He sees that the same general methods are followed by all the instructors. To this last result it is found very beneficial to have a new instructor present at two or more recitations before he is required to conduct them. The professor, aided by instructors, endeavors to keep note of the most important publications pertaining to the department, and secures them by purchase as the funds warrant. With the same assistance he watches some of the best technical and scientific journals and attempts to provide the department with the best, new and approved apparatus that the funds of the department will purchase, and which can be made useful with available facilities.

The finishing, furnishing, and equipment of the new Academy, the adaptation of its facilities to the best advantage of the department, with possible modifications in the future, require the constant attention of the professor and all of his assistants. It is often possible to greatly improve and simplify the discussions of the text by the addition of drawings or modifications of the textual matter, and to do this is one of the important duties of the professor with the advent of each new text-book. In nearly all the duties enumerated as pertaining to the head of the department much assistance is derived from the instructors, and it is the settled purpose of the head of the department to give the instructors every opportunity and encouragement to aid in its development.

Each instructor has charge of two sections, one reciting from 11 to 12, the other from 12 to 1 o'clock. The instructors are required to be present in the department by 9.30, and as a rule are there much before that time. The senior instructor, or assistant professor, is required to make out a programme for each day's recitation, selecting the matter to be given out at the board, that for questions, and the problems to be solved. All the other instructors use this programme, so that entire uniformity is observed as to the matter recited upon each day, and the experience of the senior instructor is made use of to select it. This programme is the same for all the sections in the same half of the class, but there is often made a difference between the two halves. Each instructor is required to have everything in perfect readiness in his room when the section enters. The problems given out the previous day must be corrected and ready for return to the section. He must see that any chemicals, specimens, or apparatus required in the room for the day are upon the exhibit table.

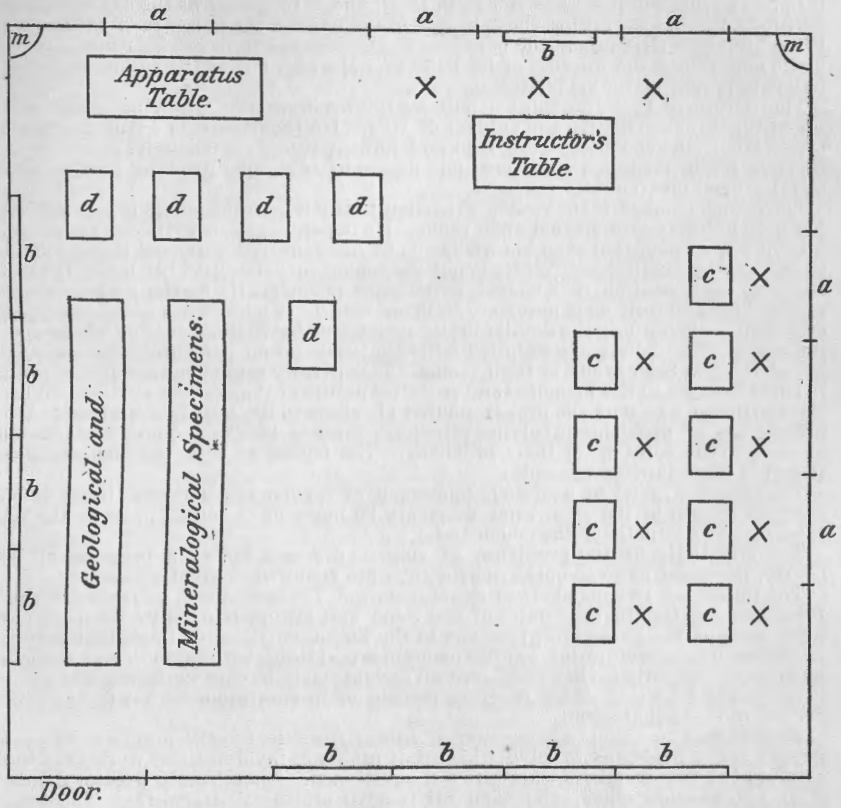
Any drawings upon the board or other work that he may need for the explanation of the lesson of the day, or of the previous day, must be in readiness. The assistant professor is charged with the accounts of purchases, expenditures, etc., and the inventorying of the new property. Included under the above duties are many details, too numerous to mention in full. The past academic year has been especially loaded with labors for them, among which may be mentioned the replacement and rearrangement of the mineralogical and geological cabinet, the placing and improvising of apparatus for electrical use in the laboratory, and the verifying of the inventory of all the property of the department.

The civilian employee has much occupation in the preparation for lectures, getting in readiness the necessary apparatus, preparing the agents, and in removing the material afterwards. He is at the service of any of the instructors in assisting to supply the exhibit of specimens, apparatus, etc., required in each section room, and in removing such exhibit after use, and in replacing it in the proper storage case.

During the instruction in mineralogy and geology he keeps all the working stands and the reagent stands of the different section-rooms properly supplied with chemicals, apparatus, and material, removing that used and replacing it by fresh—a very onerous task. With the enlisted attendant he keeps the various rooms of the department well policed. The cleaning of windows and the policing of the various rooms of the department constitute the principal work of the enlisted attendant, though he is called upon for a variety of other tasks.

The employee and attendant rub off the blackboards prior to each recitation. They both also have important duties in the power and battery-rooms in connection with the electrical part of the course.

DEPARTMENT OF CHEMISTRY, MINERALOGY, AND GEOLOGY.



GENERAL ARRANGEMENT OF SECTION-ROOM, PLAN.

a a, etc., windows.
b b, etc., blackboards.
c c, etc., cadet desks.
× ×, etc., chairs.
d d, *etc.*, working stands, mineralogy, and geology.
m m, stone shelves for mineral anvils and mortars.

The *apparatus table* during instruction in mineralogy is used as stand for reagents.

During the instruction in electricity and chemistry the working stands and the specimen tables are removed and four of the cadet seats and desks are placed on that side of the room.

SECTION-ROOM AND RECITATIONS.

The general arrangement of a section-room in the department is shown by the plan herewith. It is desirable never to have more than eight cadets in a section where the recitation lasts but one hour. Some of the larger classes have given nine cadets to some of the sections in this department. The cadets are seated in the room in the order in which they stand in the section, the section marcher being nearest the instructor.

When the section enters and the marcher has made his report, the instructor inquires if there are any questions the section wish to ask about the lesson. If there be any, as is very frequently the case, they are answered as clearly as possible. When the section has nine men, the order of recitation is as follows: After all questions are answered, five of the members are assigned subjects for discussion or description at the board.

The enunciations of the subjects at the board are printed and bound in pamphlet form. The instructor directs Mr. A, B, C, D, and E to discuss at the board subjects 20, 21, 23, 24, and 25, taking them in the order named, the numbers of the subjects being already written upon the boards. Each cadet called writes his name upon the board containing the number of his subject. He uses one of the enunciation pamphlets in preparing for his recitation.

The nature of these pamphlets will be known from the following enunciation taken therefrom: Discuss the subject of HCl. Its occurrence in nature; artificial preparation; the common liquid acid and how produced; commercial source of the common liquid acid; action of heat on; action of acid upon growing plants; upon metals; upon metal oxides.

The enunciation calls the cadets' attention to the important points of the subject, but does not give information upon them. He is permitted to write out under each term of the enunciation such knowledge as he has acquired in regard thereto and is then ready for recitation. While being permitted to write upon the board the substance of his recitation, each cadet is encouraged to outline the matter diagrammatically and only so fully as is necessary to bring readily to mind what he wishes to say and then to bring out the details orally instead of by writing out the whole upon the board. The cadets are supplied with the enunciation pamphlets and have the use of them in their study at their rooms. This greatly assists most cadets, serving to call attention to the principal and essential points of the subjects studied. When the instructor has sent the proper number of cadets to the board, he assigns to two others, sets of problems involving principles already studied. These two proceed at once to the solution of their problems. The nature of these problems is illustrated in the following example:

The specific gravity of a gaseous compound of carbon and hydrogen is 14; in 112 parts by weight of the compound there are 96 parts of C and 16 parts of H; find the molecular formula of the compound.

The simplicity of the problems, of course, depends upon the progress of the course, becoming more complex as principles are acquired in greater number.

The remaining two members of the section not yet mentioned, are called up and take their position in the center of the room and are questioned by the instructor upon parts of the lesson not given out at the board, on the more important parts of the lesson of the previous day, or upon principles pertaining to the subject which should be known. Experience has developed an advantage in having the cadets who are to be questioned take the floor together instead of in succession as was formerly the custom in this departmemt.

After these two cadets are questioned from fifteen to twenty minutes, they are given a set of problems to solve—this set of problems involving less work than that given to the two members who were not questioned. Sometimes a greater number than two is questioned, and then all receive problems afterwards. The exact programme for each day is arranged by the senior instructor and is followed in all the sections.

When the instructor has finished with the cadets on questions, some member at the board is generally ready or nearly ready to recite. This member is then called upon and proceeds to make his recitation. He makes such use of his board work as is necessary to enable him to set forth all the information he possesses upon the points enumerated in his enunciation. During the discussion of each heading the instructor makes only such interruption as is essential to correct understanding and statement. Before leaving any particular heading the instructor brings out by questions all the important points that may have been omitted. At the close of the recitations the instructor endeavors to call attention to all points in any part of the subject which seem not to have been properly appreciated. It is also a prime effort of the department to show the relation between new principles and facts brought out and others already studied and to point to some application which these principles find in the arts and industries. This is done by a simple statement of the instructor or by a query to the cadet as to whether he had ever observed *such* or *such* applications.

The above-described method for section-room exercises is applicable during the study of heat, chemistry, and electricity. During the study of mineralogy and geology the method is materially different. A smaller number of subjects is given out at the board; no problems are given out, but instead several members of the section are assigned a number of mineralogical or geological specimens to determine by practical tests, suitable stands and all the necessary apparatus being in the room for the purpose. In mineralogy and geology the cadets placed upon questions are very frequently asked about the objects themselves. Thus, cadets called up for questions are placed in front of a lot of mineralogical or geological specimens and each, in turn, is directed to pick up one of them and is then asked all of its visible and easily determined characteristics, as color, structure, texture, luster, hardness, tenacity, heaviness, etc.

After being questioned, these gentlemen are given selected specimens to determine by the blowpipe or chemical tests. The cadets who have minerals or other specimens

to determine, after due time bring them up in front of the instructor's desk and give the results of their determinations, being required at the same time to state what tests were applied in the determination. The recitations are so short that in these subjects it is often impossible to hear all recite upon their determined specimens. In such cases those not reciting, leave their names in their trays with their labeled specimens and any serious mistakes of determination are referred to the next day.

The time devoted to the determination of minerals, rocks, and fossils is largely increased by allowing the cadets to use in the section-room certain "tables for the determination of minerals." By this aid they can have the practice upon minerals not in the lesson of the day. In the same way, by the use of their text-books in the section-room, we are enabled to give out rocks and fossils though they have not been mentioned in the lessons of several previous days. In other words, the practical work on rocks and minerals, etc., is not limited to the time that the lithology and mineralogy are studied, but continued through all the course of geology as well.

Thus we have developed a thoroughly practical course of very reasonable length. In each room a full set of ordinary exhibition specimens of minerals, rocks, and fossils is placed, so that the cadets have the benefit of a small cabinet collection in their study of the subject. This exhibit collection is allowed to be used only under such restrictions as tend to cultivate the powers of observation and partially supply the defects of insufficient time. It is of great assistance in acquiring a knowledge of the subjects.

The electrical laboratory exercises are again different from the section room exercises already described. These involve practical work in electricity, and are given in April.

They consist of explanation of apparatus by the instructor and use of the same by the cadets. For this instruction two sections attend daily from 11 to 1 o'clock. During the past year the second assistant instructor, aided by the two junior instructors, had immediate charge of this instruction. For this work a series of practical electrical problems is outlined beforehand and each cadet is supplied with a statement of each problem. It is indicated to each section in advance which of the problems will be involved in the laboratory work of the day. They are thus enabled to look up the principles applicable and the description of the instruments to be used. When they come to the laboratory they put up the necessary apparatus, make the required observations for the solutions of the indicated problems.

The following example will illustrate the nature of this work: "Using a Weston ammeter and a Thomson voltmeter, make the necessary connections and take the data for finding the power consumed in an Edison incandescent lamp."

In the laboratory the sections are divided into squads of four men each and they successively and in rotation use the apparatus for securing the data for the different problems. The three instructors present see that the apparatus is used properly and give assistance when any squad is using too much time in making any observation.

Occasionally written recitations are held, usually as the subjects are being reviewed. In these cases the entire class or half the class attends at the same hour in one of the larger rooms of the Academy. All write answers to a series of questions pertaining to the subjects of the lesson for that day or of principles which are always required. This written recitation is generally adopted when it is desired to include a number of important facts or principles. The attention of each cadet is then called to the desired points and more time is given for them to express their knowledge of them. The written recitation serves to pick out the cadets who are weakest in certain directions. It is also occasionally resorted to as a means of introducing a set of problems involving the application of principles that it is desired to impress promptly upon all. Only a small number of such recitations is found desirable in this department.

In addition to the cabinet tables already referred to in the mineralogical section rooms, there is kept another table in each room at all times. Upon this table are exhibited the special chemical specimens, apparatus, or drawings referred to almost daily in the text. Any members of the section not otherwise engaged are permitted to examine and familiarize themselves with the objects thus exposed. The members around this table are permitted to converse in regard to the objects under consideration, but it is contrary to order to discuss other matters or to seek information upon the subjects not yet recited upon.

Daily merit marks are given upon the results of the section-room work, and when only eight or nine cadets are in a section the methods above described enable the instructor to give each cadet a mark each day, with rare exceptions. The daily assignments of work in the section rooms are such that each cadet shall receive the same proportion of board, question, and problem-subjects during the term. The particular subjects of either class are assigned daily by lot. The scale of marking is: Thorough, 3; good, 2.5; indifferent, 2; bad, 1.5; very imperfect, 1; complete failure, 0.

The head of the department, unless other duties prevent, visits two section rooms daily, remaining one hour in each. He marks the cadets independently of the

instructors, and afterwards compares his marks with theirs, using the comparison to establish as nearly the same standard as possible throughout the department. After the last recitation of the week the daily marks are summed, giving the weekly totals; the whole is transcribed to the weekly class reports, prepared for the purpose, and submitted through the head of the department to the Superintendent of the Academy, who has the marks conveniently posted for the inspection of the cadets or others.

A transcript of the weekly totals is kept by the professor and are added to the totals of the following week as soon as the week closes. He thus has before him at the beginning of each week the total mark of each cadet from the beginning of the term. This, with the section-books of the instructors, supplies the complete section-room record of each cadet in the different subjects of the department. Whenever such a difference exists between the total marks of two cadets in different sections as to clearly indicate that one is mastering the course better than the other a "transfer" is, at the end of the week, recommended by the professor to the Superintendent, and if he approves, he directs the "transfer" to be made. The cadets concerned, at the beginning of the following week change sections. In this way it is endeavored to keep the cadets of about the same proficiency in the same sections so far as the number of members in a section permits.

In recommending these transfers the professor consults with his instructors and makes every effort to avoid changing the sections of cadets upon an inequality of marks due to fortuitous circumstances or to causes other than the proficiency of the cadets. While mistakes may sometimes be made and cadets improperly discouraged thereby, such mistakes are open to early correction if the misplaced cadet shows that he did not deserve a transfer. Cadets often pass down through several sections and by steady effort regain their lost ground.

The lectures which pertain to the course are delivered to the entire class assembled in the lecture room of the department. The arrangement of lectures is such that they, in general, are delivered on the advance course and pertain to the discussion and illustration of principles and subjects already studied by the cadets. Having the lecture precede the study of the subject was tried and found less satisfactory than the method indicated. It frequently happens that the knowledge of the class is such that subjects in advance of the lesson may with advantage be dealt with; it is then done, but as a rule the lectures relate to the subjects already studied. All but a few of the lectures are delivered during the advance lessons of the class and follow each other in such order that the illustrations and demonstrations in each may embrace, as nearly as possible, all the matter studied by the class since the preceding lecture. There were twenty-seven lectures during the last academic year, thus giving one lecture for each three advance lessons of the course, there being eighty-one such lessons. The intervals between lectures is not, however, uniform, so that precisely three recitations do not always intervene between them, even when no review is made.

These frequent assemblies of the class give ready opportunity to enforce considerations in the direction that the section-room consideration shows to be most desirable. They are made the occasion of calling the attention of any members of the class to subjects, principles, etc., that have been slighted or need more study. While the main object of the lectures is to illustrate and elucidate the principles and facts of the text, they are taken advantage of to convey much useful information—scientific, historical, and otherwise—in the effort to show the breadth of the sciences taught, their relations to other branches of knowledge, and in the effort to give to the study a real meaning and create a living interest in the cadets.

SEMI-ANNUAL EXAMINATIONS.

The annual and semiannual examinations in this department have, with few exceptions, been oral. The relations between the different subjects pertaining to each term and the present distribution of time to each subject renders intermediate examinations impracticable and undesirable. The oral examinations at the end of each term are considered a part of the course, and each cadet is required to show proficiency at them. When a cadet's work during the term indicates deficiency, in the opinion of the department, he is subjected to a written test at the end of the term. A cadet whose mark during the term indicates doubtful proficiency is given a sufficiently extended oral examination to dispose of such doubt. If in the oral test he still fails to prove his proficiency to the satisfaction of every member of the academic board, he is then given a more extended written test. All those cadets whose marks during the term clearly indicate proficiency are at examination given some subject in the course, usually chosen by lot. These subjects are taken from all parts of the course, and there is little or no repetition among them. A proficient knowledge of such subject indicates a proficient knowledge of the course, and it is so taken. A failure upon one subject is followed by a test upon another selected in the same way. A second failure makes it necessary for the cadet to prove his proficiency upon a more extended test.

At the examinations there is no question as to the proficiency of nearly all the cadets. The oral examinations in these cases is an indication of excellence rather than a test of proficiency. The experience of the department has shown that when a single recitation on the course in advance is given a weight of one, a review recitation should have a weight of two, and the oral examination a weight of five. In this apportionment of weights no distinction is made between the advance and first review. The term review applies only to the last review, where there is more than one. These weights have met the approval of the board and have been adopted by it.

The decision as to the probable proficiency of cadets at the end of the term and before examination is based upon the entire work during the term. The considerations involved are numerous and varied, and differ in different cases. The record made upon general review is given the greatest weight. Generally, when a cadet has made an average of a little over two-thirds of the maximum in all parts of the course, his work is taken by the department to indicate proficiency. An average of a little less than two-thirds of the maximum over all parts of the course indicates doubtful proficiency, and the doubt is decided by the results of the examination. An average considerably less than two-thirds—say 1.8 out of 3—in all parts of the course is considered to indicate deficiency, and an extended written examination is considered essential to determine whether such cadet has been able to make up the deficiency between the time recitations ceased and the examinations are held.

COURSE AND METHOD OF INSTRUCTION.

From 1880 to the present time (except the gain of 25 days in 1870) the total time allowed all the subjects of the department has been very nearly the same. The additional time given in 1879 was used first in extending the geology; second, extending the electrics; third, to embrace the subjects of physiology and hygiene. As electricity has grown in importance it has been further increased and the geology shortened. At the present time the additions to the electricity and the physiology and hygiene consume all the time gained in 1880. At the time (1879) that the instruction of the first class year was transferred to the second class year, it was arranged to complete the chemistry proper in the first term of the academic year.

This subject has been previously examined in at both the January and June examinations, the second examination including the subject-matter of the first. Since 1880 the chemistry proper is finished in one term and only one examination held in the subject. This change made available a little time for the development of the course. Another slight additional gain has been made by the exercise of a proper discrimination over the different parts of the course. Instead of requiring the cadets to traverse all parts of the course three times (first, second, and third times over), equal benefit and less weariness to cadets is produced by going over certain portions only once, other portions twice, and only the remainder three times. These last two changes, it will be noted, give additional opportunity but not additional time to the department.

It is not possible from the records available to determine the exact extent of the courses taken in the different subjects of this department for more than forty years, but during that time the extent of the courses has gradually increased, and at earlier date it is pretty certain that the extent was still less. Since 1879 the department has had more time and more opportunity than previously, and the course embraces a greater number of lessons and includes more material than at any previous time. The time and attention devoted to the respective studies is now well proportioned, but considerable modification is still possible. As the subjects vary in importance additional adjustments can be made by further extension of lectures wherever found available and by the further exercise of such discrimination as is above referred to, coupled with a corresponding reduction in the amounts required at examination.

The method of instruction is, in general, the same that has long prevailed at the institution. The transfer of all the instruction of the department to the second class year, and of all recitations to the morning hour (made 1880), allows each instructor to devote his entire time at any period to one subject, to the manifest and greatest benefit of the instruction. It permitted a perfection of arrangement in all the details of the section-room work not before possible, adding greatly to the efficiency of the instruction.

In present instruction greater importance than formerly is attached to the practical bearing of all that is taught. To this end, in the subjects of heat, chemistry, and electricity, the solutions of problems involving the principles taught—has become a marked feature of the recitation work. During the day's recitation of two hours in the above subjects, each instructor gives out from twelve to thirty problems. The cadets make an effort to solve them, and the instructor examines, corrects, and returns them to the section at the next recitation. In mineralogy and geology trays of minerals, rocks, etc., for determination replace the problems, and each instructor

must daily provide from eight to ten sets of specimens, each containing from six to ten varieties of minerals, rocks, or fossils. The method now pursued has greatly increased and concentrated the labors of the instructors, with the greatest advantage to the instruction. While it is certain that the course embraces more now than formerly, and while it is thought that as good results are obtained over the broader course, it is believed that no greater effort is required from cadets. This belief is based upon observation and the conversation of cadets, as well as upon the reasons for such results apparent in the facts above set forth.

A comparison between the courses and methods of instruction at this institution and any other, to be of value, would first require a full consideration of the objects and of the conditions surrounding the other institution. In general, it may be said that the subjects which are included in this department (excepting mineralogy and geology) are, in institutions of equal standing elsewhere, taught in connection with a greater proportion of laboratory practice. It is believed, however, that when all the facilities of the new academy are made available, we shall have theory and practice balanced, to the best advantage, when all the considerations connected with this institution are justly weighed.

The marked advantages of this department in accomplishing results may be stated as follows:

1. The division of the class into small sections by which each instructor is enabled to give greater individual attention to each cadet and closer personal supervision of all the work of his section.

2. The assistance of competent, willing, and interested instructors, by which the department is enabled to create and develop the interest of the cadets in the subjects taught. This factor, too, keeps the department in healthy activity, and multiplies the chance of improvement in the course of study and methods of instruction.

3. The lever of effectual compulsion which pertains to all the departments of the institution.

The greatest defect to which the department is subject (without considering the length of its courses) is too great a concentration of the courses. The same actual time devoted to the subjects distributed over a longer period would be better. This was one disadvantage that did not exist when the instruction was extended over two years. It is still possible to largely mitigate this defect by alternation of recitations in the subjects taught in the department, thus extending the period during which each subject is recited upon. A method for accomplishing this result is now under consideration, and will be submitted to the proper authorities in due time.

The necessities of the service, which prevent the retention of instructors beyond a certain number of years, is also frequently a check to the most efficient work of the department.

S. E. TILLMAN,
Professor Chemistry, Mineralogy, and Geology.

G_1.

Lecture Subjects Pertaining to the Department of Chemistry, Mineralogy, and Geology.

HEAT.

Lecture 1.—Before commencing recitations beginning of academic year; general remarks on arrangement of the section room; objects intended to be accomplished; privileges to be accorded cadets in section rooms; rules of conduct to be observed; definition of physical sciences; branches of the department; chemistry defined; heat defined; how to study the subjects; how to recite; heat as a branch of physics; general effects of heat.

Lecture 2.—Thermometry; convection; specific heat (experimental illustrations).

Lecture 3.—Maximum pressure and density of vapors; ebullition; liquefaction; evaporation; freezing mixtures (experimental illustrations).

Lecture 4.—Hygrometry; conduction; radiation; meteorological phenomena (experimental illustrations).

CHEMISTRY.

Lecture 1.—Additional discussion and elucidation of the essential principles of chemistry; chemical philosophy (experimental illustrations).

Lecture 2.—Oxygen; hydrogen; water (experimental illustrations).

Lecture 3.—Nitrogen; the atmosphere; carbon; carbon dioxide; carbon monoxide; common hydrocarbons; flame (experimental illustrations).

Lecture 4.—Silicon; boron; ammonia; oxides of nitrogen; nitric acid; chlorine; hydrochloric acid; bromine; iodine (experimental illustrations).

Lecture 5.—Sulphur; hydrogen sulphide; carbon disulphide; sulphurous oxide; sulphuric acid; phosphorus (experimental illustrations).

Lecture 6.—Potassium; sodium; ammonium; barium; calcium; magnesium; aluminium; zinc; iron (explanatory and descriptive of processes, illustrations).

Lecture 7.—Cobalt; manganese; chromium; nickel; tin; copper; lead; mercury; gold; platinum (explanatory and descriptive of processes, illustrations).

Lecture 8.—High explosives; inspection of gas works (descriptive and experimental).

Lecture 9.—Paraffin and petroleum; alcoholic liquors; carbohydrates (descriptive).

ANATOMY, HYGIENE, AND PHYSIOLOGY.

Lecture 1.—Involving matters likely to be of use in the service-experience of officers; frequently delivered by one of the assistant surgeons; two, pertaining to this subject given during the year 1895–96.

ELECTRICITY.

Lecture 1.—Frictional electricity (illustrations).

Lecture 2.—Natural and artificial magnets; the needle; compass; cell; local action; amalgamation (slide illustrations).

Lecture 3.—Batteries; galvanometers (experiments).

Lecture 4.—Faraday's discoveries; induced currents; induction coils (experiments).

Lecture 5.—Lines of force; field of force (slide illustrations); magnetic rotations (explanation of).

Lecture 6.—Explanation of dynamo machines from models and drawings (for past two years delivered by Lieutenant Davis, senior assistant).

Lecture 7.—Electric lighting, machines for.

Lecture 8.—Lightning and lightning rods; electric discharge through vacuum tubes; Roëntgen photography.

GEOLOGY.

Lecture 1.—Introduction to geology; historical account of the origin, rise, and development of the science.

Lecture 2.—Internal heat of the earth; geysers; volcanoes; earthquakes (descriptive, with slide illustrations of the effects of dynamical agents).

Lecture 3.—Paleontology, its relation to geology; origin of great classes; vertebrates; mammals; birds (slide illustrations of extinct forms).

Lecture 4.—Scientific evidences of organic evolution.

G_2.

Extracts from Regulations United States Military Academy, giving tables of employment of time, 1821–1894, and programme of course of studies, 1866–1894, in department of chemistry, mineralogy, and geology.

EMPLOYMENT OF TIME.

Hours.	First class.	Second class.	Regulations.
12 to 1 ...	Monday, Wednesday, Friday: Lectures on chemistry applied to the arts, or in mineralogy and geology.	Tuesday, Thursday, Saturday: Lectures in chemistry.	1 21.
	Tuesday, Thursday, Saturday: Study of the same subject.	Monday, Wednesday, Friday: Study of the same subject.	Paragraph 47.
11 to 12 ..	Tuesday, Thursday, Saturday: Recitations in chemistry applied to the arts, or in mineralogy.	Monday, Wednesday, Friday: Recitations in chemistry.	1825.
	Monday, Wednesday, Friday: Study of the same subject.	Tuesday, Thursday, Saturday: Study of the same subject.	
12 to 1 ...	Monday, Wednesday, Friday: Lectures in chemistry applied to the arts, or in mineralogy and geology.	Tuesday, Thursday, Saturday: Lectures on chemistry.	Table A.
	Tuesday, Thursday, Saturday: Study of the same subject.	Monday, Wednesday, Friday: Study of the same subject.	
11 to 12 ..	Study of rhetoric, and moral and political science, and mineralogy and geology.	Recitations and study of chemistry.	1832.
12 to 1 ...	Same as preceding	Same as preceding	
2 to 4	Recitations of rhetoric, and moral and political science, and mineralogy and geology.		Paragraph 41.
2 to 4	Recitations in mineralogy and geology; tactics, or artillery, or study.		1839.
11 to 1 ...		Recitations in chemistry and study of same, or natural philosophy.	Paragraph 41.
11 to 1 ...		Recitations in chemistry, cavalry exercises; study.	1853.
2 to 4	Recitations in ethics, etc., mineralogy and geology; infantry tactics, artillery; study.		Paragraph 41.
11 to 1 ...		Recitations in electrics and chemistry; cavalry exercises; study.	1857.
2 to 4	Recitations in law, etc., mineralogy and geology; infantry tactics, etc.; practical engineering on the field; study.		See paragraph 38.
11 to 1 ...		Recitations in chemical physics and chemistry; cavalry exercises; study.	1866.
2 to 4	Recitations in ethics and law; mineralogy and geology; ordnance and gunnery; cavalry tactics; study.		Paragraph 41.
11 to 1 ...		Recitations in chemical physics and chemistry; cavalry exercises; study.	1873.
2 to 4	Recitations in ethics and law; ordnance and gunnery; mineralogy and geology; study.		Paragraph 40.
11 to 1 ...		Recitations in chemical physics and chemistry; cavalry exercises; study.	1877.
2 to 4	Recitations in law; ordnance and gunnery; mineralogy and geology; study.		Paragraph 363; see paragraph 41.
11 to 1 ...		Recitations in chemistry; chemical physics; mineralogy and geology; tactics; cavalry exercises; study.	1883; see paragraph 40.
		Recitations in chemistry; chemical physics; hygiene; mineralogy and geology, and in drill regulations; cavalry exercises; study.	1894; see paragraph 45.

G2.—*Extracts from Regulations United States Military Academy, giving tables of employment of time, 1821–1894, and programme of course of studies, 1866–1894, in department of chemistry, mineralogy, and geology*—Continued.

PROGRAMME OF COURSE OF STUDIES.

Year.	Class.	Department.	Time.	Allotment of time.	Regulations.
Third....	Second..	Chemistry, etc.....	11 to 1	Every other week day, alternating with riding.	Paragraph 38, Regulations 1866.
Fourth ..	First ...	Mineralogy and geology.	2 to 4	Every other week day, Saturdays excepted, from September 1 to second week in December, and three weeks before June for review, alternating with ethics and law.	To date from July 1, 1867.
Third....	Second..	Chemistry.....	11 to 1	Every other week day, alternating with riding.	Paragraph 37.
Fourth ..	First ...	Mineralogy and geology.	2 to 4	Every other week day, Saturdays excepted, from the close of January; examination to June 1, alternating with ethics and law.	Regulations 1873.
Third....	Second..	Chemistry.....	11 to 1	Every other week day, alternating with riding.	Paragraph 364.
Fourth ..	First ...	Mineralogy and geology.	2 to 4	Every other week day, Saturdays excepted, from the close of the January examination to June 1, alternating with law.	Regulations 1877.
Third....	Second..	Chemistry, etc.....	11 to 1	Every other week day from September 1 to November 1, alternating with tactics; every week day from November 1 to January 1, and from the close of the semiannual examination in January till the completion of the course.	Paragraph 364, of Regulations 1877, as modified for the second class of 1879–80.
Third....	Second..	Mineralogy and geology.	11 to 1	(*a*) Every week day from the completion of the course of chemistry till June 1, except during the month of April, and every other day during the month of April, alternating with riding.	
Third....	Second..	Chemistry.....	11 to 1	Every week day from September 1 to November 8; every other week day from November 8 till January 1, alternating with tactics, then every week day from the close of the semiannual examination in January till the completion of the courses.	Paragraph 39, 1883.
Third....	Second..	Chemical physics, mineralogy, and geology.	11 to 1	Same as paragraph (*a*) above...	
Third....	Second..	Chemistry.....	11 to 1	Same wording as in Regulations of 1883, except alternates with drill regulations instead of with tactics.	Paragraph 44, Regulations 1894.
Third....	Second..	Chemical physics, hygiene, mineralogy, and geology.	11 to 1	Same wording as in the Regulations of 1883.	

G_3.

PARAGRAPHS OF THE REGULATIONS, UNITED STATES MILITARY ACADEMY, 1821 TO 1894, WHICH RELATE TO THE EXTENT OF THE COURSE OF CHEMISTRY, MINERALOGY, AND GEOLOGY.

CHEMISTRY AND MINERALOGY.

Par. 36, Regulations, U. S. M. A., 1821.

The course of chemistry and mineralogy will embrace—

Chemical philosophy, including theory and practice of analysis and the examination of vegetable and animal productions.

Application of chemistry to the arts, as agriculture, distilling, tanning, dyeing, bleaching, gilding, pyrotechny, etc.

Mineralogy and geology, viz: Classification and description of mineral substances, general structure and classification of rocks, analysis and uses of minerals, view of different systems of geology and mineralogy and an account of the minerals and geology of the United States.

Par. 1346, Regulations, U. S. M. A., 1825.

Same as in Regulations of 1821.

CHEMISTRY AND MINERALOGY.

Par. 31, Regulations, U. S. M. A., 1832.

The course will comprise—

Chemical philosophy, including the theory and practice of analysis and the examination of vegetable and animal productions.

Application of chemistry to the arts of agriculture, distilling, tanning, dyeing, bleaching, gilding, pyrotechny, etc.

Mineralogy and geology, viz: Classification and description of mineral substances, general structure and classification of rocks, analysis and uses of minerals, view of the different systems of geology and mineralogy and an account of the minerals and geology of the United States.

CHEMISTRY, MINERALOGY, AND GEOLOGY.

Par. 32, Regulations, U. S. M. A., 1839.

The course will comprise—

Chemical philosophy, including the theory and practice of analysis and the examination of vegetable and animal productions, electricity, and galvanism.

Application of chemistry to the arts of agriculture, distilling, tanning, dyeing, bleaching, gilding, pyrotechny, etc.

Mineralogy and geology, viz: Classification and description of mineral substances; general structure and classification of rocks; analysis and use of minerals; view of the different systems of geology, and an account of the minerals and geology of the United States.

CHEMISTRY, MINERALOGY, AND GEOLOGY.

Par. 29, Regulations, U. S. M. A., 1853.

The course will comprise—

Chemical philosophy, including the theory and practice of analysis and the examination of vegetable and animal productions, electricity, and galvanism.

Application of chemistry to the arts of agriculture, distilling, tanning, dyeing, bleaching, gilding, pyrotechny, etc.

Mineralogy and geology, viz: Classification and description of mineral substances; general structure and classification of rocks; analysis and use of minerals; view of the different systems of geology and mineralogy, and an account of the minerals and geology of the United States.

CHEMISTRY, MINERALOGY, AND GEOLOGY.

Par. 25, Regulations, U. S. M. A., 1857.

The course will comprise—

Chemical philosophy: Electrics, the theory and practice of analysis, and the examination of vegetable and animal productions.

Application of chemistry to the arts of agriculture, distilling, tanning, dyeing, bleaching, gilding, pyrotechny, etc.

Mineralogy and geology, viz: Classification, description, and practical determination of minerals; general structure and classification

of rocks, uses of rocks and minerals; view of the different systems of geology and mineralogy, and an account of the minerals and geology of the United States.

CHEMISTRY, MINERALOGY, AND GEOLOGY.

This course will comprise—

Chemical physics: Magnetism, static and voltaic electricity; electro magnetism; magneto-electricity; thermo-electricity; animal electricity; construction and use of apparatus illustrating the principles of the foregoing subjects and their mutual relations; heat—the nature, sources, and effects; relation between thermal energy and other forces; measurement and equilibrium of temperatures; thermal and aqueous phenomena of the atmosphere; light as a chemical agent. Par. 31, Regulations, U. S. M. A., 1866.

Chemistry: Its general laws and language; inorganic and organic chemistry; theory of radicals, types, and substitutions; animal chemistry; animal nutrition; heat and force; relation between the mineral, animal, and vegetable kingdoms; applications of chemistry to agriculture, fermentation, etc.

Mineralogy: Crystallography; structure, practical determination, and uses of minerals; descriptive mineralogy.

Geology: The earth's features; classification, structure, modes of occurrence, and distribution of rocks; rock veins; division of geological history into ages; the various agents of geological changes; geology of the United States.

CHEMISTRY, MINERALOGY, AND GEOLOGY.

This course will comprise—

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Chemistry: Its general laws and language; inorganic and organic chemistry; theory of radicals, types, and substitution; animal chemistry; animal nutrition, heat, and force; relation between the animal, mineral, and vegetable kingdoms; application of chemistry to agriculture, fermentation, etc.

Mineralogy: Crystallography; structure, practical determination and uses of minerals; descriptive mineralogy.

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Mineralogy: Crystallography; structure, practical determination, and uses of minerals; descriptive mineralogy.

Geology: The earth's features; classification, structure, modes of occurrence, and distribution of rocks; rock veins; division of geological history into ages; the various agents of geological changes; geology of the United States.

CHEMISTRY, MINERALOGY, AND GEOLOGY.

The course will comprise—

Par. 30, Regulations, U. S. M. A., 1883.

Chemical physics: Magnetism; static and voltaic electricity; electro-magnetism; magneto-electricity; thermo-electricity; animal electricity; construction and use of apparatus illustrating the principles of the foregoing subjects, their mutual relations, and applications to the arts and sciences; heat—its nature, sources, and effects; relation between thermal energy and other forces; measurements and equilibrium of temperatures; hermal and aqueous phenomena of the atmosphere; light as a chemical agent.

Chemistry: Its philosophy; inorganic and organic chemistry, theory of radicals, types, and substitutions; animal chemistry; animal nutrition, heat, and force; relation between the mineral, vegetable, and animal kingdoms; applications of chemistry to the arts and sciences.

Mineralogy: Crystallography; structure, practical determination, and uses of minerals; descriptive mineralogy and lithology.

Geology: Dynamical, structural, and historical, with special reference to the United States.

CHEMISTRY, MINERALOGY, AND GEOLOGY.

The course will comprise—

Par. 30, Regulations U. S. M. A., 1883, as modified by letter A. G. O., Dec. 9, 1890.

Chemistry: Chemical philosophy; inorganic chemistry, chemistry of the nonmetallic elements and their compounds, chemistry of the metallic elements and their compounds, useful applications of the principles of inorganic chemistry; organic chemistry, chemistry of the carbon compounds—animal chemistry, chemistry of vegetation, useful applications of the principles of organic chemistry; physiology, action of alcohol and narcotics on the human system.

Chemical physics: Heat, thermometry, dilation of bodies, calorimetry, production and condensation of vapors, latent heat, hygrometry, conduction, radiation, relation between light and heat, thermo-dynamics, terrestrial temperatures, aerial meteors, aqueous meteors; electricity, frictional electricity, sources of electricity, magnetism, current electricity, electrostatics, electro-magnetics, electrical measurements, heat, light, and work from electric currents, thermo-electricity, electro-optics, magneto-electricity, electro-chemistry, construction and use of apparatus illustrating and involving the principles of the foregoing subjects, useful applications of electricity.

Mineralogy: Crystallography, physical and chemical properties of minerals, practical determination and use of minerals, descriptive mineralogy, and petrography.

Geology: Dynamical, structural, and historical, with special reference to the United States.

CHEMISTRY, MINERALOGY, AND GEOLOGY.

The course will comprise—

Par. 35, Regulations U. S. M. A., 1894.

Chemistry: Chemical philosophy; inorganic chemistry, chemistry of the nonmetallic elements and their compounds, chemistry of the metallic elements and their compounds, useful applications of the principles of inorganic chemistry; organic chemistry, chemistry of the carbon compounds—animal chemistry, chemistry of vegetation, useful applications of the principles of organic chemistry; physiology, hygiene, action of alcohol and narcotics on the human system.

Chemical physics: Heat, thermometry, dilation of bodies, calorimetry, production and condensation of vapors, latent heat, hygrometry, conduction, radiation, relation between heat and light, thermo-dynamics, terrestrial temperatures, aerial meteors, aqueous meteors; electricity, frictional electricity, sources of electricity, magnetism, current electricity, electrostatics, electro-magnetics, electrical measurements, heat, light, and work from electric currents, thermo-electricity, electro-optics, magneto-electricity, electro-chemistry, construction and use of apparatus illustrating and involving the principles of the foregoing subjects, useful applications of electricity.

Mineralogy: Crystallography, physical and chemical properties of minerals, practical determination and use of minerals, descriptive mineralogy and petrography.

Geology: Dynamical, structural and historical, with special reference to the United States.

G_4.

PARAGRAPHS OF THE REGULATIONS, UNITED STATES MILITARY ACADEMY, 1821–1894, WHICH RELATE TO THE MANNER OF GIVING INSTRUCTION IN THE DEPARTMENT OF CHEMISTRY, MINERALOGY, AND GEOLOGY.

The course of chemistry and mineralogy will be taught by the professor of these sciences in a course of lectures and experiments to the first and second classes, at the rate of three lectures per week to each, accompanied with suitable interrogatories. Par. 68, Regulations, U. S. M. A., 1821.

Three lectures will be delivered to the second class each week on the first part of the course of chemistry, and the same number to the first class on the second part of the course of chemistry and mineralogy. Par. 1377, Regulations, U. S. M. A., 1825.

Three lectures will be delivered each week to the second class on chemistry, and the same number to the first class on mineralogy and geology. These classes will be separately divided (the second according to general merit in chemistry) into convenient sections for recitation. The professor will be assisted in lecturing and in hearing recitations by a sufficient number of officers selected for that purpose. Par. 48, Regulations, U. S. M. A., 1832.

CHEMISTRY AND MINERALOGY.

Three lectures shall be delivered each week to the second class on chemistry, and the same number to the first class on mineralogy and geology. These classes will be separately divided (the second according to general merit, the first according to merit in chemistry) into convenient sections for recitation. The professor shall be assisted in lecturing and in hearing recitations by an assistant professor and such other assistants selected for that purpose as may be judged necessary by the superintendent. Par. 48, Regulations, U. S. M. A., 1839.

CHEMISTRY AND MINERALOGY.

Three lectures shall be delivered each week to the second class on chemistry, and the same number to the first class on mineralogy and geology. These classes will be separately divided into convenient sections for recitation at the commencement of the term, according to "general merit;" and after the January examination in the first class according to merit in the course which shall have most recitations. The professor shall be assisted in lecturing and in hearing recitations by such assistant professors as may be judged necessary by the Superintendent. Par. 48, Regulations U. S. M. A., 1853.

ELECTRICS, CHEMISTRY, MINERALOGY, AND GEOLOGY.

For instruction in electrics and chemistry, the second class shall be divided into sections in September according to "general merit;" and after the January examination according to merit in chemistry. Par. 51, Regulations U. S. M. A., 1857.

For instruction in mineralogy and geology the first class shall, in September, be divided into sections according to merit in chemistry. For review of these subjects the class shall be divided into sections according to merit in ethics, etc.

CHEMICAL PHYSICS, CHEMISTRY, MINERALOGY, AND GEOLOGY.

For instruction in chemical physics and chemistry the second class shall be divided into sections in September according to "general merit," and after the January examination according to merit in chemistry. Par. 58, Regulations U. S. M. A., 1866.

For instruction in mineralogy and geology the first class shall, in September, be divided into sections according to merit in chemistry. For review of these subjects the class shall be divided into sections according to merit in ethics and law.

CHEMICAL PHYSICS, CHEMISTRY, MINERALOGY, AND GEOLOGY.

Par. 57, Regulations, U. S. M. A., 1873. For instruction in chemical physics and chemistry the second class shall be divided into sections, in September, according to general merit, and after the January examination according to merit in chemistry.

For instruction in mineralogy and geology the first class shall be divided into sections according to merit in ethics and law.

CHEMICAL PHYSICS, CHEMISTRY, MINERALOGY, AND GEOLOGY.

Par. 58, Regulations, U. S. M. A., 1877. For instruction in chemical physics and chemistry the second class shall be divided into sections, in September, according to general merit, and after the January examination according to merit in chemistry.

For instruction in mineralogy and geology the first class shall be divided into two equal parts according to merit in law, and each half shall then be arranged according to merit in chemistry.

CHEMISTRY, CHEMICAL PHYSICS, MINERALOGY, AND GEOLOGY.

Par. 58, Regulations, U. S. M. A., 1883. For instruction in chemistry, chemical physics, mineralogy, and geology the second class shall be divided into sections, in September, according to general merit, and after the January examination according to merit in chemistry.

CHEMISTRY, CHEMICAL PHYSICS, MINERALOGY, AND GEOLOGY.

Par. 64, Regulations, U. S. M. A., 1894. For instruction in chemistry, chemical physics, mineralogy, and geology the second class shall be divided into sections, in September, according to general merit, and after the January examination according to merit in chemistry.

H.

HEADQUARTERS UNITED STATES CORPS OF CADETS,
West Point, N. Y., August 24, 1896.

SIR: In accordance with the provisions of circular letter, dated October 3, 1895, I have the honor to submit the following report:

HISTORICAL SKETCH OF THE TACTICAL DEPARTMENT, ETC.

From the earliest days of the Military Academy, 1802, cadets have received practical instruction in tactics; it was not, however, until many years later that Congress, by act dated June 12, 1858, recognized the department by law, and designated the commanding officer of the corps or battalion of cadets as commandant of cadets and instructor of artillery, cavalry, and infantry tactics.

The following extracts, taken from General Cullum's history of the Military Academy and from other sources, is of interest, and has a connection in showing the development of this department:

"By the law of May 9, 1794, the grade cadet in the Army was first established, 2 being allowed to each company of the corps of artillerists and engineers. By subsequent acts an increased number was authorized, though none were appointed until May 12, 1800, and but 9 up to the passage of the law of March 16, 1802, fixing the military peace establishment, by which the Corps of Engineers became a separate branch of service and was made 'to constitute a military academy.' This institution was therefore originally designed as a school for the instruction of engineers, was the headquarters of that corps, and the chief was ex officio its superintendent, but as 40 cadets of artillery, as well as 10 of engineers, were attached to it, the interpretation of the law did not circumscribe the function of the academy, which in fact, under engineer administration, became an educational establishment for all cadets of the Army.

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"The law of April 12, 1808, authorized 156 additional cadets of artillery, dragoons, infantry, and riflemen, and that of January 11, 1812, provided for 64 more of artillery and cavalry, making a total of 310, which was reduced to 260 by the act of April 29, 1812, reorganizing the Academy.

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"The whole number of cadets attached to the institution up to the latter date had been only 117, all of whom except 2 were appointed prior to President Madison's Administration.

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"The greatest number in the Academy at any time from 1802 to 1812 was 36, and the average for that entire period did not exceed 20.

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"The pay of the cadets at this period was $10 a month and two rations; the rations were commuted at 27 cents a day, out of which each cadet purchased his food.

"Small messes were formed, and soldiers, hired by cadets, did the cooking.

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"In 1805 the first cadets' mess was established, a captain of engineers and acting professor of mathematics supervising and presiding at each meal. This was continued but for a short period, after which and even before this time cadets were boarded at different private boarding houses, where were required to live unmarried officers.

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"*Instruction.*—From 1802 to 1812 the term time varied; usually began in April and ended in November; the remainder of the year the cadets were absent. Study hours after 1805 were from 8 a. m. to 1 p. m., 2 to 4 p. m., and in the evening, and drills and practical exercises from 4 p. m. to sunset and occasionally before breakfast.

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"The instructors for all purposes at any one time never exceeded four and sometimes were reduced to one. The instruction in infantry included the manual exercise with the musket and the infantry drill extending to the school of the company, the drill with field pieces and mortars, and a little target practice.

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"*Regulations.*—The first regulations were made immediately after the opening of the Academy in 1802; were very brief, and adapted to the small requirements of the institution. After an experience of eight years a more extended code was approved April 30, 1810, and this is the basis upon which the school rests to this day. These regulations established 15 to 20 years as the age of entrance; obliged cadets to serve the United States for four years unless sooner discharged; abolished furloughs except during vacations or under peculiar circumstances; prescribed the same uniform for all cadets of the different arms of the service, and ordained minor rules for interior police and discipline. Previous to the adoption of these regulations and between 1802 and 1810 cadets were admitted to the Academy without mental or physical examinations on any day or in any month of the year. Of the small number that were present at any time, some had good preliminary education before coming to West Point; a few were college graduates; one had been an officer in the British army; another had practiced law in the supreme court of New York, and generally they had more knowledge and maturity of mind than those of the present day, but were of all ages from 12 to 34 years, one or two being married men with several children.

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"*Quarters.*—Cadets were lodged with soldiers in the old 'Long Barracks' of the Revolution (near the site of the present hotel) and were instructed in a two-story wooden building which served both as an academy and for headquarters.

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"*Discipline.*—Little can be said for the discipline during this period, except when personally supervised by Colonel Williams, the superintendent, but when he was out of the service, 1803–1805, and when absent on other duty, 1806–1809, great irregularities took place from want of proper control on the part of the commanding officer, but more because the instructors were all civilians and foreigners.

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"July, 1810, no general examination was held and no cadets graduated; a year with that of 1816, which are the solitary blanks in its long existence that the institution did not graduate any cadet. This is the period, on account of no cadets being appointed and the detail of and dispersion of the few that were attached to company and other duties with troops away from West Point, that the Academy as an educational institution practically ceased to exist.

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"The law of April 29, 1812, authorized the appointment of 260 cadets and an academic staff. On the last day of September, 1812, there was present only one officer, a captain of engineers, and one new cadet. April 15, 1813, the Military Academy, with less than a dozen cadets, resumed its existence.

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"In 1814 a civilian was appointed to take charge of the cadet commons.

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"The prescribed uniform at this time was a coat and pantaloons of blue cloth, round hat with black silk cockade and gilt eagle, and Jefferson shoes. The coat was single-breasted, with one row of bullet buttons and a standing collar. The belts were black, and the muskets the same as those used by soldiers, except a lighter one for the small boys. Each cadet was expected to wear a sword, but few possessed the weapon.

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"During the summer of 1814 the cadets, under command of the commanding officer of the post and acting superintendent, made an excursion to Governors Island, New York Harbor, and another excursion of three days to New York was made in the summer of 1816.

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"The regulations approved July 2, 1816, under the head of military instruction, prescribed infantry and artillery tactics, practical gunnery and camp duties, and broad and small sword exercises.

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"Pierre Thomas was the first sword master, appointed in May, 1814. Sword exercise was only given to such cadets as were specially selected.

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"The present uniform for cadets, with slight differences, was adopted September 4, 1816.

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"During the period from 1812 to July 28, 1817, when Capt. and Bvt. Maj. Sylvanus Thayer was appointed superintendent, the course of instruction prescribed by Regulations was practically ignored, except infantry and artillery drills, which were the acting superintendent's delight, and were well taught by him in person, but were necessarily limited, owing to the small number of cadets to exercise and the few pieces of ordnance for drill and target practice.

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"There was no officer designated specially as instructor of tactics prior to 1818. The acting superintendent from 1814 to 1817 was commander, professor teaching all branches then taught, and, when need be, chaplain."

The record history of this department may be considered, properly speaking, to date from the time that Bvt. Maj. and Capt. Sylvanus Thayer assumed command and the superintendency of the Military Academy.

He at once organized the cadets into a battalion of two companies, officered by members of their own body, with a colonel at its head and an adjutant and a sergeant-major for his staff, and appointed an officer of the Army to command the battalion, as instructor of infantry tactics and in soldierly discipline, and was responsible for the interior police and administration.

Second Lieut. G. W. Gardiner, of the Corps of Artillery, was detailed for this duty temporarily September 15, 1817, and was succeeded by Capt. John Bliss, of the Sixth Infantry, April 2, 1818, who was the first commanding officer of the battalion of cadets and instructor of infantry tactics. The position was not known as commandant of cadets until the Regulations of 1825. The Regulations of 1821 provided that a captain or field officer should be detailed as instructor of infantry tactics.

These regulations also provided for the following instruction in this department: The system of infantry tactics established for the Army of the United States and to include instruction in the school of the soldier, school of the company, school of the battalion, and the evolutions of the line, the exercises and maneuvers of light infantry and riflemen; the duties in camp and garrison of privates, noncommissioned officers, and officers, including those of guard and police.

In 1818 the commanding officer of the battalion of cadets was first designated as the inspector of the cadet commons, and the Regulations of 1825 makes him the permanent president of the board to audit the accounts of the cadets' mess and board of inspectors of supplies.

In 1821 was first introduced the study of infantry tactics as a regular course, recitations upon which were held between 2 and 4 p. m., the text-books being the rules and regulations prescribed for the infantry branch of the service.

From 1820 to 1827 there were two assistant instructors of infantry tactics. After that period for a number of years three were authorized, and later, 1852, four assistants were authorized.

July 20, 1821, the corps of cadets made a notable summer excursion to Boston, Mass., under Maj. William J. Worth, the then commandant and afterwards distinguished general. The corps went by steamer to Albany and thence marched to Boston, where they spent two weeks; thence they marched to Providence, R. I., where they spent several days, then resumed the march to New London, Conn., having marched more than 310 miles; thence by steamer to New Haven; after a few days' stay there they

embarked again for New York and by steamer the same day for West Point, N. Y., where they arrived September 25.

The Regulations of 1825 provides for the battalion being divided into four companies, and designates the instructor of infantry tactics and commanding officer of the battalion of cadets as "commandant of cadets," and first mentions the designation of "officer in charge," and defines his duties, which are practically the same as at present. The Regulations also for the first time provides that the corps of cadets shall be divided into as many squads as there are tables in the mess hall, and when the signal for breakfast, dinner, and supper is sounded, these squads will assemble under the direction of the first or second carver, and shall march to the mess hall by the superintendent of the mess hall.

The regulations of 1829 makes the first mention requiring explanations to be submitted for offenses; from this time until 1857 all explanations were required to be submitted in writing. From 1857 until 1866 they were required to be submitted verbally, and if unsatisfactory to the commandant might be submitted in writing. From 1866 until 1892 they were all to be submitted in writing. From 1892 until the present time they may be submitted verbally and in writing; if unsatisfactory to the commandant may be submitted in writing. From the date when written explanations were first required various forms of submitting the excuses have been prescribed. First, the form prescribed that it should be characterized as "offense," then follows the "excuse," later it was known as "delinquency," then follows the "explanation," then as "report," and followed by "explanation;" finally, and at present, the form is that prescribed for official correspondence in the service.

In 1837 the first instructor of cavalry tactics was appointed.

In 1838 the term of service of cadets was increased to eight years, unless sooner discharged.

In 1839 the regulations prescribe that during the encampment cadets of the first class should study the evolutions of the line in the system of infantry tactics prescribed for the Army, and would recite upon and explain the same to the instructor. Also selected portions of the General Regulations of the Army should in like manner be studied and recited upon. This was continued until the summer of 1862.

In 1839 a sergeant and five dragoons were ordered to West Point, N. Y., from Carlisle Barracks to aid in exercises and instruction of cadets in riding. Twelve horses were supplied by the quartermaster's department. The sergeant was discharged the service and, as a civilian, appointed riding master. At this time was also purchased the necessary horses and harness for the light battery. Previous to this time cadets hauled the pieces and carriages about by means of rope harness.

In 1840 it was provided by law that the commander of the corps of cadets should be either the instructor of infantry tactics, of cavalry and artillery, or of practical military engineering.

In 1842 regulations first designated an officer as instructor of artillery and cavalry tactics.

In 1849 the regulations designated the instructor of cavalry as instructor in riding. The riding master disappears in 1852.

In 1852 the register shows the "commandant" and instructor of infantry tactics with four assistant instructors of infantry. In 1857 the regulations provide that at the hour appointed for breakfast, dinner, and supper the companies would be formed and united, and marched to mess hall by senior cadet officer present.

On June 12, 1858, Congress first recognized the title of "commandant of cadets," and provided by law that "the commandant of cadets shall have the local rank and the pay and allowances of a lieutenant-colonel of engineers, and besides his other duties shall be charged with the duties of instructor in the tactics of the three arms of the service."

February 28, 1853: First mention of an officer as instructor in small arms and military gymnastics. The sword master was his assistant. This instruction was discontinued on April 24, 1861.

September 12, 1859: During the five-year course, by direction of the Secretary of War, the subjects of strategy, grand tactics, outpost duty, army organization and administration, equitation, veterinary science were transferred to the second class, department of tactics, and the commandant of cadets was directed to prepare a programme for instruction. For want of proper number of assistants in the tactical department the commandant recommended that the subjects strategy, grand tactics, and outpost duty be continued in the first class, department of engineering. This was approved October 20, 1859.

These subjects, together with infantry and cavalry tactics, were taught in the first class course, to include the June examination of 1860; after that time these subjects were discontinued in that class. After the January examination of 1860 the abovementioned subjects were also taught in the second class, department of tactics, up to and including the June examination of that year. From September, 1860, until May 4, 1861, these subjects were taught in the second class, department of tactics. At the end of this time the course was again changed to four years, and the subjects of

strategy, grand tactics, and outpost duty were transferred back to the first class, department of engineering. The subjects, viz, army organization and administration and veterinary science were dropped. The other subjects were continued in the second-class course.

The text-books at this period were Tactics of Three Arms; Tactics for Garrison, Siege, and Field Artillery; Youatt on the Horse; Mahan's Treatise on Advanced Guards and Outposts; Jomini's Art of War; Thackeray's Army Organization and Administration, and Army Regulations.

While this additional theoretical course was in this department, it was, under the commandant of cadets, taught as follows:

The cavalry assistant taught cavalry tactics, equitation, and outpost duty; the senior infantry assistant taught infantry tactics, strategy, grand tactics, and logistics; the senior artillery assistant taught artillery tactics and army organization and administration.

After May, 1861, and the return to the four-year course, the theoretical branches taught in the department were those described above, and from which there has been but little change to the present day.

In 1863, during the New York riots, there occurred an incident in the history of West Point and of this department which has never been made of record. Rumors reached the authorities of the intention of the disorderly element of New York City to visit and destroy the Cold Spring Foundry, which at that time was the largest establishment for making guns in the country, and at the same time to visit and burn West Point. Ball cartridges were issued to cadets, and the other military resources of the post were at once made use of, including the issuing of arms and performing of guard duty by civilians and employees attached to the Academy. Pickets of cadets, with a field gun at each point, were established at the south and north docks and Gees Point; the river and back roads at challenging intervals were lined with armed sentinels. This state of armed resistance was kept up for several days and nights. No attack was made. From this time dates the present custom of armed sentinels patrolling the post night and day.

In 1873 the corps of cadets took another excursion from West Point to Washington, D. C., absent several days participating in the ceremonies of the second inauguration of General Grant as President, Lieut. Col. and Bvt. Maj. Gen. Emory Upton in command. In 1876 the corps visited Philadelphia, where they spent a week on the occasion of the centennial celebration of the Declaration of Independence, Lieut. Col. and Bvt. Maj. Gen. Thomas H. Neill in command. The corps has in more recent years made other short excursions from West Point for a day or two, and on one rather notable occasion the corps visited the World's Columbian Exposition at Chicago in the summer of 1893, leaving West Point August 17, and returning to West Point August 30, 1893, Lieut. Col. Sam'l. M. Mills in command.

List of commandants of cadets.

Name.	Rank and regiment.	Time.	
		From—	To—
George W. Gardiner	Second lieutenant, Corps of Artillery	Sept. 15, 1817	Apr. 2, 1818
John Bliss	Captain, Sixth Infantry	Apr. 2, 1818	Jan. 11, 1819
John R. Bell	Captain, Light Artillery	Feb. 8, 1819	Mar. 17, 1820
William J. Worth	Captain, Second Infantry, brevet major	Mar. 17, 1820	Dec. 2, 1828
Ethan A. Hitchcock	Captain, First Infantry	Mar. 13, 1829	June 24, 1833
John Fowle	Major Third Infantry	July 10, 1833	Mar. 31, 1838
Charles F. Smith	First lieutenant, Second Artillery	Apr. 1, 1838	Sept. 1, 1842
J. Addison Thomas	First lieutenant, Third Artillery	Sept. 1, 1842	Dec. 14, 1845
Bradford R. Alden	Captain, Fourth Infantry	Dec. 14, 1845	Nov. 1, 1852
Robert S. Garnett	Captain, Seventh Infantry, brevet major, U. S. A.	Nov. 1, 1852	July 31, 1854
William H. T. Walker	Captain, Sixth Infantry, brevet lieutenant-colonel, U. S. A.	July 31, 1854	May 27, 1856
William J. Hardee	Major Second Cavalry, brevet lieutenant-colonel	July 22, 1856	Sept. 8, 1860
John F. Reynolds	Captain, Third Artillery, brevet major	Sept. 8, 1860	June 25, 1861
Christopher C. Augur	Major Thirteenth Infantry	Aug. 26, 1861	Dec. 5, 1861
Kenner Garrard	Captain, Fifth Cavalry	Dec. 5, 1861	Sept. 25, 1862
Henry B. Clitz	Major Twelfth Infantry	Oct. 23, 1862	July 4, 1864
John C. Tidball	Captain, Second Artillery, colonel volunteers, U. S. A.	July 10, 1864	Sept. 22, 1864
Henry M. Black	Major Seventh Infantry, colonel volunteers. U. S. A.	Sept. 22, 1864	July 1, 1870
Emory Upton	Lieutenant-colonel First Artillery, brevet major-general.	July 1, 1870	June 3 1875
Thomas H. Neill	Lieutenant-colonel Eighth Cavalry, brevet major-general.	July 1, 1875	June 30, 1879
Henry M. Lazelle	Lieutenant-colonel Twenty-third Infantry	July 1, 1879	Aug. 4, 1882
Henry C. Hasbrouck	Captain, Fourth Artillery	Aug. 22, 1882	Feb. 1, 1888
Hamilton S. Hawkins	Lieutenant-colonel Twenty-third Infantry	Feb. 1, 1888	Sept. 1, 1892
Samuel M. Mills	Captain, Fifth Artillery	Sept. 1, 1892	----------

The scope of this department in the beginning included infantry tactics, interior police and discipline, and the supervision of the cadet commons. The functions of the department were not appreciably enlarged until the law of 1858, which made the commandant of cadets instructor of tactics in the three arms of the service and increased for the two years following the theoretical course by transferring to this department the subjects heretofore mentioned and taught in the first class, department of engineering.

The commandant of cadets has always had supervision of the instruction in saber and broadsword exercise, the sword master being a civilian. From February 28, 1858, until April 24, 1861, instruction in small arms and military gymnastics was added to this instruction, and a commissioned officer not attached to the tactical department had charge of it. After 1861 this instruction was returned to the commandant of cadets with a civilian as sword master, but without gymnastics. In 1881 an officer of this department reorganized gymnastics at the Academy, which instruction was continued by an officer, the civilian as sword master, until February 1, 1885, when the present incumbent was appointed and has since, under the direction of the commandant of cadets, had charge of all this instruction. This step has been an important and most successful one in the development of this part of the instruction. The department has developed otherwise along the lines of general improvement in military instruction adopted and employed in the service during the past forty years, a description of which would involve the history of these modern methods.

The following are some of the changes made in the methods of administration and changes of regulations with the approval of the Superintendent that have been introduced in the past four years: The assembling of the officers of the department daily in the commandant's office, to hear reports of the previous day; to receive commandant's instructions for the day, interpret regulations so that in all dealings and intercourse with cadets the practice and rulings should be uniform; adjutant excused from making consolidated morning report, but required, before signing, to make note of required data for details, etc.; revised, reduced, and simplified reports and returns required from cadet companies and from headquarters corps of cadets to correspond with army methods and returns; made the salute of cadets to correspond with the drill regulations; revised, rearranged, and indexed interior regulations, known as blue book; extended the hours of commandant of cadets for transacting business with cadets; introduced verbal explanations; introduced new form in submitting written explanations to correspond with the official correspondence found in the service; revised and printed the lectures for second class on subjects modified to read, staff, post, and company administration; promulgated rules and regulations in the use of the gymnasium and natatorium; attached linen collar to dress and fatigue coat with fastenings; modified riding trousers and introduced leggings; discontinued wearing waist belt to church and equipments in quarters at Sunday morning inspection; discontinued the police inspection after reveille and of signing a certificate pertaining thereto; introduced the system of anthropometric records and extended the same to include other classes besides the fourth; reintroduced the battalion color; introduced the regimental drill and parade; cordage and application of tackles for raising heavy weights; during the encampment all drills and instruction, except dancing, to take place in the morning; during the absence of the second class on furlough all appointments of sergeants made from the first class. Experience has thus far confirmed good results from these changes.

Statement of Present Course, etc.

THEORETICAL.

Text-books used.—Drill Regulations, United States Infantry, Cavalry, and Artillery; Tidball's Manual of Heavy Artillery; Blunt's Firing Regulations for Small Arms; Fitzwagram upon Horses and Stables; Wagner's Service of Security and Information; Guard Manual; Articles of War and United States Army Regulations. Recitations only in first three named, twelve recitations in infantry and ten in artillery; drill regulations between November 8 and December 31, second class year, and twelve recitations in cavalry drill regulations. February, first class year, sections attending in all cases on alternate days. Length of lessons, about 16 pages, and no lessons in review.

The hours of study and recitation are from 11 a. m. to 1 p. m. The length of the recitation is one hour and the total number of hours allowed to each subject, both inside and outside the section room, is 24 for infantry, 24 for cavalry, and 20 for artillery. The course is the same for all sections. Short lectures upon company, post, and staff administration are given to the second class from November 1 to March 15, weekly, half the class attending at a time for one hour.

The lectures, nine in all, are printed and delivered to the class in advance. The lecture is read to the section by the instructor and the hour spent in explaining points

referred to. The lecture is required to be read over carefully by cadets before coming to the lecture room; notes are not taken upon it. The lectures are compilations from Army Regulations and Orders of the War Department, and deal with the following subjects:

1. Instructions of recruiting officers; reports and returns.
2. Company organization; how men are gained and disposed of.
3. Army ration.
4. Company records; reports and returns.
5. Duties pertaining to the quartermaster's department.
6. Subsistence and ordnance departments.
7. Property accountability.
8. Money accountability.
9. Duties of post treasurer and post adjutant; returns and reports; the post exchange.

These lectures, in pamphlet form, are subsequently and before graduation given to the class to carry into the service.

Three lectures are given to the first class by the senior assistant instructor of cavalry in latter part of June and in connection with field exercises during that period.

The following subjects are treated: Preparations for field service; marching and camping; bits and bitting (illustrated); stable management; the horse's foot, shoeing; common diseases of the horse; the conformation and points of the horse; the age of the horse as indicated by the teeth, and packing the Moore pack saddle.

Instructions are also given to members of the first class as to the proper method of making out the daily reports of a company.

In addition to the above one hour is spent daily in camp during latter half of June, when there is but little practical work, in readings and explanations of the guard manual, Articles of War, and regulations upon the police and government of cadets in camp, based upon Army Regulations.

PRACTICAL WORK CONTINUES DURING THE FOUR YEARS.

First year.—First three weeks, school of the soldier, settings up, manual, and exercises of the squad; three drills daily. Thereafter, and until the new class is sufficiently advanced to become part of the battalion (a period of about two weeks), two drills daily. In camp, from June 30 to August 28, practical instruction in military police and camp discipline. Practical instruction in guard duty from about July 4. From July 5 to August 28, artillery drill each week day, one hour; school of the cannoneer; siege and mortars on alternate days; swimming for one hour, until all the class have qualified—qualification consists in the cadet being able to swim at least ten minutes with chest stroke; infantry drill three-fourths of an hour daily, except Saturday and Sunday, in August, school of the company. September: Infantry drill, school of the company, battalion, and regiment. October: Infantry exercises of the squad in extended order half the month; the remaining half school of the cannoneer, siege and mortar drill, and pointing and aiming drills, small arms. March 15 to 31: Infantry, school of the company. April: Infantry, extended order, use of cover and battle exercises of the squad, and school of the cannoneer, siege and mortar drill. May: Infantry, school of the company and battalion, close and extended order. From October 1 to June 1, three-fourths of an hour daily in the gymnasium, Sundays excepted, use of the sword and bayonet, and military gymnastics.

Second year.—In camp June 15 to August 28; practical instruction in guard duty, etc., same as in first year; after July 4, instruction in small arms, gallery practice; artillery drill, school of the cannoneer; instruction in cordage; infantry, school of the company same as first year. Drill masters for the fourth class squads and gunners and chiefs of detachment for fourth class batteries. September: Infantry, school of the company, battalion and regiment. October: Heavy artillery, seacoast battery; squad leaders for fourth class squads, extended order and instruction in small arms; range practice. November 1 to March 15: Riding, school of the trooper on alternate days. March 15 to 31: Same as first year. April: Same as October. May: Same as first year.

Third year.—September: Same as first and second years. October: School of the cannoneer, light artillery. November 1 to May 1: Cavalry, school of the trooper, troop, and squadron. March 15 to 31: Infantry, same as in first and second years. April: Artillery, same as October. May: Same as first and second years.

Fourth year.—In camp June 15 to August 28. Cavalry exercises, advance and rear guards and outposts, latter half of June. Instructions as to the method of giving commands. Practical instruction in heavy artillery, mechanical maneuvers, use of blocks and tackles and in light artillery, school of the battery. Infantry drill, August, as in first and second years and as officers, noncommissioned officers, and guides of companies. September: Infantry, as in other years. October: Light artillery, school of the battery. September to June: Cavalry, school of the trooper,

troop, and squadron. March 15 to 31: Infantry, as in other years. April: As in October, and infantry extended order, battle exercises. May: As in other years. Practical instruction throughout the year in the exercise and responsibilities of command as officers and noncommissioned officers in camp, in charge of subdivisions in barracks and in command of companies at infantry drill, and of various detachments at artillery and cavalry exercises.

The members of the class before graduation are sent to visit the squad rooms and stables of the cavalry detachment to see the manner in which enlisted men are quartered and cared for.

Organization of the Department.

The department as now organized has charge of all strictly military drills and exercises and military gymnastics, including the sword and bayonet. The personnel is as follows:

A commandant of cadets with the rank of lieutenant-colonel. He is in immediate command of the corps of cadets, the instructor of tactics, inspector of the cadets' mess, president of the board of inspectors of supplies for cadets, and in charge of the police, discipline, and administration of the corps.

One senior assistant instructor of cavalry tactics, usually a captain, member of the board of inspectors of supplies for cadets.

One senior assistant instructor of artillery tactics, usually a first lieutenant. He is under the commandant, the inspector of clothing for cadets.

One senior assistant instructor of infantry tactics, usually a first lieutenant.

Four assistant instructors of tactics, commanding the cadet companies, lieutenants.

One assistant instructor in cavalry, lieutenant.

An instructor of military gymnastics and use of the sword and bayonet, civilian; appointed permanently.

The senior assistant instructor in cavalry and assistant take all the drills in riding.

The infantry and artillery drills are divided as nearly as possible equally among the other officers of the department.

The instructor in military gymnastics, etc., has charge also of the exercises in swimming.

The four assistant instructors, commanding cadet companies, conduct the infantry drills of their companies and are responsible for the ordnance equipments issued to them. They are also under the regulations of the Academy and instructions from the commandant, directly in charge of the police and discipline of the companies. They are required to make inspections of their companies at least twice daily before taps, both in camp and in barracks, with frequent inspections after taps. The official papers of the companies pertaining to delinquencies, privileges, etc., pass through their hands.

All the officers of the department, except the head and the senior in cavalry, form a roster for "officer in charge." This officer is the executive head of the department for the day, and represents the commandant in his absence.

Description and Recitation; Class Reports; Transfers, etc.

For recitation the classes are divided into sections, and the system of instruction marking, etc., conforms to the practice of the other academic departments. Weekly class reports and exhibition of marks the same. Transfers are rarely made on account of the small number of recitations.

Examinations, Weight of, etc.

The examinations are written. The standard required for proficiency conforms to that prescribed in other departments. The subjects (drill regulations for the three arms) in which recitations are prescribed have a total weight of 100 in the general merit roll of the class.

Critical Review of the Present Course, Method of Instruction, Advantages, etc.

The present course designs to give to the cadet the elements of a military education, as comprehended in the drill regulations of the three arms of the service and in the other manuals and lectures referred to in the theoretical course; and in the practical work to impress upon him a thorough knowledge and appreciation of discipline and of military police, both in barracks and in camp; to educate him in the important qualities of attention to detail and of promptness in all his work; to give him the physical training necessary for the work and hardships he may be

called upon to endure; and, in conjunction with the other departments, to instill into his mind during his four years at the Academy a proper spirit of subordination and obedience to authority and to develop his confidence and capacity for command.

The physical training, so far as it relates to work in the gymnasium, aims at the following results:

1. To counteract by judicious and well-regulated exercise the immense mental strain which the successful mastery of the academic course makes necessary;

2. To improve the physical and general carriage, develop strength, health, and endurance, and

3. To develop agility, activity, and grace; also self-reliance, self-control, precision, and accuracy.

These results are accomplished by a thorough system of progressively arranged exercises, from which are excluded all movements of questionable value, and every one in the execution of which the element of danger is involved.

At the beginning of each year every cadet is measured in accordance with the rules prescribed by the American Association for the Advancement of Physical Education. These measurements, nearly 60 in number, are compared with those of the average student of the same age; the weak points are noted, and directions given as to how they may be strengthened. Only members of the fourth class attend the regular drills, but the above measurements are made for cadets of every class and the members of the upper classes are encouraged to avail themselves of the opportunity the gymnasium affords.

Each class spends three of the four summers in camp, a total of about two hundred and ten days. The remainder of the four years, with the exception of two and one-half months on furlough at the end of the second year, is spent in barracks.

The cadets are organized, under regulations prescribed by the Superintendent, into a battalion of four companies, each company composed of fractions of all four classes. The cadet officers for the companies, with an adjutant and quartermaster for the battalion, are selected from the first class. The noncommissioned officers from the second and third classes. The selections are made by the Superintendent, upon the recommendation of the commandant, from "those cadets who have been most studious, soldier-like in the performance of their duties, and most exemplary in their general deportment."

The companies have separate quarters in barracks, separate tents and company streets in camp, and separate tables at meals.

The tents used in camp are the regulation wall tents with flies. Two cadets live in each tent, except members of the fourth class, most of whom live three in a tent.

Two cadets live in a room in barracks.

Cadets are allowed in camp only the minimum of bedding, clothing, etc., needed for the climate and season and consistent with a neat and soldierly appearance at all times.

The commandant of cadets and the four assistant instructors of tactics, with an assistant surgeon, live in camp.

All regular drills in camp are finished before 1 p. m. During the academic term, the practical work in the department is done between the hours of 4 and 6 p. m., with the exception of a portion of the cavalry exercises and the military gymnastics.

Two dress parades are held daily in camp, at troop and retreat, except on Saturday, when the troop parade is replaced by an inspection.

One dress parade is held daily while in barracks, at retreat, except on Saturday, when it is replaced by an inspection at 2 p. m.

A complete guard is maintained at all times in camp and the instruction in this duty is most thorough. During the term in barracks a guard is posted in the divisions of barracks during study hours in the evening only to preserve quiet and to prevent cadets from visiting or from leaving the barracks without authority.

The companies are practiced with the fire engine and apparatus one week each autumn, and are turned out for service whenever the emergency justifies it.

Cadets are formed by companies, classes, details, or sections, and the rolls called for all drills and exercises and for marching to meals and to recitations. Reports of all roll calls are rendered to the cadet officer of the day, whose duty it is to promptly investigate every case of absence reported to him.

Regulations are prescribed by the commandant of cadets, approved by the Superintendent, upon the arrangement of rooms in barracks, tents, in camp methods of conducting official correspondence, uniform for drills, privileges and minor duties of cadets, to more fully carry out the regulations of the Military Academy, these regulations are bound in small book form and issued one copy to each cadet.

The method of instruction, broadly stated, may be said to be based upon the principle of requiring each cadet to learn by actually performing them all the duties of a private soldier in the different arms of the service, beginning with the drill of the recruit, and thereafter the duties of the different grades of noncommissioned officer and of an officer, in so far as the conditions surrounding the course will permit.

Each cadet has at some time during the course the opportunity of exercising command in all the grades of noncommissioned and commissioned officer up to and including that of captain of a company. The method is progressive and follows the logical principle of assigning to a cadet supervision and command in any drill or exercise as soon as practicable after he has himself become proficient in it. To illustrate, the third class furnishes the drillmasters for the fourth-class squads, school of the soldier. These in their work are supervised by cadet officers of the first class and these latter receive their instructions from a commissioned officer, who has general charge of the drill. Thus does the cadet have combined, almost from the beginning of his course, the practice of command and the exercise of authority in drills in which he has become proficient, along with the work and instruction in drills not yet mastered; the proportion in the former division increasing naturally up to his graduation.

The officers of the department are assembled daily by the commandant to receive any instructions he may desire to give them upon the drills and duties of the day; to hear reports and observations of the previous day; to point out and correct errors if any have been made; to interpret tactical and other doubtful points, and to adopt absolutely uniform teaching and practice, so that all cadets, though the battalion be divided for purpose of administration into four companies, shall receive the same and uniform instruction throughout, so far as it is practicable. This supervision of the daily work is a feature introduced by the present head of the department, and has been of incalculable benefit, enabling the commandant through these means to keep closely in touch with every phase of discipline and instruction. This system, together with the more recently adopted provisions of permitting cadets to submit verbal explanations, gives the commandant an opportunity of personally coming in contact with every cadet in the corps and of learning his charactor and special aptitude for his work, to correct and point out to him the true and proper direction of his line of duty and its connection with the duties that may devolve upon him as an officer.

It is thus by constantly and unceasingly, patiently and earnestly placing before the cadet his obligations to duty and impressing upon him the qualities of mind and character that constitutes the highminded, truthful, and conscientious officer, that the commandant of cadets, in my judgment, fulfills the most important part of his many responsible duties.

Very respectfully,

SAML. M. MILLS,
Lieutenant-Colonel and Commandant of Cadets.

The ADJUTANT UNITED STATES MILITARY ACADEMY.

I.

DEPARTMENT OF MODERN LANGUAGES,
UNITED STATES MILITARY ACADEMY,
West Point, N. Y., July 1, 1896.

SIR: In accordance with letter of instructions dated headquarters United States Military Academy, West Point, N. Y., October 3, 1895, I have the honor to submit the following report for the department of modern languages:

HISTORICAL SKETCH OF THE DEPARTMENT.

The department of modern languages was established by the act of Congress of June 23, 1879, making appropriations for the support of the Army for the fiscal year ending June 30, 1880, which provided that when a vacancy occurs in the office of professor of the French language or in the office of professor of the Spanish language in the Military Academy, both these offices shall cease, and the remaining one of the two professors shall be professor of modern languages, and thereafter there shall be in the Military Academy one, and only one, professor of modern languages.

By the retirement of Prof. Patrice de Janon, professor of the Spanish language, on June 30, 1882, and in accordance with the provisions of the foregoing act of Congress, Prof. George L. Andrews, professor of the French language, became professor of modern languages. The department of modern languages, therefore, dates from June 30, 1882.

As the present department was established by the absorption of the department of the Spanish language by the department of the French language, its history will require a history of the two latter departments.

DEPARTMENT OF THE FRENCH LANGUAGE.

This department was established by virtue of the act of Congress, approved February 28, 1803, which provided that the President of the United States be, and he is hereby, authorized to appoint one teacher of the French language and one teacher of drawing, to be attached to the Corps of Engineers, whose compensation shall not exceed the pay and emoluments of a captain in the Army. Section 27 of the act of Congress, approved March 16, 1802, had provided that the said Corps of Engineers, when so organized, shall be stationed at West Point, in the State of New York, and shall constitute a Military Academy.

The act of Congress, approved April 29, 1812, which definitely established the Military Academy, provided that the Military Academy shall consist of the Corps of Engineers and certain professors, in addition to the teachers of the French language and drawing already provided:

Under the provisions of the act of Congress of February 28, 1803, Francois Désiré Masson, a native of France, was appointed teacher of the French language July 12, 1803, and was succeeded by his brother, Florimond Masson, April 15, 1810. On the resignation of the latter, January 3, 1815, Claudius Berard, a native of France, was appointed teacher, and as teacher and professor was the head of the department for thirty-three years. The above constituted the teaching force of the department from February 28, 1803, until March 1, 1818, on which date Joseph Du Commun was appointed second teacher of the French language. The office of second teacher was not created by act of Congress, as had been the case with that of teacher, but the appointment was made March 1, 1818, by virtue of an order of the Secretary of War in February, 1818. Pay, however, was appropriated for the second teacher of the French language in the successive appropriation bills for the support of the Military Academy, and it might therefore be said that the existence of the office was sanctioned by Congress. From March, 1818, the two teachers were designated in the regulations and registers of the Military Academy as first teacher and second teacher, respectively, the first teacher being the head of the department. In 1846 the head of the department was made professor by virtue of an act of Congress approved August 8, 1846, which provided that the teacher of drawing and the first teacher of French at the Military Academy shall hereafter be, respectively, professor of drawing and professor of the French language.

The remaining teacher (Hyacinthe R. Agnel) was, however, still designated as second teacher until his appointment, May 16, 1848, as professor of the French language, to succeed Professor Berard, who died May 6, 1848. From May 16, 1848, no more teachers were appointed.

The teaching force of the department from March, 1818, until the appointment of Professor Berard as professor in 1846, consisted of the two teachers, permanent officers of the Military Academy, and such number of officers of the Army and cadets as was deemed necessary detailed as assistants in the department.

In the early part of this period recommendations and efforts were made at several times for the appointment of an additional teacher of the French language, but Congress failed to create the office. These recommendations were evidently based on the belief, quite prevalent in that day, that instruction in French should be given by a native of France. In accordance with this belief, Théophile d'Orémieulx, a native of France, was appointed an officer of the Army, receiving the commission of second lieutenant, First Infantry, and detailed as an assistant in the department. He resigned December 8, 1856, having risen to the rank of captain, though serving continuously at the Academy and in the department. Since December 8, 1856, the assistants in the department have invariably been officers of the Army detailed for that purpose, except in some years when cadets were detailed in addition to the officers already serving as assistants. In 1860 the head of the department, Professor Agnel, in his statement to the Congressional committee of that year, gave strong reasons in favor of having officers of the Army as instructors in preference to having natives, his reasons having been based both on his experience and on theory.

During the period above mentioned (from 1818 to 1846) the officers and cadets detailed as assistants in the department were designated as assistant teachers. From 1848, the date of the appointment of the second teacher as professor, the senior officer was designated as assistant professor and the others as acting assistant professors. Professor Agnel served as the head of the department from the date of his appointment as professor, May 16, 1848, to his death, February 10, 1871, thus having a service as professor of twenty-three years; or including his service as second teacher from February 4, 1840, the date of his appointment, a total of thirty-one years' service in the department. He was succeeded by George L. Andrews, brigadier-general and brevet major-general of volunteers, a distinguished graduate of the Military Academy, who was appointed professor February 28, 1871, and who served as head of the department until its incorporation with the department of the

Spanish language June 30, 1882. He then became the first professor of modern languages and served as head of that department until he was retired August 31, 1892, thus having a total service in the departments of the French language and of modern languages of twenty-one years.

He was succeeded by the undersigned, who was appointed professor of modern languages October 1, 1892.

The following table gives the different heads of the department from its organization in 1803:

Appointment and name.	Army rank when appointed.	Term of service.		Remarks.
		From—	To—	
DEPARTMENT OF FRENCH.				
First teachers. (*a*)				
1. F. D. Masson		July 12, 1803	Apr. 15, 1810	
2. Florimond Masson		Apr. 15, 1810	Jan. 3, 1815	Resigned.
3. Claudius Berard		Jan. 3, 1815	Aug. 8, 1846	Appointed professor.
Professors. (*b*)				
4. Claudius Berard, First Teacher of French.		Aug. 8, 1846	May 6, 1848	Died.
5. Hyacinthe R. Agnel, Second Teacher of French.		May 16, 1848	Feb. 10, 1871	Do.
6. George L. Andrews	Brevet major-general of volunteers.	Feb. 28, 1871	June 30, 1882	Professor of modern languages.
DEPARTMENT OF MODERN LANGUAGES. (*c*)				
Professors.				
7. George L. Andrews, professor of French.		June 30, 1882	Aug. 31, 1892	Retired.
8. Edward E. Wood	Captain, Eighth Cavalry.	Oct. 1, 1892		

a The teachership of French, created by law of February 28, 1803.
b The professorship of French, created by law of August 8, 1846.
c The professorship of modern languages, created by law of June 23, 1879; went into effect June 30, 1882.

TIME ALLOTTED TO INSTRUCTION IN THE FRENCH LANGUAGE.

Owing to the lack of complete records relating to the early years of the Military Academy, I am unable to give with exactness and certainty the amount of time allotted to instruction in the French language previous to 1824. From 1803 until 1812 it seems that there were no annual classes. Cadets remained at the Academy for different periods, varying from six months to six years, before they were graduated, the length of time depending upon their previous preparation and upon their capacity. The teaching appears to have been mainly individual, and some cadets supplemented it by private lessons. The French language seems to have been practically a voluntary study, as it was not a requisite for graduation, as appears from the fact that in some years the examinations therein were passed over for the reason that all the cadets had not had the same advantages with respect to their acquirements on entering the Academy. With reference to the hours of recitation, the only information thereon I have been able to obtain is that in 1805 recitations in French were from 11 a. m. to 1 p. m. (probably recitations of one hour), and alternated with drawing, the teacher of French having, at that time, charge of the instruction in the latter branch until the appointment of a teacher of drawing.

Although in the reorganization of the Military Academy in 1812 provision was made for annual classes, and for examinations for passing into the next class and for graduation, yet it does not appear that these provisions were rigidly and systematically carried out until 1817. From the above it should seem that the results of the instruction in French before 1817 could not have been uniformly satisfactory, and it has been stated that, at the examination in 1817, but few cadets could translate with tolerable facility the easiest French author.

From 1817 dates the definite establishment at the Military Academy of annual classes, of uniform and systematic instruction, of regular allotments of time, and of examination for passing from class to class and for graduation.

The earliest official record of a recommended allotment of time to instruction in the French language appears in the report of the academic board made July 1, 1816, which states what should be considered as a complete course of education at the Military Academy. In this report it is recommended that French be studied the

first year (fourth class) in connection with English, and that it be completed the second year (third class). The number of recitations or hours of recitation are not given, but if, as is probable, it was intended that French should alternate with English in afternoon hours of recitation for the first year (fourth class), and that it should have daily recitations in the forenoon in the second year (third class), it would give about 310 recitations of one hour each. I have been unable to ascertain whether this proposed allotment of time went into effect or not. If so, it was changed by the year 1820. A committee of the academic board had been appointed March 1, 1819, to revise the course of studies at the Military Academy, and submitted its report January 29, 1820, in which it recommended that the French language should be taught daily during five days of the week for the first two years (third and fourth classes). This would give about 360 recitations. In a communication to Congress from the honorable Secretary of War, dated February 28, 1820, he incloses a report from the Superintendent of the Military Academy on the course of studies etc., in which two additional teachers of French are recommended. If they were granted, daily attendance in French during the first year (fourth class) and alternately during the second year (third class) would be sufficient, but with an insufficient number of teachers for the two largest classes at the Academy it would require daily recitations for two years.

In 1824 the records show that the allotment of time to instruction in the French language was as follows: Daily recitations during the first year (fourth class) of one hour each, from 2 p. m. to 4 p. m.; daily recitations during the second year (third class) from 12 m. to 1 p. m., being a total of about 400 recitations.

In 1826 this was changed, and the allotment of time was as follows: Daily recitations during the first year (fourth class) of one hour each, from 2 p. m. to 4 p. m.; recitations of one hour each from 11 a. m. to 1 p. m., alternating with English or history in second year (third class), being a total of about 290 recitations.

This allotment of time remained in force until 1845, when it was changed to the following: In the first year (fourth class) recitations of one hour each from 2 p. m. to 4 p. m., from January to June, alternating with English or history; daily recitations of one hour each during the second year (third class) from 11 a. m. to 1 p. m., being a total of about 272 recitations.

A letter from the inspector of the Military Academy dated July 5, 1854, was laid before the academic board at its meeting July 8, 1854, in which the opinion of the board was desired on an arrangement of studies for a five years' course, the Secretary of War being desirous of adding a fifth year. The letter laid down certain considerations to be observed, among which were "(2) No more time to be given to French than at present; (5) the introduction of the Spanish language."

This letter was referred to a committee of the board, which submitted its report July 28, 1854. This report, which was adopted by the academic board and approved by the Secretary of War, recommended the following allotment of time to the French language: To begin the second year (fourth class) and to have during that year daily recitations of one hour each, from 2 p. m. to 4 p. m.; in third year (third class) to have recitations of one hour each, from 11 a. m. to 1 p. m., alternating with Spanish from September to January. This gave a total of about 238 recitations.

The arrangement of studies for the five years' course went into operation September 1, 1854; but as French began the second year, the above allotment of time for instruction therein did not take effect until September 1, 1855.

At a meeting of the academic board held August 30, 1858, a letter from the inspector of the Academy was laid before it, stating that the Secretary of War favored a return to the four years' course, and directing a report and programme of studies to be submitted therefor. The programme submitted allotted the same amount of time to French that it had before the five years' course was adopted—that is, 272 recitations.

The Secretary of War having suggested, among other modifications, that French might be omitted from the fourth class course, leaving it with about 218 recitations, the academic board recommended that French be retained in the fourth class on account of the importance of the language, and also on account of its being one of the best exercises for precision in the use of language, because of the remarkable care of its structure and the exact signification of its words received from some of the most acute minds and lucid writers. On account of the above reasons and also from the difficulties attending its acquirement and the lack of preparation in any language on the part of most of the cadets, less time than proposed (272 lessons) should not be allotted to it.

By direction of the Secretary of War, the five years' course was reduced to one of four years, May 22, 1861. By the programme of studies that was drawn up in accordance with the above order, the allotment of time to French was the same as submitted in 1858, namely, in the first year (fourth class) recitations of one hour each, from 2 p. m. to 4 p. m., from January to June, alternating with English; in the second year (third class) daily recitations of one hour each, from 11 a. m. to 1 p. m., being a total of about 272 recitations.

By the act of Congress approved June 16, 1866, candidates for admission to the Military Academy were required to have, in addition to the previous requirements, a knowledge of the elements of English grammar, of geography, and of history; in consequence, August 31, 1866, the academic board was directed to modify the programme of studies so as to meet the requirements of the above act. The programme adopted and approved went into operation July 1, 1867. It omitted English studies and allotted to the French language the following amount of time: Daily recitations of one hour each during the first year (fourth class) from 2 p. m. to 4 p. m.; recitations of one hour each from 11 a. m. to 1 p. m., alternating with Spanish, in second year (third class), being a total of about 290 recitations.

English studies were restored in 1877, and during the academic year from September, 1877, to June, 1878, 60 lessons were given to the study of the English course; these 60 lessons were taken from the time allotted to French, so that during this year the number of recitations in French was about 230.

On the recommendation of the academic board at its meeting of June 11, 1878, approved by the Secretary of War, June 18, 1878, the department of the French language was charged with the instruction in English studies. The allotment of time to French was modified accordingly, June 25, 1878, and modified as follows: In first year (fourth class), from January to June, three recitations per week of one hour each from 2 p. m. to 4 p. m.; in second year (third class), daily recitations of one hour each from 11 a. m. to 1 p. m., being a total of about 280 recitations. This allotment of time continued in force until the consolidation of the department of the French language and the department of the Spanish language into the department of modern languages, June 30, 1882.

The following table gives the various changes in the time allotted to instruction in the French language until June 30, 1882, the allotments previous to 1824 being either unknown or considered as probable; from 1824 they are taken from records:

From—	To—	Recitations (one hour each).	Number and hours.		Preparation—time of study at quarters (two hours per lesson).
1803	1817	Not known.			
1817	1820	Probable; first year (fourth class), recitations in afternoon, alternating with English.	90	310	620
		Second year (third class), recitations daily in forenoon.	220		
1820	1824	Probable; first year (fourth class), recitations daily five days per week.	180	360	720
		Second year (third class), recitations daily five days per week.	180		
1824	1826	First year (fourth class), recitations daily in afternoon.	180	400	800
		Second year (third class), recitations daily in forenoon.	220		
1826	1845	First year (fourth class), recitations daily in afternoon.	180	290	580
		Second year (third class), recitations in forenoon, alternating with English or history.	110		
a 1845	*a* 1855	First year (fourth class), recitations from January to June in afternoon, alternating with English studies.	52	272	544
		Second year (third class), recitations daily in forenoon.	220		
a 1855	*a* 1861	Five years' course adopted in 1854; went into effect in French, September 1, 1855. Second year (fourth class), recitations daily in afternoon.	185	238	476
		Third year (third class), recitations from September to January in forenoon, alternating with Spanish.	53		
a 1861	*b* 1867	Four years' course; first year (fourth class), recitations from January to June in afternoon, alternating with English.	52		
		Second year (third class), recitations daily in forenoon.	220	272	544
b 1867	*a* 1877	First year (fourth class), recitations daily in afternoon.	180	290	580
		Second year (third class), recitations in forenoon, alternating with Spanish.	110		
a 1877	*a* 1878	During this period 60 lessons were given to English studies from French.	230	230	460
a 1878	*c* 1882	First year (fourth class), from January to June, three recitations per week in afternoon.	60	280	560
		Second year (third class), recitations daily in forenoon.	220		

a September 1. *b* July 1. *c* June 30.

INSTRUCTION, TEXT-BOOKS, ETC.

As before stated, but little is known concerning the amount and kind of instruction in the French language previous to 1817. The division of the cadets into annual classes was not strictly observed even after 1812, nor were examinations for passing from one class to another or for graduation systematically required. As stated, the examinations in French were sometimes passed over on the ground that the cadets were not on an equality as regards knowledge of the language when they entered the Academy. As a result, the study of the language with respect to application must have been practically voluntary. The amount of instruction appears to have varied according to the capacity and previous knowledge of the cadet and to have been mainly individual in its character. In some cases it was supplemented by private tuition. The only definite information I have been able to obtain concerning the kind of instruction is that about 1814 it consisted in reading aloud for the pronunciation and accent, and in writing from dictation for the orthography. There was but one teacher for all the cadets undergoing instruction in French. His vernacular being that language, the embarrassment and difficulties experienced by the learner from differences of construction and analysis would neither be appreciated nor removed. As a result of the above circumstances, the examination in 1817 appears not to have been satisfactory.

The only information that I have been able to obtain concerning the text-books during this period is that Masson's French Grammar and Masson's French Reader were used in 1814.

Systematic instruction, regular allotment of time, requirement of examinations, and division of classes into sections for recitation date from 1817.

March 1, 1818, a second teacher of French was provided, and from that date until the establishment of a professorship of French, August 8, 1846, the instruction was given by the two teachers, supplemented by the detail of such number of officers and, at times, cadets as was required. From 1846, or rather from the appointment of Second Teacher Agnel to the professorship of French, May 16, 1848, the assistants of the head of the department were officers of the Army, supplemented at times by cadets detailed as instructors.

Previous to the January examination in 1821 the third and fourth classes in French were examined together, the sections being numbered consecutively throughout the two classes. Beginning with the above-named examination and down to the present day, the two classes have always been examined separately, the sections being numbered consecutively in each class.

The earliest record of what was considered to be the requirements of a course of French at the Military Academy is found in the report made by the academic board, July 1, 1816, which states as follows: A course of French shall consist in pronouncing the language tolerably, and translating from French into English, and from English into French, with accuracy.

January 29, 1820, the academic board adopted the report of the committee appointed March 1, 1819, to revise the course of studies. This report stated the requirements of the French course to be as follows: The course of French shall consist in teaching to pronounce that language tolerably, to read and translate French into English, and to convert English into French. The elementary instruction in this department will be conveyed nearly in a like manner to all the sections. An extent of French reading, however, will be admitted in the higher sections proportional to their progress and capacity.

The system of relative weights to be given the different subjects of instruction at the Military Academy was first adopted June 2, 1818. The weight given to the French language was 1, that of mathematical studies being 2.

The earliest official record of the text-books used in the department is that for the year 1821–22. The text-books in use at that time were as follows: In the first year, or fourth class, Wonostrocht's French Grammar, Murray's Lecteur Français, and Gil Blas (Vol. I); in the second year, or third class, Wonostrocht's French Grammar, Lecteur Français, Gil Blas (Vols. II, III, IV), and Voltaire's Charles XII. Under the two general heads of grammars and of readers the above text-books were changed at varying intervals. A complete list of the various text-books used in the department from 1821 to 1882 is given below.

The following programme of the course in French and requirements thereof was adopted by the academic board at its meeting, March 13, 1840:

1. The elements of pronunciation, so as to impart a thorough knowledge of all the sounds of the language.
2. Reading with a correct pronunciation and the proper modulation of the voice.
3. French grammar in its general principles and particular rules.
4. Exercises in English translated into French on the blackboard, so as to reduce all the rules of the language to familiar practice.
5. Reading and translating into English the whole of the Leçons Françaises and as many volumes of Gil Blas as the capacity and progress of the pupils will allow.

6. Translating into French Murray's English Reader.

N. B.—This last exercise is now (1840) confined to the first section of the third class.

7. Speaking French. This can not be done except with the upper sections of the fourth and third classes.

In 1853 the requirements were as follows: French grammar; reading French with a correct pronunciation; translating English into French and French into English accurately.

In 1882, when incorporated with Spanish, the requirements were as follows:

French language.—Grammar; reading and writing French; translating (from text and orally) English into French and French into English.

From between 1817 and 1821 up to 1859 instruction was imparted by lessons assigned in the grammar and in the reader, the lessons varying in length and difficulty proportionate to the progress and capacity of the cadet. This progress and capacity would be indicated by the number of his section. During the recitation of one hour certain members of the section would be given subjects in the grammar lesson, comprising rules and principles and their application by illustrative exercises, to be put upon the blackboard and explained and recited upon orally. The remaining members of the section would be called upon to read the reading lesson, reading aloud as much of the French text as the time permitted and then giving the English translation, either literal or free, as might be required. A due alternation was observed in assigning subjects in grammar and in reading. Pronunciation was acquired by the information imparted therein, and by the practice in reading and in oral recitation.

In 1842 an attempt was made to introduce a course of military reading by the adoption of Rocquancourt's Cours Élémentaire d'Art et d'Histoire Militaire as a text-book in the department, but the committee of the academic board reported against it March 1, 1842, on the ground that its style had not sufficient variety, being only an enumeration of military events, and that it presupposed on the part of the student too great a knowledge of military matters and extensive reading; that literary works best possess the qualifications for studying a language.

In 1849 a verb book (Bolmar's) was adopted and used until 1872, which, from its clear and systematic arrangement and explanation of French verbs, both regular and irregular, greatly facilitated the instruction in that difficult subject.

In addition to the text-book used as a grammar, Agnel's Elementary and Practical French Tabular System was adopted in 1859 and used until December 14, 1883, when it was discontinued on account of being out of print. This most valuable and useful text-book, entirely original in method and scope, was devised and written by Prof. H. R. Agnel, then head of the department. It had for its object the methodical classification of the defining words of the language, the important subject of the place and order of personal pronouns, a scheme of derivation for the ready use of regular and irregular verbs, the use of the past tenses of the indicative, the difference between French and English prepositions, the use of the subjunctive mood, and a course of idioms; the whole so framed as to harmonize with the portion of the grammar rules and exercises studied simultaneously with the tables during the whole course of instruction. Each table as successively studied was written out on the blackboard by the cadet from memory, recited upon and explained by him thoroughly in all its bearings. The practical exercises for each table, arranged in the form of question and answer, were translated into French and written out in exercise books by the cadet while studying in quarters. These exercise books were then given to the instructor of the section, who corrected the exercises and returned the book to the cadet. From 1872 these exercises were written upon the blackboard during recitation and recited upon orally.

After the introduction of the tabular system the cadets when writing a French verb were required to write in addition its primitive tenses.

A detailed programme of the course of instruction in the French language in 1859 is given in the appendix and marked A.[1]

This programme, though it gives the respective lessons and course of instruction for 238 lessons only, which was the allotment during the five years' course at the Academy, was yet practically the same until 1872. The text-books remained, with the exception that a second course of idioms was added in 1867, the same as given in the programme, and the only difference was the natural enlargement of the course arising from the change from 238 lessons to 272 and 290 lessons.

After Professor Andrews became head of the department, February 28, 1871, many changes were made in the text-books previously used, their places being supplied by those of more modern date and of better adaptation to the requirements of the course. These changes are shown in the table given below. The methods of instruction were made more uniform throughout the classes undergoing instruction. Great thoroughness was required of the cadets in their comprehension of the grammatical principles

[1] Not forwarded.

and rules, of the construction of the language, and accuracy in their explanation and application thereof. An accurate and natural English translation was required in translating from the reader, accuracy was exacted in pronunciation and clearness in enunciation, and the average acquirement of the language by the cadets was considerably increased, especially in the sections below the first.

As previously stated, the exercises in the tabular system from 1872 were no longer written in exercise books, but were written upon the blackboard during recitation and explained and recited upon orally, thus giving more practice in pronunciation and a better opportunity to verify the cadet's comprehension of the subject. The method of examination was also changed. Previous to January, 1873, the examinations in French were oral, each cadet at examination being given a subject in grammar to explain and illustrate upon the blackboard, and also being required to read in French and translate orally a portion of the course in reading studied during the preceding term. From the January examination, 1873, the examination in grammar and in the tabular system (as long as that text-book was used) was made written. The examination in reading remained oral.

As before, the lessons during this period varied in length and difficulty according to the progress and capacity of the cadet.

A detailed programme of the course of instruction in the French language in 1878–79 is given in the appendix and marked B.[1] This remained practically the programme until 1882, with the exception of changes arising from different text-books, the number of lessons being the same.

The following table gives the text-books used in the department of the French language until June 30, 1882:

Year.	Text-books.		Remarks.
1803–1820	Masson's French Grammar; Masson's French Reader		Not known when these books were first used or when discontinued, but known that they were used in 1814.
	Third class.	*Fourth class.*	
1821	Exercises in Wonostrocht's French Grammar; The Poetry of the Lecteur Français; Voltaire's Charles XII; Gil Blas, Vols. II, III, IV.	Wonostrocht's French Grammar; Lecteur Français; Gil Blas, Vol. I.	Wonostrocht's Grammar and the Lecteur Français discontinued between 1820 and 1832, the exact year not known.
1832	Berard's French Grammar; Voltaire's Charles XII; Gil Blas, Vols. II, III, IV.	Berard's French Grammar; Berard's Leçons Françaises; Gil Blas, Vol. I.	The exact year when adopted not known.
1841	Levizac's French Grammar; Berard's Leçons Françaises; Gil Blas, Vols. II, III, IV; Murray's English Reader (used in first section only).	Levizac's French Grammar; Berard's Leçons Françaises; Gil Blas, Vol. I.	Gil Blas discontinued September 27, 1841; Murray's Reader adopted April 7, 1840.
1842	Levizac's French Grammar; Berard's Leçons Françaises; Voyage du Jeune Anacharsis; (Murray's English Reader).	Levizac's French Grammar; Berard's Leçons Françaises; Voyage du Jeune Anacharsis.	Voyage du Jeune Anacharsis adopted September 27, 1841.
1848	LeBrethon's Guide to the French Language; Chapsal's Leçons et Modèles de Littérature Française.	LeBrethon's Guide to the French Language; Berard's Leçons Françaises.	LeBrethon adopted September 1, 1847; Chapsal adopted August 22, 1848.
1849	Bolmar's Levizac's French Grammar and Verb Book; Chapsal's Leçons et Modèles de Littérature Française; Rowan's Morceaux Choisis des Auteurs Modernes.	Bolmar's Levizac's French Grammar and Verb Book; Berard's Leçons Françaises.	Bolmar's Levizac and Rowan adopted January 16, 1849.
1852	Same, with addition of Berard's Leçons Françaises.	Same	
1856.....	Bolmar's Levizac's French Grammar and Verb Book; Chapsal's Leçons et Modèles de Littérature Française; Rowan's Morceaux Choisis des Auteurs Modernes.	Same, with addition of Chapsal's Leçons et Modèles de Littérature Française; Spiers and Surenne's French and English Dictionary. Used for reference in both classes.	Spiers and Surenne's Dictionary adopted June 2, 1856. For reference.
1859.....	Bolmar's Levizac, etc.; Rowan's Morceaux, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary.	Bolmar's Levizac, etc.; Chapsal's Leçons, etc.; Rowan's Morceaux, etc.; Berard's Leçons, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary.	Agnel's Tabular System used in manuscript from 1859. Adopted in printed form July 1, 1865.

[1] Not forwarded.

Year.	Text-books.		Remarks.
	Third class—Continued.	*Fourth class*—Continued.	
1862.....	Bolmar's Levizac, etc.; Berard's Lefons, etc.; Chapsal's Leçons, etc.; Rowan's Morceaux, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary.	Bolmar's Levizac, etc.; Berard's Leçons, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary.	
1868.....	Bolmar's Levizae, etc.; Chapsal's Leçons, etc.; Rowan's Morceaux, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary.	Bolmar's Levizac, etc.; Berard's Leçons, etc.; Chapsal's Leçons, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary.	A second course of idioms added to the tabular system in 1867. In third class Bolmar's Levizac, Chapsal and Berard's Lecons, etc., were discontinued June 24, 1872.
1872.....	Borel's Grammaire Française; Reynal's Verb Book; Rowan's Morceaux, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary.	Bôcher's Otto's French Grammar; Reynal's Verb Book; Bôcher's French Reader; Bôcher's College Series of French Plays, Vols. I and II; Agnel's Tabular System; Spiers and Surenne's French Dictionary.	Bôcher's Grammar, Reader, French Plays, Borel's Grammaire and Reynal's Verb Book were adopted June 24, 1872. Bôcher's Grammar discontinued July 3, 1878.
1879.....	Keetels' Analytical and Practical French Grammar; Reynal's Verb Book; Borel's Grammaire Française; Bôcher's College Series of French Plays, Vols. I and II; Rowan's Morceaux, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary.	Keetels' Analytical and Practical French Grammar; Reynal's Verb Book; Bôcher's French Reader; Agnel's Tabular System; Spiers and Surenne's Dictionary.	Reynal's Verb Book and Bôcher's Reader discontinued Nov. 1, 1881.
1882.....	Keetels' Analytical and Practical French Grammar; Borel's Grammaire Française; Bôcher's College Series of French Plays, Vols. I and II; Rowan's Morceaux, etc.; Agnel's Tabular System; Spiers and Surenne's Dictionary.	Keetels' Analytical and Practical French Grammar; Keetels' Analytical French Reader; Agnel's Tabular System; Spiers and Surenne's Dictionary.	Agnel's Tabular System discontinued Dec. 14, 1883.

DEPARTMENT OF THE SPANISH LANGUAGE.

The Secretary of War directed, in a letter from the inspector of the Military Academy, dated July 5, 1854, that the academic board arrange a programme of studies for a five years' course, and observe therein certain conditions, among which was the introduction of the Spanish language. The programme of studies drawn up by the academic board in accordance with the above instructions was subsequently approved by the Secretary of War and went into operation September 1, 1854. The Spanish language as one of the courses of instruction at the Military Academy therefore dates from September 1, 1854.

Previous to this date, however, it appears that there had been some thought of introducing the study of this language. A letter from the Superintendent of the Military Academy, dated January 28, 1824, to the inspector of the Academy, acknowledges the receipt of a letter from the latter, in which it was stated that the authorities at Washington proposed to add to the academic board two professors (or teachers) of the Spanish language. In his reply the superintendent states that the objection to the introduction of the language was the lack of time, unless some studies were dropped.

In 1825 the Board of Visitors recommended that instruction be given in Spanish.

Although the Spanish language as a part of the course of studies dates from September 1, 1854, yet from the fact that in the arrangement of studies it was put in the third year (third class), instruction in it did not begin until September 1, 1856.

From September 1, 1856, to the establishment of a professorship of Spanish by Congress February 16, 1857, and until the appointment of a professor, the instruction in that language was placed under charge of the professor of the French language, who was styled the professor of French and Spanish, and the department was styled the department of French and Spanish.

The act of Congress approved February 16, 1857, provided that "there shall be appointed at the Military Academy, in addition to the professors authorized by the existing laws, a professor of Spanish."

Under the provisions of this act, Patrice De Janon was appointed professor of Spanish July 1, 1857. With the exception of the period from September 16, 1863, to March 4, 1865, during which he was out of service, Professor De Janon was the head of the department until his retirement June 30, 1882, when the department of Spanish was incorporated with the department of the French language, into the department of modern languages.

Professor De Janon was the only professor of Spanish under the above act of Congress, and his total service as head of the department extended over twenty-three years.

From September 16, 1863, to July 27, 1864, the department was again placed under charge of the professor of the French language. From July 27, 1864, to March 4, 1865, when Professor De Janon returned, it was under charge of Capt. Edward R. Platt, Second United States Artillery, and major United States Volunteers, as acting professor.

The following table gives the different heads of the department from September 1, 1856:

Name.	Army rank when appointed.	Term of service.		Remarks.
		From—	To—	
Professors.				
Hyacinthe R. Agnel	Professor of French	Sept. 1, 1856	July 1, 1857	Relieved.
Patrice De Janon	Sword master	July 1, 1857	Sept. 16, 1863	Out of service.
Hyacinthe R. Agnel	Professor of French	Sept. 16, 1863	July 27, 1864	Relieved.
Acting Professor.				
Edward R. Platt	Captain, Second Artillery; major, United States Volunteers.	July 27, 1864	Mar. 4, 1865	Do.
Professor.				
Patrice De Janon		Mar. 4, 1865	June 30, 1882	Retired.

TIME ALLOTTED TO INSTRUCTION IN THE SPANISH LANGUAGE.

When the instruction in Spanish began, September 1, 1856, the time allotted to it in the programme of studies drawn up and approved in 1854 for the five years' course was as follows:

In the third year (third class), recitations of one hour each from 11 a. m. to 1 p. m., alternating with French, from September to January; daily recitations of one hour each from 11 a. m. to 1 p. m. from January to June; being a total of about 170 recitations.

When the change from the five years' course to one of four years finally took effect, September 1, 1861, the time allotted to Spanish in the new arrangement of studies was as follows:

In the fourth year (first class), recitations of one hour each from 11 a. m. to 1 p. m., alternating with riding, from September to June, being a total of about 110 recitations. As Spanish was changed from the third year to the fourth year, the first class was not reached until September 1, 1862; consequently from September 1, 1861, to September 1, 1862, no instruction was given in Spanish.

In the modification of the arrangement of the course of studies caused by discontinuing English studies, which went into effect September 1, 1867, instruction in Spanish was changed from the fourth year (first class) to the second year (third class), and the following allotment of time was made: In the second year (third class), recitations of one hour each from 11 a. m. to 1 p. m., alternating with French, from September to June, being a total of about 110 recitations.

In the rearrangement of the course of studies made necessary by the restoration of English studies in 1877, instruction in Spanish was, on the recommendation of the academic board, approved June 18, 1878, again changed from the second year (third class) to the fourth year (first class), and the following allotment of time was made: In the fourth year (first class), recitations of one hour each from 11 a. m. to 1 p. m., alternating with riding from September to June, being a total of about 110 recitations.

As Spanish was changed from the second year the fourth year, the first class was not reached until September 1, 1880; consequently from September 1, 1878, to September 1, 1880, no instruction was given in Spanish.

This allotment of time was remaining in force June 30, 1882, when the department of Spanish was incorporated with the department of the French language into the department of modern languages.

The following table gives the various changes in the allotment of time to Spanish from September 1, 1856:

From—	To—	Recitations (one hour each).	Number of recitations.	Preparation—time of study at quarters (two hours per lesson).
Sept. 1, 1856	Sept. 1, 1861	Five years' course adopted in 1854; went into effect in Spanish September 1, 1856. Third year (third class), recitations from September to January, alternating with French in forenoon; from January to June, recitations daily in forenoon.	170	340
Sept. 1, 1862	Sept. 1, 1868	Four years' course adopted in 1861; went into effect in Spanish September 1, 1862. Fourth year (first class), recitations in forenoon, alternating with riding.	110	220
Sept. 1, 1868	Sept. 1, 1880	Change went into effect in Spanish September 1, 1868. Second year (third class), recitations in forenoon, alternating with French.	110	220
Sept. 1, 1880	June 30, 1882	Change went into effect in Spanish September 1, 1880. Fourth year (first class), recitations in forenoon, alternating with riding.	110	220

INSTRUCTION, TEXT-BOOKS, ETC.

The instruction in Spanish followed as closely as possible the same system and methods previously described as having been followed in the department of the French language previous to the introduction of the tabular system in 1859. The examinations were oral, and conducted in the same manner as the examinations in French previous to 1873. From September, 1857, to September, 1858, the professor had no assistants, and was the only instructor in the department. The large sections necessitated thereby made it impracticable to give each cadet the requisite amount of individual instruction and practice. From 1858 assistants were provided.

The requirements of the course in Spanish until the absorption of the department June 30, 1882, were as follows: Spanish grammar; reading and writing Spanish; translating (from text and orally) English into Spanish and Spanish into English.

Detailed programmes of the course of instruction in Spanish for 1876 and for 1880 are given in the appendix and marked, respectively, C[1] and D.[1] The latter programme was in force June 30, 1882.

The following table gives the text-books used in the department until June 30, 1882:

Year.	Text-books.	Remarks.
1856..	Third class (third year), Josse's Grammar; Romer and Camacho's Spanish Reader; Ollendorff's Oral Method as applied to Spanish by Velazquez.	Adopted June 2, 1856. Romer and Camacho's Reader discontinued July 16, 1858.
1858..	Josse's Grammar; Morales' Progressive Spanish Reader; Ollendorff's Oral Method, etc.	Morales' Reader adopted July 16, 1858. Josse's Grammar discontinued September 1, 1874.
1862..	First class, same as above.	
1865..	Same; Seoane's Neuman and Baretti's Spanish Dictionary.	For reference.
1868..	Third class, same as above.	
1874..	Vingut's Guide to Spanish and English; Ollendorff's Oral Method, etc.; Morales' Reader; Seoane, etc.	
1881..	First class, same as above.	
1882..	Vingut's Guide to Spanish and English; Ollendorff's Oral Method, etc.; Morales' Progressive Spanish Reader; Seoane's Neuman and Baretti's Spanish Dictionary.	

ENGLISH STUDIES.

English studies were restored as a part of the course of instruction at the Military Academy June 26, 1877, and from that date until June 18, 1878, were under charge of the chaplain and professor of history, geography, and ethics, although the instructors therefor, with the exception of the assistant professor of geography, history, and

[1] Not forwarded.

ethics, were taken from the department of French. June 18, 1878, the instruction in English studies was placed under charge of the professor of French, who from that date, and until the organization of the department of modern languages, was styled the professor of French and English studies, and the department was styled the department of the French language and English studies.

When the instruction in English studies was transferred to the department of the French language, June 18, 1878, the following allotment of time was made therefor: English studies, first year (fourth class), September to January, daily recitations of one hour each, from 2 p. m. to 4 p. m., being about 84 recitations; first year (fourth class), January to June, recitations of one hour each, from 2 p. m. to 4 p. m., two days each week, being about 40 recitations; a total of 124 recitations, with a preparation of two hours' study in quarters for each lesson, or two hundred and forty-eight hours. This allotment was in force at the organization of the department of modern languages.

English studies from June 18, 1878, comprised instruction in English grammar, rhetoric, and composition, and the use and meaning of words and constructions. Hart's Rhetoric and Abbott and Seeley's English Lessons for English People had been used as text-books during the academic year 1877–78. These two books were retained, and to them was added, July 3, 1878, Whitney's Essentials of English Grammar. Abbott's How to Write Clearly was added to the above, January 16, 1880, and was used in place of certain portions of English Lessons for English People.

The above text-books continued in use to the date of the organization of the department of modern languages.

The order and length of the lessons in English studies at the above date will be seen in so much of the detailed programme for the department of modern languages for 1890 (appended, marked E[1]) as relates to English, the said programme having been in operation in 1882 as regards that branch of instruction.

The examinations were oral at January and written at June.

The requirements of the course in English studies June 30, 1882, were as follows: English grammar; rhetoric; rules and exercises on composition; study of words and sentences.

DEPARTMENT OF MODERN LANGUAGES.

The department of modern languages at its organization, June 30, 1882, was made to comprise the three following branches of instruction: (1) English studies; (2) the French language; and (3) the Spanish language.

The requirements in each branch were the same as those previously described under the respective heads of the above three branches.

The following table gives the respective heads of the department from its organization to the present date:

Name.	Army rank when appointed.	Term of service.		Remarks.
		From—	To—	
George L. Andrews ...	Professor of French	June 30, 1882	Aug. 31, 1892	Retired.
Edward E. Wood	Captain Eighth Cavalry	Oct. 1, 1892	.....	

TIME ALLOTTED TO THE DIFFERENT BRANCHES OF STUDY.

The time allotted to instruction in English studies, the French language, and the Spanish language at the organization of the department has been given under those respective heads. It remained in force for all the above branches until August 27, 1883, when the Secretary of War approved the recommendation of the academic board of March 14, 1883, that the study of history be introduced and that it be allotted the time hitherto allotted to Spanish from September to January in the first class year.

From August 27, 1883, therefore, the allotment of time was as follows:

English studies.—Daily recitations of one hour each, from 2 p. m. to 4 p. m., September to January, fourth class year, and two recitations per week from 2 p. m. to 4 p. m., one hour each, from January to June, same year, or 124 recitations.

French language.—Three recitations per week of one hour each, from 2 p. m. to 4 p. m., from January to June, fourth class year, or 60 recitations. Daily recitations of one hour each, from 11 a. m. to 1 p. m., from September to January, third class year, or 220 recitations, being a total of 280 recitations.

Spanish language.—Recitations of one hour each from 11 a. m. to 1 p. m., alternating with riding, from January to June, first class year, or 60 recitations.

[1] Not forwarded.

The above allotment remained in force until 1893. June 19, 1893, the academic board adopted a programme rearranging the order and time of certain studies at the Military Academy, which received July 30, 1893, the approval of the Secretary of War for so much as related to the department of modern languages. The allotment of time then made to the department is the one now in force, and will be given in the description of the present course. This new programme took effect September 1, 1893, for English studies; January 1, 1894, for the French language; March 1, 1895, for the Spanish language.

The first class, however, still continued under the previous programme as regards time, lessons, and text-books, until June, 1896, both the third and first classes, therefore, undergoing instruction simultaneously during the years 1895 and 1896.

The following table gives the changes in the time allotted from June 30, 1882, exclusive of the present arrangement:

From—	To—	Recitations (one hour each).	Number and Hours.		Preparation—time of study at quarters (two hours per lesson).
June 30, 1882	Sept. 1, 1883	English studies: First year (fourth class), recitations daily in afternoon, September to January; January to June, two recitations per week in afternoon.	124	124	248
	-----do ------	French language: First year (fourth class), January to June, three recitations per week in afternoon.	60	280	560
		Second year (third class), September to June, daily recitations in forenoon.	220		
	Jan. 1, 1884	Spanish language: Fourth year (first class), September to June, alternating with riding, in forenoon.	110	110	220
Sept. 1, 1883	Sept. 1, 1893	English studies: First year (fourth class), recitations daily in afternoon, September to January; January to June, two recitations per week in afternoon.	124	124	248
	Jan. 1, 1894	French language: First year (fourth class), January to June, three recitations per week in afternoon.	60	280	560
		Second year (third class), September to January, daily recitations in forenoon.	220		
Jan. 1, 1884	Mar. 1, 1895	Spanish language: Fourth year (first class), January to June, recitations in forenoon, alternating with riding.	60	60	120

INSTRUCTION, TEXT-BOOKS, ETC.

From the organization of the department, June 30, 1882, to the reorganization of the course of studies therein, July 30, 1893, the instruction in English studies and the French language followed the same methods as previously used, and which are described above under those heads. The same text-books in English studies and the French language remained in use, with the exception that Agnel's Tabular System was discontinued December 14, 1883, on account of having gone out of print. Its place was supplied during this period by selecting for each lesson an exercise selected from the French Reader. This exercise was given to the cadets in English and was required to be written in French upon the blackboard, recited upon, and explained. On the introduction of new text-books in 1893, this practice was discontinued. Rowan's Morceaux Choisis was also discontinued in 1885, and its place supplied by Roemer's Cours de Lecture et de Traduction.

In Spanish, the former text-books (Vingut's Guide to Spanish, Ollendorff's Oral Method by Velazquez, and Morales' Spanish Reader) were discontinued December 8, 1883, and their place supplied by the introduction of Knapp's Spanish Grammar and Knapp's Modern Spanish Readimgs. The latter were text-books of more modern date and were better adapted to the requirements of the course. Thoroughness and accuracy were required in recitations both in grammar and in reading, and the system and method of instruction were made to harmonize with the system and method followed in English studies and in French.

The method of examination in English studies and in French remained during this period the same as before the organization of the department of modern languages, that is to say, as follows:

English studies.—January examination, oral; June examination, written.

French.—All examinations, both oral and written.

In Spanish all examinations were both oral and written from and including that of January, 1883.

A detailed programme of the course of instruction in English, French, and Spanish, department of modern languages in 1890, is given in the appendix and marked E[1]. This programme was in force until 1893.

The following table gives the different text-books used in the department until July 30, 1893:

From—	To—	Third class.	Fourth class.	Remarks.
1882	1893	.....	English: Whitney's Essentials of English Grammar; Hart's Composition and Rhetoric; Abbott & Seeley's English Lessons for English People; Abbott's How to Write Clearly.	Whitney's Grammar discontinued July 30, 1893. Abbott & Seeley's English Lessons discontinued July 30, 1893. Hart's Rhetoric discontinued July 30, 1893.
1882	1885	French: Keetels' Analytical and Practical French Grammar; Borel's Grammaire Française; Bôcher's College Series of French Plays, Vols. I and II; Rowan's Morceaux Choisis des Auteurs Modernes; Agnel's Tabular System; Spiers and Surenne's French Dictionary.	French: Keetels' Analytical and Practical French Grammar; Keetels' Analytical French Reader; Agnel's Tabular System; Spiers and Surenne's French Dictionary.	Agnel's Tabular System discontinued December 14, 1883. Rowan's Morceaux Choisis discontinued 1885.
1885	1894	Keetels' Grammar; Borel's Grammaire; Bôcher's Plays, Vols. I and II; Roemer's Cours de Traduction et de Lecture, Vols. I and II; Spiers, etc.	Keetels' Grammar; Keetels' Reader; Spiers, etc.	Keetels' Reader discontinued July 30, 1893. Bôcher's College Series of French Plays, Vol. I, discontinued July 30, 1893.
1882	1883	Spanish (first class): Ollendorff's Oral Method by Velazquez; Vinçut's Guide to Spanish; Morales' Spanish Reader; Seoane's Neuman and Baretti's Spanish Dictionary.		Discontinued December 8, 1883.
1883	1896	Knapp's Spanish Grammar; Knapp's Modern Spanish Readings; Seoane's Neuman and Baretti's Spanish Dictionary. N. B.—Spanish in first class continued until June, 1896.		Do.

The Present Course.

The department of modern languages at the present time comprises the following branches of study, taught in the following order and with the following allotment of time:

First. English studies. Taught in first year (fourth class) from September to January, with daily recitations of one hour each, from 2 p. m. to 4 p. m., and with a total of 84 recitations.

Second. The French language. Taught in first year (fourth class) from January to June, with daily recitations of one hour each, from 2 p. m. to 4 p. m., with 100 recitations; in second year (third class) from September 1 to March 1, with daily recitations of one hour each, from 11 a. m. to 1 p. m., with 142 recitations, or a total number of recitations in the French language of 242.

Third. The Spanish language. Taught in second year (third class) from March 1 to June, with daily recitations of one hour each, from 11 a. m. to 1 p. m., with a total of 78 recitations.

ENGLISH STUDIES.

The requirements of the course in English studies, as given in the academic regulations of 1894, are as follows: Rhetoric; rules and exercises on composition; study of words and sentences; study of synonyms; history of the English language; history of English literature.

From the above requirements and the authorized text-books, the course in English studies is divided into the following subjects:

1. Rhetoric; study and use of words; rules and exercises in composition.
2. Study of synonyms.
3. History of the English language and literature.

[1]Not forwarded.

TEXT-BOOKS.

The text-books adopted, with the date of their adoption, for the course in English studies are given below in the order in which they are used. The order and numbers correspond to the order and numbers of the subjects given above:

1. Williams's Rhetoric and Composition, adopted July 30, 1893; Abbott's How to Write Clearly, adopted January 16, 1880.
2. Smith's Synonyms Discriminated, adopted July 30, 1893.
3. Meiklejohn's English Language, adopted July 30, 1893.

BOOKS OF REFERENCE.

Roget's Thesaurus of English Words, adopted July 30, 1893; Smith's Synonyms Discriminated, adopted July 30, 1893; Webster's Dictionary.

The above books of reference are used as such throughout the entire course of the three languages taught in the department. Webster's Dictionary is furnished to the cadets not merely for use in their language studies, but for use during their entire four years at the Academy.

LESSONS.

The course in English studies comprises 84 lessons, of which 56 are assigned to lessons in advance and 28 to lessons in review.

Rhetoric, composition, etc.—Williams's Rhetoric and Composition, from page 1 to bottom of page 321; 31 advance lessons and 16 review lessons. Abbott's How to Write Clearly, rules, from top of page 14 to bottom of page 40; exercises, I, page 41 to 92, page 59; 9 advance lessons and 4 review lessons.

The total number of lessons in the subject of rhetoric, study and use of words, and rules and exercises in composition is 60, of which 40 are advance lessons and 20 are review lessons.

Study of synonyms.—Smith's Synonyms Discriminated: This subject is begun October 1, and is taught by assigning daily one word and its synonyms from the above date until the end of the course in languages in June of the third class year, making a total of 384 words, with their synonyms. (See requirements in French and Spanish.)

History of the English language and literature: Meiklejohn's English Language, from Part III, page 271, to bottom of page 443; 16 advance lessons and 8 review lessons, a total of 24.

The respective review lessons in Williams's Rhetoric, Abbott's How to Write Clearly, and Meiklejohn's English Language follow in the order named immediately after the last advance lesson in Meiklejohn's English Language.

The length of each of the lessons in the course of English studies, in advance and in review, is given in the detailed programme or list of lessons for the fourth class, marked F[1] in the appendix.

In English studies there is no difference of course for higher and lower sections, and the subject is taught by lesson and recitation without lectures.

The total number of recitations in English studies being 84, each of one hour in length, with two hours' study or preparation at quarters, the total number of hours devoted to the subject is 252.

Instead of original composition, additional practice in the art of written expression is to be given when the cadet has acquired a fair knowledge of French, short selections from that language to be given in third class year for written translation into the best English form.

THE FRENCH LANGUAGE.

The requirements of the course in French, as given in the academic regulations of 1894, are as follows: Grammar; reading and writing French; study and use of idioms; military terms; translating (from text and orally) English into French and French into English; study of English synonyms.

The instruction in French is divided into the following courses:

1. First course: First year (fourth class), January to June, daily recitations of one hour each, from 2 p. m. to 4 p. m., with 100 recitations.
2. Second course: Second year (third class), September to January, daily recitations of one hour each, from 11 a. m. to 1 p. m., with 102 recitations.
3. Third course: Second year (third class), January to March 1, daily recitations of one hour each, from 2 p. m. to 4 p. m., with 40 recitations.

THE FIRST COURSE.

One hundred lessons; 66 advance, 34 review, the proportion between advance and review varying in different text-books.

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[1] Not forwarded.

Text-books.—De Peiffer's French Pronunciation, adopted July 30, 1893; Keetels' Analytical and Practical French Grammar, adopted July 3, 1878; Castarède's Treatise on the Conjugation of French Verbs, adopted July 30, 1893; Roemer's Cours de Lecture et de Traduction, Vol. I, adopted in 1885; Bôcher's College Series of French Plays, Vol. II, adopted June 24, 1872.

Books of reference.—Spiers and Surenne's French Pronouncing Dictionary, adopted June 2, 1856.

Lessons.—The course of lessons in the above text-books is divided into the upper course, or course for the first two sections; the lower course, or course for the last two sections, and the middle course, or course for the remaining sections.

In De Peiffer's Pronunciation and Castarède's Verb Book the lessons are the same for all courses.

De Peiffer's French Pronunciation, 2 lessons, from page 7 to bottom of page 31, the book to be used afterwards as a book of reference.

Castarède's Verb Book, 60 lessons advance, 32 review, from page 1 to bottom of page 96; same for all courses; begun at eighth lesson.

Keetels' Grammar, 64 lessons advance, 34 review; begun at third lesson. Upper course: From lesson 1, page 25, to end lesson 56, page 467. Middle course: From lesson 1, page 25, to end of lesson 54, page 462. Lower course: From lesson 1, page 25, to end of lesson 53, page 448.

Readers, 58 lessons advance, 28 review; begun seventeenth lesson. Roemer's Reader, Vol. I: Upper course, 80 pages; middle course, 70 pages; lower course, 60 pages. Bôcher's Plays, Vol. II, Les Petits Oiseaux, 65 pages, for all courses.

The length of each of the above lessons, in advance and in review, is given in the detailed programme or list of lessons for the fourth class, marked F[1] in the appendix.

SECOND COURSE.

One hundred and two lessons; 68 advance, 34 review, the proportion between advance and review varying in different text-books.

Text-books.—Castarède's Treatise on the Conjugation of French Verbs; Borel's Grammaire Française, adopted June 24, 1872; Hennequin's Lessons in Idiomatic French, adopted July 30, 1893; Bôcher's College Series of French Plays, Vol. II; Roemer's Cours de Lecture et de Traduction, Vol. II, adopted in 1885; Revue Militaire de l'Étranger, six months' subscription each year, adopted July 30, 1893.

Books of reference.—De Peiffer's French Pronunciation, Spiers and Surenne's French Pronouncing Dictionary.

Lessons.—As in the first course, the lessons are divided into lessons for the upper course, middle course, and lower course, respectively, except in the Verb Book, where the lessons are the same in all the courses.

Castarède's Verb Book, 62 lessons advance, 40 review, from page 1 to middle of page 141.

Borel's Grammaire Française, 70 lessons advance, 32 review. Upper course, from section 15 to section 119; middle course, from section 15 to section 118; lower course, from section 15 to section 116; omissions for all courses, sections 73, 74, 75, 77, 78, 79, 80, 81, 86, 88, 89, 115.

Hennequin's Idiomatic French, 51 lessons advance, 51 review. One lesson per day, omitting in advance French exercises and conversation. In review, upper course take French exercise and theme; the other courses take themes only.

Readers: 70 lessons advance, 32 review. Bôcher's Plays, Vol. II, Le Roman d'un Jeune Homme, 90 pages, all courses. Roemer's Reader, Vol. II. Upper course, 120 pages; middle course, 100 pages; lower course, 70 pages.

Revue Militaire de l'Étranger, one lesson per week; no review lessons. Upper course, 3 pages per lesson; middle course, 2½ pages per lesson; lower course, 2 pages per lesson. The length of each of the above lessons, in advance and in review, is given in the detailed programme or list of lessons for the third class, marked G[1] in the Appendix.

THIRD COURSE.

Forty lessons; all advance; no review.

Text-books.—Castarède's Treatise on the Conjugation of French Verbs; Edgren's Compendious French Grammar, adopted July 30, 1893; Hennequin's Lessons in Idiomatic French; Roemer's Cours de Lecture et de Traduction, Vol. II; Revue Militaire de l'Étranger; Monday Daily Figaro, three months' subscription each year; adopted July 30, 1893.

Books of reference.—De Peiffer's French Pronunciation; Spiers and Surenne's French Dictionary.

[1] Not forwarded.

Lessons.—As in the first and second courses, the lessons are divided into lessons for the upper, middle, and lower courses, respectively, except in the verb book, where the lessons are the same in all courses.

Castarède's Verb Book, 40 lessons, no review, from page 50 to bottom of page 141.

Edgren's Grammar, 37 lessons advance, 3 review; selected portions of text to paragraph 171, page 110; thence to end of page 249. Exercises shortened for two lower courses.

Hennequin's Idioms, 1 lesson per day, 40 lessons, no review; composition omitted and exercises shortened for two lower courses.

Readers, no review. Roemer's Reader, Vol. II. Upper course, 4 pages per lesson; middle course, 3½ pages per lesson; lower course, 3 pages per lesson.

Revue Militaire de l'Étranger, 4 lessons per week, 32 lessons. Upper course, 4 pages per lesson; middle course, 3½ pages per lesson; lower course, 3 pages per lesson.

Monday Daily Figaro, three months' subscription yearly; 1 lesson per week; no lesson assigned; reading at sight.

Dictation exercises are given once a week throughout the third-class course, and sight reading is practiced whenever time is available.

The length of each of the above lessons is given in the detailed programme or list of lessons for the third class, marked G[1] in the appendix.

The three courses of the French language are taught by lesson and recitation without lectures.

The total number of recitations in the French language being 242, each of one hour in length, with two hours of study or preparation at quarters, the total number of hours devoted to the subject is 726.

THE SPANISH LANGUAGE.

The requirements of the course in Spanish, as given in the Academic Regulations of 1894, are as follows: Grammar; reading and writing Spanish; translating (from text and orally) English into Spanish and Spanish into English; study of English synonyms.

There is one continuous course of 78 lessons; 52 advance, 26 review, the proportion varying in different text-books.

Text-books.—Knapp's Spanish Grammar, used as verb book and for pronunciation, adopted December 8, 1883; Monsanto and Languellier's Spanish Grammar, adopted July 30, 1893; Mantilla's Spanish Reader, No. 3, adopted July 30, 1893; Eco de Madrid, adopted July 30, 1893; Knapp's Spanish Readings, adopted December 8, 1883.

Books of reference.—Seoane's Neuman and Baretti's Spanish Dictionary, adopted in 1865.

Lessons.—The course of lessons in the above text-books is divided into the upper course, or course for the first two sections, and the lower course, or course for the remaining sections. The lesson in pronunciation from Knapp's Grammar and the lessons in verbs from the same text-book are the same for both courses.

Knapp's Grammar, pronunciation, 2 lessons, from page 1 to paragraph 56, page 20, and to be used afterwards for reference.

Knapp's Grammar, verbs, 52 lessons advance, 22 review; from Haber, page 162, to end of paragraph 554. Intermediate review in four lessons of the first eight lessons in verbs; begun at fifth lesson.

Grammar, 49 lessons advance, 27 review; begun at third lesson. Monsanto and Languellier, one lesson daily, omitting lessons 24, 26, 32, 33, 34, 35, 38, 39, 40, 50, 53, 54, 56, 57, 60, 62; the themes are shortened in the lower course. Knapp's Grammar, paragraphs 406 to 412 and paragraph 706; 47 lessons advance, 18 review; begun at fourteenth lesson.

Readers, 47 lessons advance, 1 review. Begun at fourteenth lesson. Upper course: Mantilla's Reader, 20 pages; Eco de Madrid, 35 pages; Knapp's Reader, 50 pages.

Readers, lower course: Mantilla's Reader, 15 pages; Eco de Madrid, 35 pages; Knapp's Reader, 40 pages. Intermediate review, in two lessons, of the first four lessons in reading.

The length of each of the above lessons, in advance and in review, is given in the detailed programme or list of lessons for the third class, marked G[1] in the Appendix.

The Spanish language is taught by lesson and recitation without lectures.

The total number of recitations in the Spanish language being 78, each of one hour in length, with two hours of study or preparation at quarters, the total number of hours devoted to the subject is 234.

ORGANIZATION OF THE DEPARTMENT.

The department, as now organized, comprises the professor of modern languages, head of the department, and seven assistants, who are officers of the Army that have

[1] Not forwarded.

been detailed for such duty. The two senior assistants are by rank assistant professor of the French language and assistant professor of the Spanish language, respectively. As two classes (third and fourth) are undergoing instruction daily in the department, each one of the assistants has assigned to him for instruction three sections, either one section of the third class and two sections of the fourth class, or two sections of the third class and one section of the fourth class. The assistant professor of French is the principal assistant as far as relates to the instruction of the fourth class, and the first and last sections in that class are assigned to him for instruction in addition to the section assigned to him in the third class. The assistant professor of Spanish has similar duties assigned to him in the third class, having the first and last sections thereof, as a rule, in addition to the section in the fourth class. The senior of the two assistant professors is a member of the academic board and examining committee, for the purpose of examining cadets, arranging them in order of merit, and determining the proficiency or deficiency in every branch of study in the department.

The various duties of the head of the department and his assistants are as given in Article V, Academic Regulations of 1894.

The Recitation.

The section rooms are the same in size and form as those used in the other departments of instruction at the Military Academy. The instructor's seat and desk, on a raised platform, are in the center of that side of the section room which is opposite the entrance door. The seats and desks of the cadets are in two lines parallel to those sides of the section room which form right angles with the instructor's side, and arranged so that the two lines of cadets face each other, leaving as much vacant space in the center of the room as possible. Cadets are assigned to seats in the order of their rank in the section, the senior member of the section, or section marcher, having the seat nearest to the instructor and in the line of seats to the right of the latter when facing the door. The next in rank has the seat next to the section marcher, and so on to the last in rank, who has the last seat to the left of the instructor.

The number of cadets in a section varies according to the size of the third and fourth classes. During the past four years the number has varied from nine to twelve or thirteen. The sections are made as equal as possible in their strength, and where it is not possible to do so the lower sections are given the smallest number of cadets.

The members of the section, after entering, take their places in rear of their respective seats and stand at attention until the section marcher reports. The section marcher enters the room last, closes the door, and, standing in front of the instructor, reports the section as all present or gives the names of the absentees, immediately after which all members of the section take their seats. In accordance with the regulations for section rooms, opportunity is now given for members of the section to ask pertinent questions concerning difficulties in the lesson of the day. Immediately after this the recitation proper begins.

THE RECITATION IN ENGLISH STUDIES.

In English studies as many members of the section are assigned subjects for recitation at the blackboard as the size of the section will permit, reserving one member, and sometimes two, for questions on the lesson of the day or on the lesson of the preceding day. Each cadet, when his name is called, takes his place in the center of the room facing the instructor, and standing at attention receives his enunciation. He then goes to the particular blackboard assigned to him by the order in which his name was called to receive an enunciation or subject of recitation, the first cadet called taking the first blackboard to the right of the instructor on the side of the room opposite the latter, the others following in consecutive order from right to left. Immediately upon arriving at his proper blackboard the cadet writes his name in the upper right-hand corner and under his name the number indicating the order in which he received his enunciation. He then proceeds to put upon the blackboard the work called for by his subject. He is not permitted to write out the subject-matter of his recitation, but is required to write the different heads thereof in the form of a synopsis showing their relation to one another, and is required to make the explanation orally. At each recitation one member of the section is required to write a synopsis of the lesson of th day and another member to write a synopsis of the lesson of the preceding day. When the cadet is ready for recitation, he indicates it by taking the pointer in his han and standing at the blackboard facing the instructor. Until the first cadet is called upon to recite at the blackboard, the time has been occupied in questioning those members of the section who were not sent to the blackboard. The cadets questioned make their recitation standing in the center of the room facing the instructor, and when the questions are finished they take their seats or are given subjects at the blackboard when one becomes vacant.

When a cadet at the blackboard is called upon to recite, he first gives from memory the enunciation of his subject in the exact words in which he received it, and then proceeds to explain and illustrate the subject by the knowledge of it that he has obtained by his own study. If his recitation be entirely satisfactory in every respect, he is then told that it is sufficient, and takes his seat. If not so, the instructor then goes over the subject, until by explanation and question the cadet understands it.

The work upon the blackboard, including the cadet's name and number, is required to be written neatly and spelled and punctuated correctly. In the case of illustrative examples and exercises for correction, the whole work, of course, is put upon the blackboard.

THE RECITATION IN FRENCH.

The preliminaries up to and including the questions on the lesson of the day are the same as in English studies. At each recitation, immediately after the preliminary questions, a portion of the time, not to exceed ten minutes from the entrance of the section, and limited if possible to five minutes therefrom, is employed for pronunciation exercises and practice.

These exercises and practice vary for different days. One day the time will be devoted to explanation and practice of certain difficult sounds in the language; another, to sentence accentuation; another, the instructor reads aloud a portion of the reading lesson of the day, the members of the section following the reading in their books and observing the pronunciation; another, short sentences in French will be given orally to the members of the section, which they will repeat in French and then translate into English; another, sentences in English will be given, which they will translate orally into French; another, a short extract in French, which the members have not seen, will be read to them, and they will translate it. This practice is carried on during the entire course in French, and in its purpose is equivalent to a daily drill. Each Monday, in the third-class course, this time is employed in dictation exercises, the papers being subsequently corrected and marked by the instructor, and the mark given therefor combined with their mark on the recitation of the day.

Immediately after this daily practice in pronunciation the recitation proper begins. The members of the section are called up in order, and, with the exception of three or four who are reserved for recitations in reading, are given subjects for recitations at the blackboard. These subjects contain grammatical principles to be explained and illustrated and themes and exercises connected therewith, or idioms and exercises thereon; each subject, however, always requires a tense of a verb to be written on the blackboard in addition to the subject-matter proper. Until the first recitation at the blackboard the time is employed in the recitations in reading by those cadets who were not sent to the blackboard. After these cadets have completed their recitation in reading, they are required to write a verb on the blackboard. The recitation at the blackboard is similar in form to that in English studies, except that the subject-matter is all put upon the blackboard, with the exception of explanations.

The recitation in reading is conducted as follows:

1. The cadet, standing in the center of the room and facing the instructor, reads aloud a portion of the French text as an exercise in pronunciation.
2. He then translates literally or freely, as may be required.
3. The book is then closed and as an exercise in ear training portions of the French text that he has read, or, when more advanced, portions of French text that he has not read, are read aloud to him by the instructor, the cadet being required to give, as well as possible, the English translation of what he hears.

In order to counteract the pernicious habit of guessing at the sense without an accurate knowledge of the meaning of each word, and also in order to accustom the cadet to the order of the words in French (differing so much from the order in English), translations strictly literal are required for the first twenty lessons in reading. After that free translations will be given, the instructor, however, whenever deemed necessary, ascertaining that the cadet understands thoroughly the literal translation.

Reading at sight is practiced whenever time is available.

THE RECITATION IN SPANISH.

This recitation is conducted in the same manner and by the same methods as in French.

All recitations are marked on the following scale: 3, thorough; 2.5, good; 2, indifferent; 1.5, bad; 1, very indifferent; 0, complete failure.

The different sections in the two classes, varying in number from 17 to 20 and 21, are visited by the head of the department, when practicable, at least once each week.

Weekly Class Reports, etc.

In accordance with the provisions of the Academic Regulations of 1894, each instructor having the immediate charge of one or more sections of a class keeps daily notes of the progress of each and of the relative merit of the members, and at the end of each week reports the result to the Superintendent, through the head of the department, with such additional explanations as may be necessary to show the relative progress of the members of the respective sections. The head of the department at the same time recommends such transfers from section to section as he may consider expedient.

The above-named weekly report is made out in the following form:

[United States Military Academy, third class, first section. Department of modern languages (French).]

Report for the week ending ———, 189–.

[Scale of daily merit: Thorough, 3; good, 2.5; indifferent, 2; bad, 1.5; very indifferent, 1; complete failure, 0.]

No.	Name.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.	Total.	Maximum for the week, 18.0. Progress during the week.
1	A.....	3	.....	2.5	2.5	2.8	2.9	16.4	Transfers recommended: Cadet B to the second section. E. E. W., professor of modern languages.
2	B.....	2.5	2	2.7	2.5	2.6	2.4	14.7	
3	C.....	2.9	3	2.9	3	2.8	2.5	17.1	

———— ————,
Instructor.

Prof. E. E. W.,
Department Modern Languages.

The above weekly report is posted in a convenient place in the Academy building during the week following the one for which it is submitted, thus affording the members of the section an opportunity to see their marks and keep themselves informed of their merit in the study.

As the members of the fourth class in English studies begin that study September 1 with an alphabetical arrangement in their class, the first transfer is effected at the end of the first month by rearranging the whole class in order of merit by the total marks of its members and reassigning the latter to sections accordingly. The same course is followed when the fourth class begins the study of the French language in January. All other transfers from section to section are recommended on the weekly class report, when judged expedient or necessary by the head of the department.

Examinations.

The number and kind of examinations held in the respective classes undergoing instruction in the department are as follows:

Examination of the fourth class in English studies, January—oral.
Examination of the fourth class in French, June—written and oral.
Examination of the third class in French, January—written and oral.
Final examination of the third class in French, March 1—written.
Examination of the third class in Spanish, June—written and oral.

The oral examination of the fourth class in English studies is conducted by means of subjects assigned to each cadet for recitation at the blackboard. Each enunciation contains subjects from both the course in rhetoric and composition and the course in the history of the English language and literature, and also contains such matter as will show the cadet's knowledge of the principles of punctuation. In case his oral examination gives rise to doubt concerning his proficiency, he is reexamined by written examination.

In the oral examinations in French and in Spanish, each cadet is required to read aloud, to test his pronunciation, selections from the course in reading, and to translate them into English; in addition, each cadet is required at each oral examination in French and Spanish (fourth class French in June, third class French in January, and third class Spanish in June) to read at sight selections from those languages.

In the written examinations the examination papers are of such length and contain such a number of sentences as will thoroughly test the cadet's knowledge of the grammatical principles learned during the past term and his knowledge of a number of the idioms.

The sentences of course differ from year to year, but their number for each written examination remains the same, and is as follows:

Fourth class, French, June—Upper course, 80; middle course, 70; lower course, 60.
Third class, French, January—Upper course, 80; middle course, 65; lower course, 50.
Third class, French, March 1—Upper course, 50; middle course, 40; lower course, 30.
Third class, Spanish, June—Upper course, 70; lower course, 60.

The academic board has fixed the weights to be given to all examinations either oral or written, and the respective examinations in the department have in consequence the following weights: Oral examination, fourth class, English studies, in January, 15; written and oral examination, fourth class, French, in June, one-half the weight of review mark; written and oral examination, third class, French, in January, one-half the weight of review mark; written examination, third class, French, on March 1, 15; written and oral examination, third class, Spanish, in June, one-half the weight of the review mark.

After the examination, the examination mark received by the cadet is added to the sum of his total mark received during the past term increased by his review mark, and the sum thus obtained is called his grand total mark. In estimating the deficiency or proficiency of a cadet after examination, it is considered that the knowledge shown by him during his daily recitations and the knowledge shown by him at the examination should give him a mark not varying much from two-thirds of the maximum grand total.

Review of Present Course.

In the course of instruction as at present arranged in the department the three languages taught follow one another in succession; each language, English, French, Spanish, is taken up and completed before the succeeding one is begun, and no two languages are studied simultaneously by the same class. By being placed, according to the programme of studies, entirely in the first two years at the Academy (fourth and third classes), they are taught in combination with but one other branch of study, mathematics, thereby affording not only the natural and best correlation of studies for mental training during those years, but also the best opportunity for acquirement.

ENGLISH STUDIES.

As a consequence not only of the amount of time available for instruction in this study, but also of the fact that candidates for admission are required to possess a fair knowledge of the elements of English grammar, the study of the latter has been discontinued, and the course in English studies is mainly rhetorical, with the addition of a short course in the history of the language and of its literature.

As the cadets of the Military Academy are destined to be officers of the Army, the primary aim of their instruction in rhetoric and composition is to give them such information, instruction, and training as will enable them to express themselves clearly and plainly, so that their meaning can not be mistaken, and that it be expressed in the most clear and forcible way. The course in rhetoric and composition is therefore prepared with this aim in view. It comprises the essential principles of punctuation, of the selection and right use of words, of the construction of sentences and the errors to be avoided therein, the principles of paragraphing, the outlining of subjects of composition, the effect and use of figures, and the forms to be observed in letters. All of these are supplemented by examples for practice in application. By these means the cadet obtains a knowledge of the errors to be avoided in expression and a knowledge of the various devices used in making it most effective.

As regards oral expression, it is known that errors therein are prevalent among cadets, though it is doubtful whether they are more so than throughout the country or among students elsewhere. Certainly the cadets are fair representatives of the average youth of the various schools throughout the United States. It is simply more noticeable to visitors here on account of the greater opportunity the latter have, from the examinations and recitations, of hearing those errors.

Be this as it may, it is of course desirable to correct as far as possible these errors in oral expression. But it must be borne in mind that they are the result of acquired habit, and can be changed only by another acquired habit. This last can come only by persistent and constant correction of those errors of speech whenever and wherever they are heard in all branches of study. Mere knowledge given to the cadet of these errors is not sufficient to eradicate them; correction of these errors during a recitation of an hour in one branch of study is not sufficient to eradicate them. Daily and constant correction everywhere is the only remedy.

Although the writing of compositions has considerable value, yet to require the cadet to furnish both the ideas and their expression would take far too much of his time, considering his other studies. It is believed that fully as good, if not better, results can be obtained by furnishing him with the ideas and requiring of him their

best expression in accordance with the rhetorical principles he has learned. This is best attained after he has some knowledge of another language, as French, by giving him extracts from that language to be translated and expressed in the best rhetorical way. For this reason practice in composition is to be given in the third class year. After writing this translation, the paper is given to the instructor of the section, who indicates the errors on the margin of the paper. The errors are not corrected by the instructor, but reference is to be made by number of rule to the principle violated. The paper is then returned to the cadet and he makes his corrections; this is to continue until the paper be without error.

A knowledge of the exact and precise meaning of the words to be used is of great value, and some instruction in the distinction of synonyms is desirable. It is thought, however, that consecutive lessons on this subject alone for a definite time as a separate division of English studies would not produce the best results. The knowledge would soon be forgotten by the introduction of new matter. Moreover, any such number of synonyms as would necessarily be given for a single lesson would require considerable time for their proper study. It is believed that the best practicable results are obtained by assigning daily one word and its synonyms (learned from Smith's Synonyms Discriminated) from October 1 of the fourth class year until the end of the entire language course—that is, June of the third class year. The labor required daily to learn one word and its synonyms is a trifling addition to that required for the study of the lesson of that day, and by extending the study over the entire language course the habit of discrimination, resulting from studying 380 synonyms, would, it is hoped, be acquired.

The course in the history and historical elements of the English language and in its literature, though short, fulfills an object of considerable importance, namely: It not only gives information and knowledge such as those having the position of officers of the army should possess, but it is also intended to be suggestive of different courses of reading that the cadet could follow with interest and advantage. This suggestion and indication are by this course given him in his first year at the Academy. It is known that many cadets enter the Academy with a great lack of knowledge and culture derived from reading. Without some such suggestion as is given by this course of literature, the use of the library by many cadets would naturally be desultory and aimless.

THE FRENCH LANGUAGE.

Immediately after the completion of English studies the study of the French language is begun in January, fourth-class year, and extends over 242 daily recitations from that time until March 1, third class year, being divided by examinations into the course from January to June, fourth class, September to January, third class, and January to March 1, third class, called the first, second, and third courses, respectively.

THE FIRST COURSE.

As regards pronunciation, the aim of the instruction throughout all the courses is to make the cadet acquire, by knowledge and practice, the ability to pronounce accurately each word, to acquire a thorough knowledge of all the principles and sounds of sentence accentuation, and in practice to be fairly able to give the sentence accentuation correctly. Ease in word pronunciation and ease and correctness in sentence accentuation can be acquired only by fluency of speech. Fluency of speech in a foreign language can be acquired only by habitual use of it by one person by association with another using the language, or by residence where it is spoken. In the entire course in French, consisting of 242 recitations or hours of practice, the sections number ten members, and frequently a greater number. This gives little more than twenty-four hours' practice in pronunciation for each cadet during the entire course. The same conditions to a greater or less extent prevail in all institutions where a foreign language is necessarily taught in the class room, and it is for that reason that the power to speak with even moderate fluency a foreign language can not be and never has been acquired in a class room.

As the majority of the cadets when they begin the study of French have no previous knowledge of the language, the first 2 lessons in the course are given solely to pronunciation. Lessons are assigned in the text-book on pronunciation, upon which the cadets recite as well as receive information and example from the instructor. After the first 2 lessons instruction and practice in pronunciation are given by the daily recitations and by the daily pronunciation drill described under the head of recitations.

Instruction in grammar is begun at the third lesson of the course. In the text-book used (Keetels' Analytical and Practical French Grammar), only the grammatical principle and rules, the illustrative examples thereon, and their application in the theme are required to be learned for recitation, the oral exercises and examples being

used for reference only, except that in each lesson the first paragraph of the oral exercises, consisting of a few short sentences, is required to be committed to memory, not to be put upon the blackboard, but to be recited orally as an exercise in sentence accentuation. The first 10 lessons in the grammar are reviewed in 5 lessons, so as to give the cadet an opportunity thoroughly to grasp the first elements of the language. After that the lessons are continuous until the seventieth lesson, when the whole grammar course is reviewed. By those means all of the essential part of each lesson is retained and the labor much lightened, so that more time can be given to reading and translation, which are of prime importance.

It has been found by experience that for the study of the French verb better results are obtained by using a verb book separate and distinct from the grammar. The verb is difficult for beginners and should be made as plain, full, and comprehensible as possible, and the forms and English translations thereof should be constantly repeated in the text-book. In the verb book used all the verbs conjugated are given in full with the English meaning of each word and tense in the opposite column, and the irregular verbs are grouped by classes of similar conjugation. To further aid the study of irregular verbs, a pamphlet has been prepared giving a brief explanation of the derivation of the different verb forms from the primitive tenses, accompanied by a model of the form in which the verb must always be written upon the blackboard.

It is deemed best not to begin the assignment of verbs for study from the verb book until the eighth lesson in the course, or sixth grammar lesson. By that time the cadet has gradually learned from the grammar lessons most of the different forms of "avoir," and he is prepared to take the verb as a whole. After completing the two auxiliary verbs and the four model verbs of the regular conjugation in 16 lessons, they are reviewed. After that the lessons are continuous until the seventy-eighth lesson, when the whole verb course is reviewed.

In reading, no single text-book has been found that is suitable for the course here, and it has been found necessary to use several of them and to make suitable selections therefrom. As much as possible, text-books without vocabularies have been selected, as experience has proved that more French is acquired and more French retained when the learner has to search for the meaning of words and sentences in the dictionary than when he relies upon incomplete and faulty vocabularies and notes in the text-book. The first reader used (Roemer's, Vol. I) contains examples of comparatively easy French for beginners, the extracts gradually increasing in difficulty, and gives the learner acquaintance with literary French. It is followed by a French play, which gives the learner an opportunity of becoming acquainted with conversational and everyday French.

The reading begins at the seventeenth lesson in the course, experience having shown that this is as soon as advisable. The cadet will also then be in the first review in grammar, and can begin reading to better advantage. The lessons are then continuous until the seventy-sixth lesson in the course, when the remaining lessons are given to review.

THE SECOND COURSE.

As a thorough and familiar knowledge of the verbs is essential, repetition of their study is necessary. Beginning, therefore, at the first verb in the verb book, two verbs are assigned to each lesson as far as the fiftieth lesson, after which the verbs previously learned are reviewed.

For a text-book in grammar in this course it has proved advantageous to use a grammar entirely in the French language. Though the use of a grammar in French is somewhat difficult in the first lessons therein, yet it soon becomes simple, and the ability of the cadet to read French is much increased thereby. Lessons, simplified as much as possible by the omission of everything except the principles and rules with a sufficient number of illustrative examples to explain them, are assigned continuously in the advance lessons until the seventieth lesson in the course, when the remaining lessons are given to review. Dictation exercises begin in this course, and are given every Monday. In the second course, it is considered that the cadet has made sufficient progress in his knowledge of the language to admit of the introduction of a course in the study of French idioms. The text-book used on that subject is peculiarly suited, on account of the number of lessons into which it is divided and the arrangement of the subject-matter in each lesson, to the limitations and requirements of the course here. The book is divided into 50 lessons, each lesson containing two idioms with explanation, an exercise in French exemplifying the idioms, a short theme or composition, and a conversational exercise. Beginning with the second lesson of the programme of lessons, one lesson in the text-book on idioms is assigned to each lesson in the course, omitting the French exercise and the conversation, and taking only the two idioms and the theme or composition; at the fiftieth lesson the book is completed, and the idioms are then gone over again in 50 lessons. In the review the theme or composition and the conversation are omitted, only the

two idioms and the French exercise being required. As the course in grammar contains no themes, but only principles or rules and illustrative examples, the course of grammar and idioms taken together is no more difficult than an ordinary lesson in grammar.

As the cadet is to be an officer of the Army, the course in the French language should give him something of a military vocabulary. The course in reading, therefore, has a certain amount of military literature. As the cadet at this stage of his progress has a fair acquaintance with literary and everyday French, it has been decided to introduce military literature in this course, keeping it subordinate to general literature. For this purpose one lesson per week is assigned in a French military periodical, the Revue Militaire de l'Etranger, thus giving in the second course 16 lessons in military reading. As it is deemed important to acquire as large a military vocabulary as possible, and as the style in military literature is generally quite simple and easy, the reading in the Revue Militaire de l'Etranger is continuous without any review. This periodical is taken by a six months' subscription each year, and consequently has the advantage of dealing with current military matters. Moreover, in addition to the instruction it gives in the use of the French language, the information it gives is eminently valuable to the military student, and is likely to be remembered.

The remaining lessons in reading, 86 in number, are devoted to general literature and a French play, and are divided into advance and review.

THE THIRD COURSE.

This course has only 40 lessons, and is the final or finishing course in French.

The study of the verb is continued and repeated by assigning two verbs in the verb book to each lesson, as in second course. The lessons in this course, however, are without any review.

It is believed that the grammar course at this stage of the instruction in French should be of the nature of a general review or survey of the general and important principles of the language, combined with some instruction in the historical development of its various forms and constructions, the latter instruction being adapted to the knowledge and capacity of the cadet. Some knowledge of this historical development is not only information proper for an educated man, but is extremely useful in enabling the student to understand, remember, and use the various forms and constructions of the language he is studying. As best answering the above requirements, Edgren's Grammar has been selected for this course. Its explanations of many of the difficulties of French are plain and clear, and its account of the development of the various forms, though sufficient for the purpose, is concise and easily understood. In using this text-book, the themes and illustrative examples are shortened when considered longer than necessary.

The lessons are continuous with no review, as the whole third course is of the character of a general review or survey of the general principles of the language.

As there are only 40 lessons in the third course and 50 lessons in the text-book for idioms, 40 of the most important lessons in the book are selected and assigned to each lesson in this course. Each lesson includes the two idioms, the French exercise, and the conversational exercise, the theme being omitted. This conversational exercise is used orally.

In this course the military reading is made predominant. There is also introduced a course of reading from a French newspaper taken three months each year.

The following division is made of the different kinds of reading during the third course: Military reading from the Revue Militaire de l'Etranger during three days of the week; reading in general literature during two days of the week; reading at sight from a French newspaper for one day of the week. The lessons in reading are continuous in all kinds of reading, without any review. Review lessons in reading are necessary in the beginning of the study of a language, in order to test the learner's knowledge of what he has gone over, to reiterate explanations, and to familiarize him with the constructions and the words that make up the framework of a language; but after that it is more advantageous to read continuously and as much as possible, not only on account of acquiring a larger vocabulary, but also on account of the learner's interest in the subject being better maintained.

The characteristics of the course in French are the variety of grammatical instruction arising from the use of many grammars, which enables the same subject to be presented in different ways and which gives more benefit than several reviews in the same book, the extent and variety of the course in reading, military reading, sight reading, the course of idioms, and the daily drill in pronunciation.

THE SPANISH LANGUAGE.

The system and methods used in the course in Spanish follow the same lines as in French, with the exception that there is no military reading and no course of idioms,

time not being available therefor. On account of the small number of lessons, the same proficiency as in French can not be attained.

As in French, the first 2 lessons are given to pronunciation, which is afterwards taught and practiced by the same methods as in French. Grammar begins at the second lesson of the course, and the lessons therein are continuous, without any intermediate review, until the fifty-first lesson, when the remaining lessons are given to review.

A good knowlege of the forms of the verb in Spanish is relatively of greater importance than in French, owing to the ordinary omission of its subject. The ease and quickness with which the verb in Spanish may be understood and learned depends almost entirely on the manner in which its forms are named, explained, and presented. For these reasons Knapp's Grammar has been selected as the text-book for verbs, and also for the reason given in the course in French that verbs are always better learned in a verb book separate and distinct from the grammar. By Knapp's method of arranging and naming the different forms, certain peculiarities that are exceedingly difficult for beginners are made clear and comprehensible. His treatment of irregular verbs simplifies greatly their acquirement.

Although beginning a new language, yet as the cadet has had instruction in a foreign language for some time, it is believed that he can easily begin the study of verbs at the third grammar lesson, or fifth lesson of the course. After completing the verb "haber" and the three model verbs of the regular conjugations in 7 lessons, they are reviewed in 5 lessons. After that the lessons are continuous until the fifty-sixth lesson, when the remaining lessons are given to review.

It has been found necessary to use three text-books to answer the requirements of the course in reading. In no other way was it possible to combine the necessary ease for beginners with the necessary variety in vocabulary and construction, and variety in examples of the literature of the language as well as its everyday speech. It is particularly the case in the Spanish course here, where it is necessary to have as much variety as possible in a short period of time. In selecting the three readers used, it has been the aim to secure thereby easy and simple selections for the beginning of the course in reading, good and representative examples of modern Spanish literature, and also reading selections that would give instruction in everyday speech and in the names of the ordinary and usual objects therein mentioned. The Eco de Madrid is used for the latter purpose.

The reading course begins with Mantilla's Reader and at the twelfth grammar lesson, or fourteenth lesson of the course. The first 4 lessons in Mantilla's Reader are reviewed in 2 lessons. After that the lessons are continuous until the sixtieth lesson of the course, or forty-sixth lesson in reading, and in the following order: Fifteen lessons in Mantilla's Reader, 15 lessons in the Eco de Madrid, 16 lessons in Knapp's Spanish Readings.

The remaining lessons are given to a review, as it is not deemed judicious to omit a review in reading in the short period of time the cadet has to give to the study of Spanish.

In comparing the present course with former courses in the three languages, the comparison must be made between differences in arrangement of time and differences in matter and instruction. Formerly the three languages were in three different departments and under three different professors; now they are all under one head. Formerly and until 1893 two of the three languages were taught at the same time in the same class; now each language is taught separately, and the three languages follow one another in due succession—a great advantage over the former arrangement. In regard to the time devoted to their study, formerly French varied from 400 recitations to 272, having once 238 recitations; now it has 242 recitations. Formerly Spanish varied from 170 recitations to 60; now it has 78 recitations. English studies since their reintroduction in 1877 varied from 60 to 124 recitations; now it has 84 recitations.

In regard to matter and instruction, English at the present time differs from the former courses in the absence of instruction in grammar, in having a course in the history of the language and of its literature, in allowing only the heads of a subject to be put upon the blackboard, and in requiring synopses. French differs from former courses in having a greater variety of text-books in grammar and in reading, in having a course of military reading, in reading from a French newspaper, in the practice of sight reading and in requiring it at all examinations from every cadet, in having dictation exercises, in the method of teaching pronunciation, in having daily pronunciation drill, and in the absence of a review in reading in the final course. Spanish differs in the greater variety of the reading, in having sight reading, requiring it of every cadet at the examination, and in the method of teaching pronunciation.

As the object and aim of the instruction at the Military Academy give it a special character peculiarly its own, I have found it impossible to make any fair comparison between the course here and in other institutions.

The advantages of the present course are in the arrangement of studies, which permits the three languages to be studied separately without interfering with one another, and which permits them to follow one another in due order.

The defects are, first, the short time given to Spanish; second, the fact that the instructors are required to be versed in three languages and are required to teach two different languages at the same time, hearing recitations in both languages on the same day.

Language being so much a matter of acquired and afterwards involuntary habit, it is difficult to pass from the atmosphere of one immediately into the atmosphere of another for the purpose of instruction.

I am, sir, very respectfully, your obedient servant,

E. E. WOOD,
Professor of Modern Languages, U. S. M. A.

The ADJUTANT UNITED STATES MILITARY ACADEMY.

K.

METHODS OF INSTRUCTION IN LAW AND HISTORY.

THE DEPARTMENT OF LAW.

The Regulations of the Military Academy, issued under the authority of the Secretary of War on July 10, 1816, prescribed that "a course of ethics shall include natural and political law." It is difficult at this distance of time to understand what was meant by the terms thus used by the Secretary of War. Natural law, a term but little used in England and the United States, relates to a subject which has always been extensively studied on the continent of Europe, especially in those states whose jurisprudence is derived from or based upon the civil law. Natural law, the jus naturale of the Roman law, may be defined[1] as "the rule and dictate of right reason, showing the moral deformity or moral necessity there is in any act according to its suitableness or unsuitableness to a reasonable nature," and embraces those fundamental rules of conduct in human affairs which have received general assent and recognition in all civilized states. It also includes matter which in England and the United States would be taught under the name of ethics or moral science. As I can find no record of the adoption or introduction of a text-book on this subject I am constrained to believe that no formal instruction was given at any time in natural law.

The term political law, as used in 1816, is also somewhat vague. The great text-book on that subject, prepared by Sir William Blackstone, and published in 1758, would have been too voluminous for use in a course of study so elementary in all respects as was that which appeared in the Regulations of 1816. I am disposed to believe that the regulation above cited is to be regarded rather as an expression of the executive will, as to the general importance or necessity of the study of law in some form at the Academy, than as a direction that the two subjects named should form a part of the official course of study.

Section 2 of the act of April 14, 1818 (3 Stat. L., 426), provided that there should be "one chaplain stationed at the Military Academy at West Point, who shall be professor of geography, history, and ethics, with the pay and emoluments allowed the professor of mathematics." Under the authority conferred by this statute the Rev. Dr. Thomas Picton was appointed chaplain and professor of ethics on July 23, 1818, and continued in office until January 21, 1825, when he left the service by the resignation of his commission. The first text-book of law studied at the Military Academy seems to have been Vattel's Law of Nations, then as now the most widely accepted standard of authority on the subject of which it treats.

The records show that Wheaton's National Law was introduced at some time prior to 1839, when it was replaced by Kent's Commentaries. I can hardly believe that the title cited is that of the text-book actually adopted and studied. The first edition of Wheaton's International Law was issued in 1836 and was, in all probability, adopted as a text-book immediately upon its publication. I have been unable, after considerable inquiry, to learn that Mr. Wheaton ever wrote on the subject of national, as distinguished from international, law. He was for many years the reporter of the decisions of the United States Supreme Court, but never wrote upon the subject of national or constitutional law. His work gave place in 1839 to Kent's Commentaries, a single volume covering the subjects of both constitutional and international law, which continued to be used as a text-book in those subjects for more than thirty years.

[1] Taylor's Civil Law.

Professor Picton was succeeded in the chair of geography, history, and ethics by the Rev. Charles P. McIlvaine, who resigned on December 31, 1827, and was in turn succeeded by Prof. Thomas Warner, who was appointed on January 1, 1828, and continued in office until September 1, 1838, when he vacated the office by resignation, and was succeeded by Prof. Jasper Adams, during whose incumbency of the office Chancellor Kent's work was adopted as the principal text-book in the course of study in law.

The register of the Academy for 1841 contains the name of the Rev. M. P. Parks as professor of geography, history, and ethics, and the register for 1842 contains the first outline of the course of study in law, together with a list of the text-books then in use at the Military Academy. In this list appears Kent's Commentaries, including the constitutional and international law, Vattel and Wheaton having both been superseded. The Rev. William T. Sprole became chaplain and professor of geography, history, and ethics on March 2, 1847, and was "superseded" in that office on August 16, 1856, by the Rev. John W. French.

During the incumbency of Professor French, which extended over a period of about fifteen years, an extensive course of study was built up, including all of the subjects mentioned in the act of April 14, 1818. In the academic year 1858–59 instruction in the subject of military law was first given, the text-book adopted for that purpose being De Hart's Courts-Martial. During the ensuing year the study of the rules and articles of war was for the first time made a part of the course of study in law. The register for the year 1862 shows Professor French's pamphlet on Law and Military Law to have been made a part of the course of study. In the academic year 1866–67 Halleck's International Law was introduced, replacing Kent, and Benét's Military Law, replacing De Hart. In the academic year beginning September 1, 1867, all instruction in the subjects of geography, history, and ethics was discontinued, and the course of study pursued under the direction of the chaplain included only the subjects of international, constitutional, and military law.

The vacancy in the chair of geography, history, and ethics, caused by the death of Professor French on July 8, 1871, was filled on the 28th of July following by the appointment of the Rev. Dr. John Forsyth, who continued to give instruction in law until August 28, 1874, when under the authority conferred by the act of June 6, 1874, which provided that "the Secretary of War may assign one of the judge-advocates of the Army to be professor of law," Maj. Asa Bird Gardiner was detailed for duty in the department of law, and the several heads of department have since been assigned by the Secretary of War under the authority conferred by this statute, although under the acts of June 1, 1880, June 27, 1881, and June 30, 1882, any officer of the Army may be assigned to that duty.

Major Gardiner initiated numerous changes in the course of study. In the year 1875–1876, Woolsey's International Law replaced the text-book of General Halleck on that subject, and the new work of Professor Pomeroy on Constitutional Law replaced Kent's Commentaries. Professor French's pamphlet on Law and Military Law, was retained and Benét's Military Law discontinued as a text-book, the latter being replaced by Gardiner's Practical Forms for use in Courts-Martial and Head Notes on the Law of Evidence in Courts-Martial, and the systematic study of General Orders No. 100 of 1863, containing Dr. Francis Lieber's admirable presentation of the rules of modern war, was introduced as a supplement to the course of International Law. Major Gardiner was relieved on August 28, 1878, and Maj. G. Norman Lieber, of the Judge-Advocate-General's department, now the Judge-Advocate-General of the Army, was assigned to duty as professor of law.

During Major Lieber's incumbency of the office, Ives's Treatise on Military Law was introduced and Pomeroy's Constitutional Law was replaced by Judge Cooley's text-book on the same subject, which is still in use. Major Lieber was succeeded by Lieut. Col. Herbert P. Curtis, of the Judge-Advocate-General's department, who was in turn succeeded by Lieut. Col. William Winthrop, during whose incumbency Winthrop's Military Law was introduced during the academic year 1886–87. Colonel Winthrop was succeeded on August 28, 1890, by Maj., now Lieut. Col. John W. Clous, of the Judge-Advocate-General's department. Beginning with the academic year 1891–92, Davis's Outlines of International Law was introduced, replacing Woolsey's Elements of International Law. Colonel Clous was relieved on August 20, 1895, by Lieut. Col. George B. Davis, deputy Judge-Advocate-General, the present incumbent.

The present course of study in law covers the subjects of elementary law, constitutional law, international law, and military law; the text-books being Davis's Introduction to the Study of the Constitutional and Military Law of the United States, Cooley's Constitutional Law, Davis's International Law, and Winthrop's Military Law. The courses of study in elementary and constitutional law are completed during the first half, and those in international and military law during the last half of the academic year. In view of the character of the subjects studied, each text-book is passed through but once in advance and once in review, the general

review being omitted. The course in elementary law embraces 12 lessons in advance and 6 in review, and that in constitutional law embraces 20 in advance and 10 in review. During the half year it is proposed to give, at intervals, a course of 6 lectures upon the following subjects: The common law, the civil law, the constitutional law of the United States, crimes and criminal procedure, and the Government of the United States.

During the second half year the courses of study in international and military law will be passed over, the former in 20 advance and 10 review lessons; the latter in 18 lessons in advance and 9 in review. During this period two lectures will be given, one upon the history of the Articles of War, the other on the subject of military discipline and administration. Under the arrangement of studies which is to go into effect at the beginning of the next academic year (1896-97), the first class will attend recitations in law three times per week throughout the entire year, alternating daily with history, in which subject two hours of recitation per week are required. Instruction in both of these subjects is carried on upon the basis of one and one-half hours of study in quarters to each hour of recitation in the section room.

The mechanism of the recitation has already been fully and accurately described by the professor of mathematics in the article treating of the course of study in that department. It only remains, therefore, to describe those matters in which the course of study in law differs from that pursued in the department of mathematics. Cadets are encouraged to ask questions and to bring to the attention of the instructor any points in the lesson of the day which may have seemed to them either difficult or obscure. These are explained to them before the recitation begins, which is carried on in the same manner as a recitation in mathematics. The practical work in the section room consists in the study of cases bearing upon the lesson of the day, the enactment, modification, and repeal of statutes, the examples being taken from the Revised Statutes and Statutes at Large of the United States, and in the application of the rules of interpretation to the statutes relating to the military establishment of the Federal Government. Cases from the reports of the United States courts are also given out for special study when important points are involved in respect to the military or constitutional law of the United States. The course of study is precisely the same for all the sections.

As at present organized, the department consists of a professor, an assistant professor, and three acting assistant professors, all detailed from the Army. For purposes of recitation the first class is divided into eight sections of nine cadets each, who attend recitations daily from 2 p. m. to 4 p. m. on Monday, Wednesday, and Friday of each week during the entire academic year. The same instructors hear recitations in history on Tuesday and Thursday of each week during the same period. The recitations are carried on, as has already been stated, in the same manner as recitations in mathematics. The same or similar section rooms and furniture are used, and the recitations are marked on the same scale and in accordance with the same system. In each section two or more of the daily recitations are required to be in writing, the subjects being chosen from the lesson for the day or taken in the form of general questions from the lesson of the day before. The recitations in writing are marked on the same scale and have the same value in all respects as the oral recitations. As there are four sections reciting at the same hour, it is impossible for the head of the department to visit each section more frequently than twice per week, the lower sections being visited more frequently than those at the head of the class where any variation is made.

The weekly class reports are made in the same form and convey the same information as those submitted by the department of mathematics. Transfers are made, as a rule, whenever a cadet has an aggregate mark greater by two units than the lowest mark in the section immediately above or less by the same amount than the highest mark in the section immediately below. While this rule is general, exception is made when from sickness, absence, or other unavoidable cause injustice would be done by its strict enforcement. The marks are posted on Saturday of each week in the frames provided for that purpose in the north hall of the Academy Building.

As two courses of study are carried on independently, the examinations are arranged in such a way as to allow one of the classes to be examined orally and the other in writing at each semi-annual examination. In this way each class as it passes through the courses of study in law and history will be examined orally and in writing in each subject of study. The weights to be attached to the term marks in advance and review and the special weight to be given to each form of examination are determined by the Rules for the Guidance of the Academic Board and its Committees.

The present arrangement of the course of study in law is based upon the experience of many years, and seems to be fairly well adapted to the peculiar needs of the institution and at the same time to carry into effect the will of Congress in its several enactments directing that the study of law shall be pursued at the Military Academy.

THE DEPARTMENT OF HISTORY.

The offices of chaplain and professor of geography, history, and ethics, created by the act of April 14, 1818, after a joint continuance of something more than seventy-eight years, were dissociated by the act of February 18, 1896, which directed the discontinuance of the latter and vested the duties of the former in an officer to be appointed by the President for a term of four years. The study of history was transferred by Executive order to the department of law, thus bringing together after a separation of nearly twenty-two years the closely related studies of history and law.

The present course of study in history went into effect on September 1, 1883, and was comprised in a course of 50 lessons, begun and completed during the first half of the academic year. The re-introduction of history into the official course of study was due to patient and persistent endeavors of the late Rev. Dr. William M. Postlethwaite, who succeeded Rev. Dr. John Forsyth in the chaplaincy and professorship on December 21, 1881. For a little more than twelve years the course of instruction in history was carried on under the able guidance of Professor Postlethwaite, whose labors were interrupted by his untimely death in January, 1896.

For purposes of instruction in history the first class was divided into sections in September of each year, the arrangement of the class being based upon the general merit roll of the preceding year. Each half class attended recitations three times per week from September to December and the course in history closed with the semi-annual examination in January.

With the resumption of academic duties in September, 1896, the new arrangement of the courses of study in law and history will become operative. The entire first class will attend recitation daily between the hours of 2 p. m. and 4 p. m. On Monday, Wednesday, and Friday instruction will be given in law and on Tuesday and Thursday in history, the same instructors and section rooms being used for both branches of study.

Myers's General History, the text-book adopted by the Academic Board, will replace Swinton's Outlines of the World's History, which has been in use since the re-introduction of the course of study in history in 1883. The new text-book is so arranged as to enable the course in ancient history to be completed during the first term, leaving the study of mediæval and modern history for the longer term from January to June.

The methods of instruction in history are the same in all respects as those prevailing in the department of law, which have already been described. The best attainable maps are constantly and freely used in the course of instruction, and a part of the written recitations in this subject will be devoted to the graphic representation of the growth and development of the principal states of antiquity and to the origin, colonization, and territorial development of the great states now constituting the civilized world.

L.

WEST POINT, N. Y., *August 28, 1896.*

SIR: In accordance with the requirements of instructions of October 3, 1895, I have the honor to submit the following report of the course of studies and methods of instruction, including practical instruction, employed at the United States Military Academy in the department of civil and military engineering.

In the preparation of part 1 I have been assisted by notes left by Prof. James Mercur. Parts 2 to 6 are almost wholly the work of Lieut. Thomas H. Rees, Corps of Engineers, acting assistant professor of this department.

Very respectfully,

G. J. FIEBEGER,
Professor of Engineering.

The ADJUTANT UNITED STATES MILITARY ACADEMY.

PART 1.

BRIEF HISTORICAL SKETCH OF THE DEPARTMENT, GIVING DATES OF ESTABLISHMENT, ITS SCOPE IN THE BEGINNING, AND IMPORTANT STEPS IN ITS DEVELOPMENT.

Some time during the years 1795 to 1798, while the regiment of artillerists and engineers was stationed at West Point, Colonel Rochefontaine and Captain Rivardi, formerly of the French Army, constructed a small model front of a fortification.

Upon the establishment of the Military Academy, by act of Congress dated March 16, 1802, instruction in military engineering began at once, and the elements of fortification were taught by the use of this model.

Until 1818 the instruction in military engineering was by means of lectures illustrated by the model above mentioned and by field exercises in practical engineering. The lectures were delivered by the suprintendent until 1808, by the teacher of French, Francis O. Musson, from 1808 to 1813, and after that by the professor of engineering.

The only text-book in use was a small pamphlet of 50 pages, translated from the French by Col. Jonathan Williams, Corps of Engineers, the first Superintendent.

The department of engineering was established by an act of Congress of April 29, 1812:

"SEC. 2. *And be it further enacted*, That the Military Academy shall consist of the Corps of Engineers and the following professors: * * * one professor of the art of engineering in all its branches, * * * and each of the foregoing professors shall have an assistant professor, taken from the most prominent characters of the officers or cadets."

* * * * * * *

Under this act Capt. Alden Partridge, Corps of Engineers, was appointed professor of engineering September 1, 1813.

Captain Partridge graduated from the Military Academy October 30, 1806, and was assigned to the Corps of Engineers. He served at the Academy as assistant professor of mathematics November 4, 1806, to June 5, 1811; as principal assistant professor of same April 29, 1812, to September 1, 1813; as professor of engineering September 1, 1813, to December 31, 1816. Much of the time while he was professor of engineering he was also Superintendent of the Academy, and therefore gave little attention to the work of his department.

General Cullum, in his history, gives the following as the state of the instruction in engineering at this time:

"Engineering was less attended to than French or drawing, the greater number of cadets on graduating never having gone beyond the definitions to be found in Colonel Williams's little primer of 50 pages on the subject, which was their only text-book. Many cadets scarce knew the difference between the ditch and the glacis of a fort save by the conventional colors adopted in their delineation. It is said that two cadets were graduated in 1815 in the Engineer Corps, whose studies never extended beyond Hutton's Trigonometry."

Captain Partridge was, on March 16, 1817, succeeded by Prof. Claude Crozet, who had been assistant professor of engineering since October 1, 1816.

Professor Crozet was born in France and was educated at the Polytechnic School. He introduced descriptive geometry as a necessary preliminary to the proper study of engineering, made much use of the blackboard in demonstrations, and seems to have made use, as far as practicable, of the methods of the Polytechnic School in developing and teaching the course of engineering.

The work of all the departments in the Academy was at this time (1817) greatly aided by the reforms instituted by the new Superintendent, Col. Sylvanus Thayer.

In 1818 there was introduced as a text-book in the department, A Treatise on the Science of War and Fortification, by Colonel de Vernon, professor of fortification in the Polytechnic School, France, and translated by Capt. John M. O'Connor, United States Artillery. This excellent work was used until the introduction of the works of Professor Mahan. The original text had been submitted to the revision of a board of distinguished marshals and engineers, and then, by order of Emperor Napoleon I, was adopted as a text-book of the Polytechnic and Military School of France. It was in two volumes, with a volume of plates. The first treated of the science of war in general, and field fortification; the second of permanent fortification, and in an appendix was given a summary of the principles and maxims of grand tactics and operations.

The staff records for 1819 indicate the method in which it was studied.

"1. The class of the fourth year (the first in rank) to be divided for instruction in the military course into two sections, after the manner practiced in the other classes of the institution.

"2. The first section to be instructed in the entire course of engineering, military science, and grand tactics in the book now used, and to be required to execute a series of drawings and plans connected with these subjects. this course to begin on the 1st of September of each year, and to end on the 20th of March next ensuing, sooner or later.

"3. The second section to be taught, in connection with military science and grand tactics, field engineering only, the whole of which will be comprised in the first volume and appendix to the work."

The other books used in the course were in French, and probably used only as aids to a course of lectures or as books of reference. They were: Program d'un Cours de Construction par Sganzin, translated in 1827, and Traité des Machines par Hachette.

The regulations of 1821 indicate that at this time the professor of engineering taught some of the sections himself.

"The professor of * * * engineering, in order to ascertain the proficiency of the sections intrusted immediately to the assistants and the manner in which they have performed their duty, shall occasionally, and in rotation, when there are more than two sections, instruct the sections intrusted to his assistants, the period for which shall be fixed by the academic staff and reported to the War Department; and the assistant professor, when the professor has his section under instruction, shall take charge of the section usually under instruction of the latter."

Prof. David B. Douglass on May 1, 1823, succeeded Professor Crozet, who resigned April 28, 1823.

Professor Douglass was appointed second lieutenant Corps of Engineers August 1, 1813. He served at the Academy as assistant professor of natural and experimental philosophy June 1, 1815, to August 29, 1820, as professor of mathematics August 29, 1820, to May 1, 1823, and as professor of engineering May 1, 1823, to March 1, 1831.

The records are not definite as to what was accomplished during his incumbency, but it appears that the instruction in civil engineering was much improved.

Professor Douglass resigned March 1, 1831, and was succeeded by Prof. Dennis H. Mahan, January 1, 1832.

Professor Mahan graduated from the Academy July 1, 1824, and was assigned to the Corps of Engineers. He served at the Academy as assistant professor of mathematics August 29, 1824, to August 31, 1825, and as acting professor of engineering September 1, 1830, to January 1, 1832. Between 1825 and 1830 he spent four years in Europe studying public works and military institutions, and was during one of these years a pupil in the military school of application for engineers and artillerists at Metz, France. The first work of Professor Mahan was to prepare a suitable set of text-books for his department; he temporarily supplied their places by lectures and his notes made while abroad.

The first record of a complete set of text-books is found in the register of 1841, and is as follows: Mahan's Treatise on Field Fortification, Mahan's Lithographic Notes on Permanent Fortification, Mahan's Lithographic Notes on Attack and Defense, Mahan's Lithographic Notes on Mines and other Accessories, Mahan's Lithographic Notes on Composition of Armies and Strategy, Mahan's Course in Civil Engineering, Mahan's Lithographic Notes on Architecture and Stone Cutting, Mahan's Lithographic Notes on Machines (for first section only). These books, frequently revised, constituted the basis of the course of engineering during the time of Professor Mahan. In 1848 he introduced Mahan's Advanced Guard and Outposts, 1858, Moseley's Mechanics of Engineering, and in 1870 Mahan's Industrial Drawing.

The instruction was confined to the fourth, or first-class, year, except during the years 1858 to 1860. The classes of 1859 and 1860 studied civil engineering during the second-class year, and the class of May, 1861, had no instruction in civil engineering.

No records are available giving a description of the methods of instruction, etc., which were in use during the entire time of Professor Mahan. Professor Mercur states that in 1865–66, when he was a student, the classes were divided into sections of 10 to 12 men each, each section receiving instruction for one and a half hours daily, between 8 and 11 o'clock a. m. When engaged in drawing, the entire class attended daily from 8 to 11 o'clock. Each section was under the immediate charge of an officer, usually of the Corps of Engineers, as instructor. The professor visited the sections daily, listening to the recitations, asking questions, making such comments and remarks and giving such additional instruction as seemed to him necessary and desirable. By this means he gained a knowledge of the capacity of the instructors, their methods of teaching and marking, and was also able to compare the individual cadets.

But few lectures were given by Professor Mahan, and these were restricted almost entirely to short descriptions of campaigns and battles, with criticisms upon the tactical positions involved. The greater portion of his oral and personal instruction was given to the cadets during his visits to the section room.

The course of engineering drawing included the accurate construction of a number of problems contained in fortification drawing and stenotomy, drawings of a canal lock in plan, section, and elevation, and the plan, section, and elevation of a half front of fortification, Noizet's Method. The canal lock and Noizet's Method were finished as completely as time allowed, and the sections, slopes, etc., were usually tinted in water colors.

Upon the death of Professor Mahan, September 16, 1871, Prof. Junius B. Wheeler was appointed September 29, 1871.

Professor Wheeler graduated from the Military Academy July 1, 1855, was first assigned to the cavalry and afterwards transferred to the topographical engineers. He served the Academy as acting assistant professor of mathematics October 5, 1859, to April 27, 1861, and assistant professor of same September 5, 1861, to June 18, 1863.

During his incumbency the course and method of instruction established by Professor Mahan remained unchanged in its essential features. Professor Mahan's text-books were revised, new material added, and portions omitted. In engineering drawing, roof and bridge trusses were substituted for the canal lock and other problems, and the Noizet front was slightly changed.

Professor Wheeler retired September 29, 1884, and was succeeded by Prof. James Mercur September 29, 1884.

Professor Mercur graduated from the Academy June 18, 1866, and was assigned to the Corps of Engineers. He served at the Academy as acting assistant professor of natural and experimental philosophy August 31, 1867, to February 21, 1870, and as assistant professor in the same February 21, 1870, to July 31, 1872.

In notes left by him Professor Mercur states that under his direction no radical change has been made either in course or methods of instruction. He revised the text-books previously used to conform to modern engineering practice and the advance in the science and art of war. A description of his methods of instruction is found in parts 2 to 6 of this report.

Professor Mercur died April 21, 1896, and was succeeded May 26, 1896, by Prof. G. J. Fiebeger.

PART 2.

STATEMENT OF THE PRESENT COURSE, GIVING TITLES OF TEXT-BOOKS, FULL LIST OF SUBJECTS, NUMBER OF LESSONS IN EACH SUBJECT, ADVANCE AND REVIEW, LENGTH OF LESSONS, HOURS OF STUDY, LENGTH OF RECITATIONS, TOTAL NUMBER OF HOURS DEVOTED TO EACH SUBJECT DURING THE TERM INSIDE AND OUTSIDE THE SECTION ROOM, NUMBER OF LECTURES AND SUBJECT OF LECTURES, DIFFERENCES IN COURSE FOR HIGHER AND LOWER SECTIONS, ETC.

The course in the department of civil and military engineering is, as the name implies, divided distinctly into two parts, viz: Civil engineering, which occupies the first term of the Academy year, from September 1 to December 31; and military engineering and the art and science of war, to which is allotted the second term of the Academy year, from the completion of the semiannual examinations in January to May 31.

Throughout the course, recitations in this department are daily on week days from 8 a. m. to 11 a. m., one-half of the class reciting from 8 to 9.30 and the other half from 9.30 to 11, except during the time allotted to engineering drawing, when the entire class attends from 8 to 11 a. m., with an intermission of about eight minutes at 9.30.

It is arranged that three hours of study in preparation for each recitation may be allowed and required.

Civil engineering, September 1 to December 31.—Text-books: Civil Engineering, Wheeler (John Wiley & Sons, New York, 1884); and Fortification and Stone Cutting, Mahan (John Wiley & Sons, New York, 1893). The subjects treated in Wheeler's Civil Engineering are as follows, viz: Building materials, strength of materials, framing, masonry, foundations, bridges, roofs, roads, railroads, and canals. This text-book has received from time to time numerous corrections and additions, which are given to the cadets in the form of printed sheets and pamphlets, with a view to keeping this course of instruction in accord with modern developments and methods in the science and art of engineering. At the same time, portions of the text that have become obsolete or which it is thought may be more satisfactorily presented have been omitted.

In this connection may be mentioned, besides minor corrections, a new treatment of the rolling load, also of the pressures sustained by retaining walls and of the loads on bridges and their effects. The subject of the graphical determination of stresses in framed structures is extended and improved, and there are issued to the cadets the following pamphlets, viz: Rivets, Riveted Joints, Pin-connected Joints, and Riveted Girders; Instructions for Truss Computations, and Notes on the Determination of Stresses in Trusses. The first of these takes the place of similar subjects in the text; the other two are for reference and assistance in the solution of problems.

That portion only of Mahan's Fortification and Stone Cutting which relates to the latter subject (stone cutting) is included in the course in civil engineering.

Civil engineering drawing includes generally for the upper part of the class the computations and drawings for an iron or steel highway or railroad bridge, and for the lower part an iron or steel roof truss. The time devoted to this drawing is from about November 20 to about December 11, or from 18 to 20 working days.

Number of lessons, civil engineering and stone cutting, September 1 to December 31 (first class).

	First and second sections.			Third, fourth, fifth, and sixth sections.		
	Civil engineering.	Stone cutting.	Total.	Civil engineering.	Stone cutting.	Total.
Advance	40	5½	45½	42	3	45
First review	20	2½	22½	21	2	23
General review	13½	1½	15	14	1	15
Total	73½	9½	83	77	6	83

And in addition, engineering drawing for about eighteen days.

Average length of lessons (approximate).

	First and second sections.		Third, fourth, fifth and sixth sections.	
	Civil engineering.	Stone cutting.	Civil engineering.	Stone cutting.
	Pages.	*Pages.*	*Pages.*	*Pages.*
Advance	12	6.6	11.5	6⅔
First review	24.1	14	23	9.5
General review	35.7	23⅓	34.4	19

	Hours.
Each of the higher sections has—	
45½ recitations in advance (1½ hours each)	68¼
22½ recitations in first review (1½ hours each)	33¾
15 recitations in general review (1½ hours each)	22½
18 sessions in drawing (3 hours each)	54
Total time in section room	178½
Each of the lower sections has—	
45 recitations in advance (1½ hours each)	67½
23 recitations in first review (1½ hours each)	34½
15 recitations in general review (1½ hours each)	22½
18 sessions in drawing (3 hours each)	54
Total time in section room	178½
All of the sections in civil engineering have—	
83 lessons, each requiring 3 hours study	249
18 drawing sessions, each requiring 1½ hours preparation	27
Total time outside of section room	276
Total time inside of section room	178½
Aggregate	454½

Allowing five minutes for the sections to form and to enter and leave the Academy building, there remain eighty-five minutes for the session of a single section. This time is employed about as follows:

	Minutes.
Noting the next lesson; questions and explanations on the day's lesson	10
Giving out enunciations	7
One recitation by questions	12
Seven recitations at blackboards, eight minutes each	56
Total	85

Other cadets in the section are given problems to work out or discussions to write at the board, or on paper at their desks, their work being examined and marked after the section is dismissed.

The higher sections finish the text-book in civil engineering in 40 lessons in advance, while the lower sections take 42 lessons in the same subject. This enables the higher sections to devote more time to stone cutting than the lower, the numbers of advance lessons being 5½ and 3, respectively, for the higher and lower sections.

This is the only difference in the courses of the upper and lower parts of the class, except that many subjects are more fully developed by the higher sections, and that their problem in engineering drawing is more difficult.

When a class has advanced about 18 lessons in civil engineering, a lecture has been delivered by the head of the department on "The materials of construction, the use of engineering formulæ, and the limitations and possibilities of the science of engineering." No other lecture is delivered during this course. The cadets of the first class are, however, given an opportunity to examine the models and engineering apparatus in the model room, with their instructors, who explain the construction and operation of the structures shown.

Military engineering, January 1 to May 31, first class.—Text-books: Elements of Field Fortifications, Wheeler (D. Van Nostrand, New York, 1882); Mahan's Permanent Fortifications, Mercur (John Wiley & Sons, New York, 1894); Attack of Fortified Places, Mercur (John Wiley & Sons, New York, 1894); Elements of the Art of War, Mercur (John Wiley & Sons, New York, 1894); Fortifications and Stone Cutting, Mahan (John Wiley & Sons, New York, 1893), of which only that portion which treats of methods of fortification drawing is included in this course.

In addition to the above, there are issued to the cadets of the first class, by the department, pamphlets containing some twenty descriptions of battles, campaigns, and other operations of war, to be studied by the cadets and used to illustrate the principles that are taught in the text-books. With the pamphlets are maps and plates showing the battle fields and theaters of operations described in the pamphlet.

Under the head of field fortifications the subject-matter treated is as follows: General principles and definitions, profile, trace, kinds of field works and lines, size and garrison, construction, revetments, defilade, interior arrangements, ditch defense, obstacles, works on irregular sites, bridge heads, hasty intrenchments, attack and defense of field fortifications, communications, and transportation.

Permanent fortifications is treated under the following heads: Profile, open and covered defenses, communications, encientes, outworks, advanced and detached works, retrenchments, systems and methods of fortification, existing German fortifications, detached forts, works on irregular sites, defilement of permanent works, accessory means of defense, seacoast defense, defensive organization of frontiers, progress of defensive methods, progress in methods of attack, modern construction in iron and steel.

In the attack of fortified places there is described, in part 1, blockade, surprise, assault, bombardment, siege works, including tools, etc., trenches, approaches, parallels, saps, etc.; tracing and construction of trenches and saps, siege batteries and magazines, siege operations, defense against a regular siege, siege parks, depots, etc.; and in part 2 (military mining) is given the nomenclature and theory of mines, galleries and shafts, ventilation, loading and firing, organization and tactics of mines, and demolitions.

The art of war is discussed under the following headings: Army organization and discipline, tactics, minor tactics in relation to logistics, grand tactics, minor operations, logistics, and strategy.

Recitations in this course begin each year about January 10 or 11, pursuant to an order from the Superintendent for the resumption of recitations after the completion of the semiannual examinations, and continue daily, Sundays excepted, until May 31, except during the time devoted to fortification drawing, from about March 20 to about April 23, when the entire class attends in the engineering drawing rooms from 8 to 11 a. m.

This drawing consists in the application of the methods of fortification drawing to the construction of plan, sections, and elevations of a detached fort for an intrenched camp.

Number of lessons in military engineering, January 10 to May 31 (first class, all sections).

	Field fortification.	Fortification drawing (text).	Permanent fortifications.	Attack of fortified places.	Art of war.	Total.
Advance	9	3	14	15	20	61
General review	6	.....	6	8	11	31
Total	15	3	20	23	31	92

And in addition about twenty-eight days in fortification drawing.

Average length of lessons.

	Field fortification.	Fortification drawing (text).	Permanent fortifications.	Attack of fortified places.	Art of war.
	Pages.	*Pages.*	*Pages.*	*Pages.*	*Pages.*
Advance	29	6	11.4	12.27	14.6
General review	45	.....	26.7	23	20.7

Number of hours devoted to each subject and to all subjects in military engineering, January 10 to May 31, first class, in section rooms, drawing, and study.

	Field fortification.	Fortification drawing (text).	Permanent fortifications.	Attack of fortified places.	Art of war.	Fortification drawing.	Total.
	Hours.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	*Hours.*	*Hours.*
Section room	22½	4½	30	34½	46½	84	222
Study	45	9	60	69	93	42	318
Total	67½	13½	90	103½	139½	126	540

This table is based on an allowance of one and one-half hours per day in section room and three hours per day study in quarters, and for drawing, three hours per day in drawing rooms and one and one-half hours per day preparation in quarters.

The time of recitation of a section in this course is divided and apportioned in the same manner as in the course in civil engineering, hereinbefore described, to which I would respectfully refer.

The course in military engineering is the same for all sections, except that some subjects are more fully developed by the higher sections than by the lower, and in fortification drawing the higher sections more nearly complete the sections and elevations of the work, whereas the lower sections usually finish only the plan.

At the end of the course a lecture has been delivered by the head of the department on the applications and use that may be made in the military service of the principles and methods taught in this course, with some remarks on courses of reading and study that may be profitably followed by graduates of the Military Academy. The descriptions of campaigns and battles were put in printed form in the pamphlet previously referred to, to serve in lieu of lecture notes.

These are given out as a part of and in addition to the regular lessons, at the rate of one or two per week, depending on their lengths, and form subjects for recitation in the section room. An opportunity is given to the class to visit the engineering museum and model room under the supervision of their instructors, who explain the models and apparatus and answer the questions of the cadets concerning them.

PART 3.

ORGANIZATION OF DEPARTMENT—NUMBER OF INSTRUCTORS—DIVISION OF DUTIES.

The department of civil and military engineering is organized as follows: One professor, head of the department; three instructors, of whom the senior in rank is appointed by the Superintendent to be assistant professor; one draftsman, employed by the department.

The professor of civil and military engineering administers the affairs, executes the business, and, subject to the approval of the Superintendent of the Academy, controls the policy and regulates the methods of the department. He recommends the text-books to be used in the course, revising and correcting them when advisable, prescribes the lessons, apportions the time to the various subjects, and, in order to insure uniformity and efficiency in the work of the department, supervises the instruction of cadets by frequent personal inspections of the progress and methods of his assistants.

There are also provided through his recommendation the necessary books of reference, apparatus, models, maps, materials, and supplies for the use of the department and the instruction of cadets.

The assistant professor, in addition to his duties as instructor, is charged with the care of the property of the department, and attends to the issuing and collecting of the books, pamphlets, maps, models, samples, and other articles used in section rooms, drawing rooms, and in the quarters of cadets, for their instruction. He acts

as instructor for two sections of the first class in engineering and aids the professor in such manner as the latter may direct. Each of the other two instructors is in charge of two sections of the first class in engineering, and, in addition, holds himself at the service of the professor for such other duties as may be prescribed.

The first class in engineering, being arranged originally in the order of their standing in natural and experimental philosophy, is organized into six sections, numbered in order from one to six, inclusive, the first section being the highest. The higher sections usually number one or two more cadets than the lower, in order that more time may be devoted to individual instruction and explanation in the lower part of the class, where presumably they are more needed. This organization of the class is maintained throughout the year, but the members of any or of all the sections may be changed by mutual transfers between the sections.

Each of the three instructors is charged with the instruction of two sections. The assistant professor begins each term with the first and second sections, the instructor second in rank begins with the third and fourth sections, and the junior instructor begins with the fifth and sixth sections. At the end of two weeks the instructors change sections, the senior taking the lower sections, the second in rank taking the higher sections, and the junior taking the middle sections. Thereafter the instructors change sections every two weeks in the order just indicated, except during engineering, drawing, and general review, when they retain the sections with which they began the term.

It is believed that this rotation of instructors eliminates to a great extent the effect of their "personal equations," and makes the merit marks of each section comparable by a just and uniform standard to those of all other sections.

This method has the further advantage of giving to all sections equal shares of the benefits arising from having the ablest instructor, and it enables the instructors to compare and weigh recitations in all parts of the class and to adjust their scales of marks to a truer and more uniform standard.

The personnel of the department during the academic year of 1895–96 was as follows:

Professor, James Mercur, until his death at Fort Monroe, Va., April 21, 1896; afterwards Gustav J. Fiebeger, appointed May 26, 1896.

Assistant professor, Henry C. Newcomer, first lieutenant, Corps of Engineers.

Instructors, Thomas H. Rees, first lieutenant, Corps of Engineers, and Francis R. Shunk, first lieutenant, Corps of Engineers.

Draftsman, Louis Marcy.

Organization of first class, 1895–96, department of engineering.

Section.	Number of members.	Attendance.	Time.	Room.	Instructor.
1	13	Daily, except Sundays	9.30 to 11	206	Lieutenant Newcomer.
2	13	do	8 to 9.30	206	Do.
3	12	do	9.30 to 11	208	Lieutenant Rees.
4	12	do	8 to 9.30	208	Do.
5	12	do	9.30 to 11	207	Lieutenant Shunk.
6	11	do	8 to 9.30	207	Do.

The rooms in the Academy building occupied and used by the department of civil and military engineering are as follows:

	Numbers.
Office	200
Section rooms	206, 207, 208
Engineering drawing academy	201, 202
Drafting room	205
Map and chart rooms	203, 300
Photography and lithography	305
Model room	106

PART 4.

THE DESCRIPTION OF A RECITATION, INCLUDING A DESCRIPTION OF A SECTION ROOM—NUMBER OF CADETS IN A SECTION—ASSIGNMENT OF SEATS—QUESTIONS AND EXPLANATORY ANSWERS—ASSIGNMENT OF SUBJECTS FOR RECITATIONS—USE OF THE BLACKBOARD—APPARATUS—MERIT MARKS—VISITS OF THE HEAD OF THE DEPARTMENT.

The section rooms used by the department of civil and military engineering are similar in all respects to the rooms on the same floor used by the department of

mathematics. The formation of the class parade, the report of the sections to the instructor, and the method of conducting oral recitations by blackboard demonstration and by questions are also similar to the general method followed by the department of mathematics. As these subjects have been very fully and carefully described in the report of that department, it is thought advisable to refer to that description and to give in detail in this report only the points in which the two departments differ.

The apparatus belonging to the department and used in the instruction of cadets consists of testing machines, models of engineering implements and machinery, including pile drivers, derricks, dredges, engines, etc.; models of engineering structures, such as arches, bridges, buildings, roof trusses, dams, locks, caissons, piers, crib work, etc.; samples of building material, models of fortifications, battle fields, defensive arrangements, block houses, etc. The smaller models and pieces of apparatus are displayed on the tables in the section rooms when they are subjects of discussion in the lesson. The larger models are in the model room (No. 106), and are described and explained to the cadets when they visit this room with their instructors. The department possesses a number of tables, drawing boards, steel rulers and triangles, color saucers and glasses for the use of cadets in engineering drawing, and the usual instruments used in reconnoissance.

In engineering drawing the entire class attends daily, except Sunday, from 8 a. m. to 11 a. m., with an intermission of about eight minutes at 9.30. Several days before the drawing begins each cadet receives a drawing board, which he takes to his quarters, and upon which he stretches a sheet of drawing paper, bringing it back to be inspected by his instructor. On the first day of drawing the whole class enters the engineering drawing academy (rooms 201 and 202, Academy building), and each cadet, directed by his instructor, seeks the table that contains his drawing board. The tables and boards have been previously arranged so that the two sections of each instructor shall be kept together in a selected portion of the rooms, and the instructor's desk and chair are so placed that he may readily oversee the work of his sections. Cadets remain standing while working at their drawings, and are required to keep at work continuously and to refrain from communicating with their neighbors and from examining adjacent drawings. Their work is inspected daily by their instructor, who points out errors and gives such directions and assistance as may be necessary. The work is marked twice a week, on Tuesdays and Fridays, each mark representing an estimate of the progress, accuracy, neatness, and industry displayed in drawing, the scale of marks used being the same as for ordinary recitations, i. e., the maximum mark for three days of perfect work is 3. At 9.20 a. m. the class is dismissed by sections for a recess of about eight minutes, forming again and returning to their work at 9.30.

Merit marks for recitations and drawings are recorded in the section book furnished to each instructor by the adjutant of the Academy for this purpose. The names of the cadets in a section, arranged in the order of their standing, and their marks for one week are entered on the left-hand page in the appropriate lines and columns, and the subjects upon which they have recited, indicated by the numbers of the paragraphs in the text-book, are entered in corresponding columns on the right-hand page, as may be seen in the following tables:

[First class, third section, 1896, department of engineering.]

LEFT-HAND PAGE.

No.	Name.	Monday, Jan. 20.	Tuesday, Jan. 21.	Wednesday, Jan. 22.	Thursday, Jan. 23.	Friday, Jan. 24.	Saturday, Jan. 25.	Weekly total (18).	Total (42).
1	H	2.8	3	2.9	2.2	A	A	16.4	38.4
2	M	2.9	2.8	2.9	2.8	2.7	2.5	16.6	38.1
3	H	2.9	3	2.6	1.9	A	2.6	15.6	38.3
4	H	2.7	2.8	3	2.9	A	A	17.1	38.9
5	B	2.9	2.9	3	1.7	2.5	2.7	15.7	38
6	W	2.9	2.9	3	2.9	2.4	2.4	16.5	38.5
7	S	2.7	2.8	2.3	2.2	2.6	2.6	15.2	38
8	K	2.9	2.5	2.9	2.4	2.5	2.6	15.8	38.8
9	M	2.8	2.9	1.6	2.9	2	2.4	14.6	37.
10	H	2.7	2.6	2.5	2.9	2.3	2.4	15.4	37.5
11	P	2.9	2.9	3	2.4	1.5	2.8	15.5	37.
12	L	2.8	2.9	A	2.8	2.6	1.9	15	37.3
		R	R	R	R	RM	R		

RIGHT-HAND PAGE.

No.	Name.	Remarks.					
		Monday, Jan. 20.	Tuesday, Jan. 21.	Wednesday, Jan. 22.	Thursday, Jan. 23.	Friday, Jan. 24.	Saturday, Jan. 25.
1	H	229–30	17	28	Prob. 9	A	A.
2	M	215–17	Q 222, Rev.	26–27	24, Rev.	10‴–11′	18–20.
3	H	231	15–16	25	Prob. 7	A	15–17.
4	H	218–20	Battle of Franklin.	24	29–30, Rev.	A	A.
5	B	174, etc., Rev.	9–14	23	Prob. 7	10″	13–14.
6	W	Q 182, etc., Rev.	Prob. 3	21–22	31, Rev.	7	8–9, Rev
7	S	223–24	6–8	31	38	8–10′	7, Rev.
8	K	225	Prob. 2	Battle of Franklin.	37	1–6	12, Rev.
9	M	210–12	3″–5	17–20, Rev.	35–36	Prob. 7	26.
10	H	226–28	20	Prob. 6	34	32, Rev.	25.
11	P	213–14	1–3′	29–30	33	Prob. 9	23–24.
12	L	221–22	18–19	A	32	11″–12	21–23′.
		Lessons.					
		Field fortifications: To end; omit 192–94; omit Chap. XVI.	Fortification drawing: To art. 21, p. 17.	Fortification drawing: To art. 32, p. 12.	Fortification drawing: To art. 39, p. 17.	Permanent fortification: To art. 13, p. 11.	Permanent fortification: To art. 27, p. 24.

The letter R at the foot of each column is the initial of the instructor. The initial M indicates that the head of the department visited the section on that day.

The day's lesson is given at the foot of the column on the right-hand page. Subjects of recitations are given by numbers of paragraphs in text-books. Review subjects indicated by Rev.

In determining the final total mark of each cadet in engineering the following schedule of weights of marks in different parts of the course is applied:

	Maximum weight.
Civil engineering:	
Each recitation in advance (×1)	3
Each recitation in first review (×1)	3
Each mark in drawing (×2½)	7.5
Each recitation in general review (×2)	6
Examination mark (×5)	15
Military engineering:	
Each recitation in advance (×1)	3
Each mark in drawing (×1)	3
Each recitation in general review (×2)	6
Examination mark (×5)	15

The head of the department, as a rule, has made two visits to the section rooms each day, visiting on one day the two sections that attend successively in one section room, say No. 206, on the next day the two that attend in room 207, and on the next the two that attend in room 208, and continuing in this order, so that each section has received a visit from the head of the department every three days, except when these visits are interrupted or prevented by attention to other duties.

The visit usually extended over the last half hour of the recitations of each section.

PART 5.

WEEKLY CLASS REPORTS—TRANSFERS—EXHIBITION OF MARKS.

Class reports are made out immediately after the last recitation on Saturday of each week, each instructor reporting the marks, absences, and progress of his two sections on the forms provided for that purpose. These reports are submitted by the instructors to the head of the department. He forwards them, with his recommendations for transfers, to the Superintendent of the Academy, who, if the transfers recommended meet his approval, causes them to be made by published orders, and the class reports are then exhibited in glazed frames in the lower hall of the Academy building, where the cadets may inspect them during release from quarters.

The weekly class report is made out, as mentioned above, by sections, the report for each section being in the main a copy of the left-hand page of the section record

book for the week considered, leaving out the last column of totals, which gives the sum of all marks up to date for each cadet. A single sheet suffices for the report of two sections, as is shown in the following table:

[First class, first and second sections, department of engineering.]

Report for the week ending October 19, 1896.

[Scale of daily merit: Thorough, 3; good, 2.5; indifferent, 2; bad, 1.5; very imperfect, 1; complete failure, 0.]

No.	Name	M.	T.	W.	T.	F.	S.	Total.	Remarks.
	First section.								
1	H	2.9	2.9	.....	2.8	2.7	2.4	16.4	Wheeler's Civil Engineering: To art. 469, p. 352. Transfer recommended Cadet C to the second section. Jas. Mercur, professor U. S. M. A.
2	S	2.8	2.8	3	.....	2	3	16.3	
3	T	2.8	2.9	.....	2.7	2.6	3	16.8	
4	C	3	2.9	2.8	.....	1.5	3	15.8	
5	G	2.7	2.6	2.7	3	2.8	A	16.6	
6	McN	2.5	2.6	2.8	3	2.8	.....	16.4	
7	C	2.8	2.4	2.6	2.6	2.9	.....	16	
8	L	2.9	2.9	2.8	2.5	3	.....	16.9	
9	M	2.8	3	2.7	2.8	.....	2.6	16.7	
10	McC	3	2.8	2.6	2.9	.....	2.9	17	
11	N	3	2.6	A	2.7	2.7	2.4	16.1	
12	D	2.9	2.8	2.8	.....	2.7	1.8	15.6	
13	H	3	.....	2.8	2.8	2.6	2.6	16.6	
		NM	N	N	N	N	N		
	Second section.								
1	E	2.7	A	2.2	2.8	2.8	2.2	15.2	Wheeler's Civil Engineering: To art. 469, p. 352. Transfer recommended Cadet E to the first section. Jas. Mercur, professor U. S. M. A.
2	E	2.8	2.7	.....	2.5	1.8	2.8	15.1	
3	B	2.8	2.8	.....	2.9	2.9	2.8	17	
4	J	2.8	2.7	2.6	.....	2.4	3	16.2	
5	S	2.5	2.8	2.6	.....	1.5	2.9	14.8	
6	T	2.5	2.6	2.7	2.7	2.9	.....	16.1	
7	T	2.4	2.8	2.7	2.7	2.9	.....	16.2	
8	M	2.3	2.4	2.4	2	2.9	.....	14.4	
9	J	2.8	3	2.5	2.6	.....	2.8	16.4	
10	F	2.3	2.9	2.6	2.8	.....	2.7	16	
11	B	1.2	2.8	2.9	3	3	2.2	15.1	
12	H	2.5	2.7	2.8	2.9	2.5	2	15.4	
13	H	2.7	2.9	2.6	A	2.7	2,3	15.8	
		NM	N	N	N	N	N		

Respectfully submitted.

H. C. NEWCOMER,
First Lieutenant of Engineers.

The PROFESSOR OF ENGINEERING, U. S. M. A.

For the first two or three weeks of each term no transfers are recommended, as it is thought advisable to allow the cadets a sufficient time to become familiar with the new subject and to settle down to work before advancing or dropping them in the class. At the end of this time, and at the end of each week thereafter, transfers are recommended on the following basis: The highest of the total marks of the cadets in one section is compared with the lowest of the total marks of the cadets in the next higher section. Then the second mark of the members of the lower section is compared with the next to the lowest mark in the section above, and so on. Those cadets in the lower section whose marks exceed by a unit or more the marks with which the comparison is made are recommended to be transferred to the next higher section, and the corresponding cadets in the higher section are recommended to be transferred to the lower section.

The exhibition of the weekly marks in the hall of the Academy building enables the cadets to keep track of their progress and of the efficiency of their work and to bring to the attention of their instructors or of the head of the department, for adjustment, any injustice or error that they may think has occurred in the awarding of marks.

PART 6.

EXAMINATIONS, WRITTEN, ORAL, WEIGHT OF—DEFICIENCY OR PROFICIENCY OF CADETS—STANDARD REQUIRED.

The general regulations giving the method to be followed in the examination of all classes are found in the Regulations United States Military Academy, 1894, sections 71 to 83, inclusive.

The examination of the first class in civil engineering in January and in military engineering and art of war in June are conducted orally by a committee of the academic board in the room and at the time prescribed by the Superintendent.

Prior to the examination each instructor prepares a list of subjects upon which he proposes to examine the members of his sections and submits it to the head of the department, who makes such alterations and corrections as may seem necessary, and the revised list is kept securely sealed pending the examination.

The examination begins with the lowest man in the lowest section and proceeds in regular order upward through the class. A section to be examined enters the examination room from three-quarters to one hour before the time appointed for the meeting of the committee of the academic board. Each member of the section, called by the instructor in order, beginning at the bottom of the section, takes from the instructor's desk by lot a paper upon which is written a subject for examination, and going to the blackboard next to the one previously occupied prepares the notes or the demonstration which his subject calls for and then returns to his seat. When the committee meets and is ready to proceed with the examination, the head of the department calls upon the cadet who first received his subject to recite. The recitation is addressed to the committee, but is conducted by the instructor under the supervision of the head of the department, with a view of determining the proficiency and degree of proficiency of the cadet.

Questions may be and sometimes are asked by other members of the committee on the subject under discussion. At the conclusion of the recitation the cadet is dismissed to his quarters, marks on his recitation are awarded by the head of the department, the assistant professor, and the instructor of the section, notes are made by the members of the committee on the degree of proficiency of the cadet, another cadet is called up to draw a subject and take the board just vacated, and the cadet next in order is called upon to recite. As soon as all the members of one section have received their subjects, the next higher section enters the room and its members are called in the same order as before to draw subjects and prepare for recitation at the boards as these become available at the conclusion of recitations.

The subjects are so limited in extent that one hour is ample time for preparation, and a cadet may be required to recite at any time after the expiration of one hour of preparation. If it happen at any time that no cadet is prepared to recite or has had an hour's time for preparation, a cadet not yet called upon may, with the approval of the committee, be required to recite without preparation by answering the questions of his professor or instructor upon a selected subject, the guidance and suggestions unavoidably conveyed in the questions being considered equivalent, in advantages to the cadet, to the opportunity for preparation usually allowed.

The time usually allotted to the examination in engineering permits recitations averaging about eight or nine minutes in length. The actual length of recitation varies from six to ten minutes, depending on the subject and the facility with which the cadet recites.

The drawings executed by the cadets during the term are displayed on a table in the examination room for inspection by the academic board, which inspection is intended to constitute a part of the examination.

The marks given on recitations for examination are based on the usual scale, whose maximum is 3. They are, therefore, in determining the final total mark, multiplied by 5, in order to give to the examination mark its adopted maximum weight of 15.

The proficiency of a cadet in civil or military engineering before examination is considered doubtful if his total mark is less than two-thirds of the maximum total mark, and he is so reported to the examining committee. The question of his proficiency is then to be determined by the examination, and if he is markedly deficient in marks before examination he may be required to undergo a written examination in addition to the usual oral examination. If a cadet fail on his first examination subject, he receives a second subject in order to determine his proficiency, but in determining his standing the mark which he receives on his first subject only is considered. If he fail on the second subject also, he may be required to undergo a written examination.

The standard of proficiency required is that the cadet's total mark shall be at least two-thirds of the maximum total mark, provided that in each case of doubtful proficiency special circumstances that may affect the justice and applicability of this standard are to be considered.

PART 7.

CRITICAL REVIEW OF THE PRESENT COURSE AND METHOD OF INSTRUCTION—COMPARISON WITH FORMER YEARS AND WITH OTHER INSTITUTIONS.

The gradual development of the present course and methods of instruction are given very fully in the preceding part of this report.

As an engineering school, its influence and methods as compared with schools making the instruction of engineering in its several branches a specialty are brought out in the report of Professor Riedler, of the Royal Polytechnicum at Berlin, in his report on American technological schools. (See Report of the Commissioner of Education, 1892–93, vol. 1, p. 657.)

The number of these colleges giving degrees in civil engineering is 45. The requirements for admission are all higher than at West Point, the course of pure mathematics consequently shorter, and the length of the course generally four years. The course of engineering is divided into recitations, lectures, laboratory work, drawing, and field work. The amount of time given to each division is quite different in the different schools.

As these schools differ very much in their methods, I have limited myself to the following extracts of the report which refer specially to West Point and military schools in general.

"*Military schools.*—Before 1840 real instruction in engineering was offered almost exclusively in the Military Academy at West Point. Up to 1840—even up to 1850—nearly all the civil engineers had received their preparation in this military school. From its establishment, in 1802, up to 1862 it prepared about 2,000 students. Of these, 200 became civil engineers and about 230 entered the military Engineer Corps.

"Among the former number are the most renowned civil engineers of the country. * * *

"Between the years 1880 and 1888 only 2 per cent of the students were admitted to the Engineer Corps of the United States. Service in this corps requires an additional study of two years and a half in the United States School for Engineers at Willets Point, Long Island, organized in 1885. The technical instruction in this school comprises twenty-two weeks in civil engineering, nineteen weeks in chemistry and photography, and forty weeks in science of explosives and torpedoes.

"Since the beginning of the sixties the Military Academy at West Point has lost some of its importance with reference to education of practical civil engineers. The number and importance of engineering schools, pure and proper, have become very great, and the enormous development of this branch has necessitated a division of labor. * * *

"The military schools do not serve the profession of civil and mechanical engineering any longer. The times in which mainly knowledge of mathematics, geometry, and geodesy were considered sufficient for the profession of engineers have passed, and to-day there is no engineering school which does not seek its main work in extensive professional instruction.

"Nevertheless the military schools, with the peculiar education and rather limited theoretical and practical instruction for civil and mechanical engineers they offer, are of great importance. We find the proof of this in the great number of distinguished civil engineers who have graduated from such schools. This holds good not only for America, but for other countries. With us the course of education of a Werner-Siemens[1] may induce us to deep reflection.

"In face of the present enormous development in exact knowledge of scientific and technical details the actual result of the study is dependent now as formerly upon simple natural conception, clearness, and thoroughness, but not upon the extent of knowledge. Military schools in this respect offer many advantages. The most distinguished technological school in France also is a military institution. If a negative advantage of these schools is the prevention of knowing and learning too many things, then the strict formation of character, the reliability and independence gained, must be a positive advantage that can not be gauged too high. Alas, many a modern school esteems that advantage too little."

M.

DEPARTMENT OF PRACTICAL MILITARY ENGINEERING,
West Point, N. Y., September 10, 1896.

SIR: In compliance with the requirements of your letter of October 3, 1895, I have the honor to report as follows upon the department of instruction temporarily in my charge.

Very respectfully, your obedient servant,

JAS. L. LUSK,
Captain, Corps of Engineers, Instructor Practical Military Engineering.

The ADJUTANT, UNITED STATES MILITARY ACADEMY.

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[1] Dr. Ernst Werner von Siemens was born at Leuthe in 1816, and received his early education in the Gymnasium of Lubeck. At the age of 18 he entered the Prussian Artillery, and at the same time the War Academy at Berlin, from which he graduated in 1838. He remained in the service until 1848, when he resigned and established the firm of Siemens & Halske. He was among the foremost scientists, inventors, and electricians of his day. For his valuable work he was raised to the nobility and made a knight of the Order "Pour le Mérite," the highest scientific order in the country, by Emperor Frederick III.

1. History of the Department.

During the early history of the Academy and up to about 1842 instruction in practical military engineering appears to have been committed to the department of engineering and the science of war, under the title of "actual (or practical) operations on the ground." (See in Appendix M_1[1]; United States Army Regulations, 1821, art. 78, par. 40; United States Army Regulations, 1825, par. 1349; Regulations United States Military Academy, 1839, pars. 34, 35.)

In August, 1842, Capt. A. J. Swift, Corps of Engineers, was assigned to duty as instructor in practical military engineering, and his name is so borne in the Annual Register for 1843. About one year later the head of the department became a member of the academic board. (See in Appendix M_1[1], Post Orders, No. 22, of 1844.)

From 1844 onward the department has existed without interruption, except during part of the war of the rebellion, when it was probably merged in a greater or less degree in the department of engineering and the science of war. (See Appendix M_2.)

For information as to the personnel of the department reference is invited to the accompanying Appendix M_3. (Prepared by First Lieut. E. Eveleth Winslow, Corps of Engineers.)

A detailed programme of instruction first appears in the Academic Regulations in 1853. That programme was somewhat extended in 1857, and again in 1867 and 1892.

Instruction in this branch was confined to the first class until 1867, when it was extended to include the second class. In 1891 it was still further extended to include the third class.

The regulations of 1857 prescribed that in making up the general merit roll of the first class, practical military engineering should have a relative value of $\frac{1}{4}$ (50) (see in Appendix M_1[1], par. 67, Regulations Military Academy, 1857), but the provision does not appear to have been carried into effect. In 1891 it was ordered, upon the recommendation of the academic board, that in making up the merit roll of the first class a weight of 45 should be assigned. (See in Appendix M_1[1], Circular No. 26, Headquarters U. S. M. A., 1891). This provision has been carried into effect in the merit rolls of the first class in 1892 and succeeding years to this time.

In 1863 Capt. S. T. Cushing, acting signal officer, was sent to West Point for the purpose of introducing "instruction in military signaling and telegraphy as a part of the regular course of instruction for cadets." Under this order Captain Cushing was on duty at West Point from July 24, 1863, to January 24, 1864, but no post order appears to have been issued assigning him to duty.

Upon the recommendation of the academic board instruction in military signaling and telegraphy was added to the course in practical military engineering in October, 1867. (See in Appendix M_1[1], Orders, No. 125, Headquarters U. S. M. A., 1867.)

2. Statement of the Present Course, etc.

During July and August of each year the first and third classes are under instruction; in October and April, the first and second classes; and during the first week in May the first class alone.

The scope of the course as at present taught can probably be best outlined by the following programme of instruction for the year July 1, 1895 to June 30, 1896:

FIRST CLASS.

School of the boat.
Making knots and lashings.
Bridge by successive pontoons.
Assembling and launching canvas pontoons.
Trestle bridge on land.
Double lock spar bridge.
Abatis.
Fascine.
Hurdle.
Hoop-iron gabion.
Brush gabion.
Gabion revetment.
Fascine revetment.
Sand-bag revetment.
Barrel revetment.
Wire entanglement.
Simple trench (one-sixth scale).
Simple trench (full scale).
Flying trench (one-sixth scale).
Flying trench (full scale).
Shelter trenches, various types.
Russian gun pit.
Epaulment for breech-loading gun.
Epaulment for muzzle-loading gun.
Full sap.
Planting vertical palisading.
Planting inclined palisading.
Gun platform.
Mortar platform.
Profiling.
Signaling with flag.
Signaling with heliograph.
Signaling with telegraph.
Use of reconnoissance instruments.
Mounted reconnoissance.
Utilization of ground and stone walls as a means of defense.
Use of explosives.

[1] Not forwarded.

SECOND CLASS.

Bridge by successive pontoons.
Gabion revetment.
Sand-bag revetment.
Barrel revetment.
Wire entanglement.
Making palisading.
Planting vertical palisading.
Planting inclined palisading.
Planting fraises in scarp.
Planting fraises in counterscarp.
Gun platform.
Mortar platform.
Signaling with flag.
Signaling with telegraph.

THIRD CLASS.

School of the boat.
Bridge by successive pontoons.
Assembling and launching canvas pontoons
Trestle bridge on land.
Fascine revetment.
Gabion revetment.
Shelter trenches, various types.
Signaling with flag.
Signaling with heliograph.
Utilization of ground and stone walls as a means of defense.
Use of explosives.

The text-books employed are solely for reference. The list includes Ernst's Manual of Military Engineering, the Woolwich and Chatham text-books on the same subject, the United States Bridge Equipage and Drill, and various other publications bearing upon the subjects taught. The actual instruction to the cadets in each subject is given out mainly in the form of printed cards containing concise descriptions and explanations of the work to be executed. The cards are supplemented by hectographed plans and sections and by oral explanations.

The number of drills possible each season depends to a certain extent upon the weather and upon interruptions in the way of musters, reviews, military funerals, etc., requiring the attendance of all the cadets.

That these causes combine to lessen to a large extent the quantity of instruction possible the following comparison will show:

	October, 1895.	April, 1896.	July and August, 1896.	Total.
Drills possible	18	17	47	82
Lost, bad weather	1	2	6	9
Lost, military funerals	1	1	.....	2
Lost, musters	1	1	.....	2
Actual drills	15	13	41	69
Drills lost	3	4	6	13
Percentage lost	16.7	23.5	12.8	15.9

The time devoted to instruction during the year in question was as follows:

	Hours.
First class:	
October, 1895, 15 drills, one hour each	15
April, 1896, 13 drills, one hour each	13
July and August, 1896, 41 drills, one and one-half hours each	61½
Total	89½
Second class:	
October, 1895, 15 drills, one hour each	15
April, 1896, 13 drills, one hour each	13
Total	28
Third class:	
July and August, 1896, 41 drills, one and one-half hours each	61½

The time lost by the individual cadets is much greater than that due to the number of lost drills. This arises from the absence of cadets who are sick, on old and new guards (during the encampment), or detailed for other duties. Excepting the case of the first class in July and August, the attendance is by half classes on alternate days. During the first class year of the class of 1896 the maximum attendance by any member of the class was 56 drills out of a total possible of 72. The average attendance was about 46 drills out of 72.

In May each cadet of the first class is required to attend one full day at mounted reconnoissance. This exercise involves about six and one-half hours of steady work of observing, recording notes, making a road sketch, and a finished map in ink, all in the field.

No stated lectures are given in this course, but as much oral instruction is imparted as time allows. There is no distinct division of the course into advance and review, but, for the sake of proficiency, certain parts of the course are repeated to a limited extent.

3. Organization of Department, etc.

Since the expansion of the course in 1891, and until quite recently, the number of instructors has been three—the instructor of practical military engineering and two assistants. As a rule, these three officers have all attended at every drill and have found themselves fully occupied. When the classes are large, the summer drills tax the energies of the officers to the utmost. The War Department has recently detached one of the assistants and has assigned no one to take his place.

There is no strict division of duties, the officers being assigned to different lines of instruction at different times, thus having under their observation all the cadets of the different classes. This arrangement is believed to bring about the fairest possible results in marking and grading the classes.

4. Description of a Drill.

When a class or half class is reported to the instructor, the details are rapidly made by roster for the different kinds of work to be done. The squads are promptly marched to the working points, where instruction cards, rough drawings, and implements are provided. When deemed necessary, oral instruction and explanation are given both before and after the squads begin working. When, in the judgment of the officer in charge, enough work has been done, the members of the squad are questioned sufficiently to ascertain their understanding of the practical features involved. The marking is done upon the method of working, the progress made, and the understanding shown of the subject. In signaling and telegraphy the marking is done upon the recorded messages turned in by each cadet.

5. Weekly Class Reports, etc.

These are made and the marks exhibited in the usual manner, the classes being divided into sections merely for the sake of convenience in marking. As a rule, transfers are not made. In general, first class men are detailed as chiefs of the working parties of the second and third classes, and are required to mark the members of their parties. The marks so given are recorded, but do not affect the final standing in the department, which is determined solely from the marks of the first class year. The members of the first class are marked by the officers alone.

6. Examinations.

These are entirely practical, and have thus far been conducted in Fort Clinton, and with one exception (that of May, 1892) they have taken place during the period of the annual examination. As there is no room suitable for indoor examination, a postponement will undoubtedly be necessary in case of inclement weather. The mark for each day's drill having a weight of unity, the examination mark has thus far been given a weight of 3, and that for mounted reconnoissance a weight of 5. The usual standard of proficiency is required.

Review of Course.

The instruction now given is believed to be as full and thorough as the time allowed will permit. Several defects exist, the most important being as follows:

1. *Lost time.*—As stated in detail above, the time lost from instruction due to drills missed from various causes and to the absence of cadets from drills makes up a large total. To partially obviate the evil requires a wearisome repetition of certain drills. There seems to be no remedy for this state of affairs without encroaching upon the practical work of other departments, which is not recommended.

2. *The short terms of service allowed the assistant instructors and the irregularity of their tours of duty.*—These officers are not allowed as long terms of service at the Academy as those in other departments, and are assigned and relieved without reference to the academic year. The work of instruction of the department begins on July 5 and ends with the conclusion of the next annual examination. It is therefore desirable that changes of assistant instructors be made between the end of the annual examination and the succeeding 1st day of July. It is also much to be wished that these officers should have tours of duty at the Academy of not less than three years.

In conclusion I desire to bear witness to the intelligence and fidelity with which the noncommissioned officers and privates of Company E, Battalion of Engineers, have for many years assisted in the instruction of cadets in practical military engineering. Their duties in this regard require much skill and labor and afford no small room for the exercise of patience and tact. That the demands upon them have been well and creditably met is, I am sure, the judgment of all who know the facts.

APPENDIX M_2.

MEMORANDA CONCERNING DEPARTMENT OF PRACTICAL MILITARY ENGINEERING DURING THE WAR OF THE REBELLION.

Engineer Company A, formed for service in war with Mexico, returned to West Point June 22, 1848, and assisted in instruction of cadets until January 18, 1861, when, under command of Lieut. J. C. Duane, instructor of practical military engineering, it left West Point for Washington, D. C.

On September 30, 1861, company returned with Capt J. C. Duane and Lieuts. G. Weitzel and John A. Tardy, jr., and remained at West Point till October 30, 1861, when the company and officers again left to join the Army of the Potomac.

A small detachment was left behind under command of Lieut. William P. Craighill, then in department of civil and military engineering, and remained at West Point under his orders (with a temporary absence June 21 to October 25, 1862) till June 18, 1863. From June 18, 1863, to August 19, 1863, the detachment was commanded by Lieut. J. A. Smith, then temporarily by several other officers in succession till September 10, 1863, when Capt. Miles D. McAlester joined as instructor of practical military engineering and commander of detachment.

During the interval between October 30, 1861, and September 10, 1863, the department of practical military engineering was probably merged in the department of civil and military engineering. The same may be true for the interval from January 18, 1861, to September 30, 1861.

The detachment of engineers above referred to was kept at West Point in department of practical military engineering till the return of A Company in 1865.

A Company remained at West Point till September 1, 1867, when a new detachment was formed and left behind till arrival of E Company on March 3, 1871.

APPENDIX M_3.

Instructors, department of practical military engineering, signaling, and telegraphy.

Instructor.	Assigned.	Relieved.	Remarks.
Alex. J. Swift, captain engineers...	Aug. —, 1842	Sept. 12, 1846	On duty at West Point June 30, 1841, to Nov. 19, 1841; duty not known, but probably organizing department of practical engineering.
Fred. A. Smith, captain, engineers.	Sept. 12, 1846	Mar. 25, 1848	
George W. Cullum, captain, engineers.	Mar. 25, 1848	May 19, 1851	
Alex. H. Bowman, captain, engineers.	May 19, 1851	June 1, 1852	
George W. Cullum, captain, engineers.	June 1, 1852	Jan. 1, 1855	
John G Barnard, captain, engineers.	Mar. 2, 1855	Sept. 8, 1856	Superintendent U. S. M. A.
Andrew J. Donelson, first lieutenant, engineers.	Sept. 9, 1856	Oct. 15, 1858	
James C. Duane, first lieutenant, engineers.	{Oct. 16, 1858 {Sept. 30, 1861	Jan. 18, 1861 Oct. 30, 1861	
Miles D. McAlester, captain, engineers.	Sept. 10, 1863	June 22, 1864	
William P. Craighill, captain, engineers.	June 22, 1864	Aug. 31, 1864	
George H. Mendell, captain, engineers.	Sept. 21, 1864	July 3, 1865	
Henry M. Robert, captain, engineers.	Aug. 31, 1865	Aug. 31, 1867	
Peter S. Michie, captain, engineers.	Aug. 31, 1867	Mar. 8, 1871	Relieved Mar. 8, 1871, on account of having been appointed professor of philosophy, to date from Feb. 14, 1871.
Oswald H. Ernst, captain, engineers.	Aug. 1, 1871	Aug. 28, 1878	
Charles W. Raymond, captain, engineers.	Aug. 28, 1878	Aug. 28, 1881	
William S. Stanton, captain, engineers.	Aug. 28, 1881	Aug. 28, 1885	
Francis V. Greene, captain, engineers.	Aug. 28, 1885	Jan. 12, 1886	
Philip M. Price, captain, engineers.	Jan. 15, 1886	Jan. 4, 1889	
George McC. Derby, captain, engineers.	Jan. 4, 1889	Mar. 4, 1893	
James L. Lusk, captain, engineers..	Mar. 31, 1893	.....	

N.

DEPARTMENT OF ORDNANCE AND GUNNERY, UNITED STATES MILITARY ACADEMY.

HISTORY.

This department is a gradual growth from the department of artillery. In the earlier stages of development the instruction was mostly practical, and little is known of it. General Cullum gives in his account of the early history of West Point the following under the head of "Instruction:" * * * "The first principles of artillery were taught with the drill of field pieces, target practice, and a little laboratory duty. Artillery was little studied, only definitions from Scheele's Artillery were learned, practical pyrotechny and preparation of fixed ammunition taught, and the use of field pieces and mortars in drills and at target practice."

The department of artillery first appears upon the records in 1817, the first instructor being George W. Gardiner, second lieutenant, Corps of Artillery, whose tour of duty extended from September 15, 1817, to February 1, 1820. During part of this time he was also commandant of cadets.

Paragraph 7, Academic Regulations of 1821, prescribes: "There shall be detailed a captain or field officer, and attached to the Academy as instructor of tactics; and the captain or commandant of artillery to be stationed at West Point shall perform the duty of instructor of artillery." * * *

By paragraph 9 of the same regulations the instructor of artillery is constituted a member of the academic board.

In accordance with the above provisions the instructor of artillery, Capt. Fabius Whiting, Corps of Artillery, appears as a member of the academic board for the first time June 30, 1821. The same provisions as to detail of instructor of artillery appear in the regulations of 1839 and also in those of 1853, except that "a captain or lieutenant may be detailed as instructor of artillery."

The department of artillery continued till 1857, and a list of the instructors in that department is given below, with the dates of their services:

List of instructors of artillery.

Name.	Rank and regiment.	From—	To—
George W. Gardiner	Second lieutenant, Corps of Artillery	Sept. 17, 1817	Feb. 1, 1820
Fabius Whiting	Captain, Corps of Artillery	Aug. 15, 1820	Aug. 7, 1821
Z. J. D. Kinsley	Second lieutenant, Third Artillery	Dec. 18, 1823	Dec. 1, 1835
Robert Anderson	First lieutenant, Third Artillery	Dec. 1, 1835	Nov. 6, 1837
Minor Knowlton	First lieutenant, First Artillery	Nov. 9, 1837	July 1, 1844
E. D. Keyes	Captain, Third Artillery	July 25, 1844	Dec. 24, 1848
William H. Shover	Captain, Third Artillery, and brevet major, U. S. A.	Dec. 24, 1848	Sept. 7, 1850
George H. Thomas	First lieutenant, Third Artillery, and brevet major, U. S. A.	Apr. 2, 1851	May 1, 1854
Fitz John Porter	First lieutenant, Fourth Artillery, and brevet major, U. S. A.	May 1, 1854	Sept. 11, 1855
Henry F. Clarke	First lieutenant, Second Artillery, and brevet captain, U. S. A.	Sept. 11, 1855	Aug. 6, 1856

In 1857 the department of ordnance and gunnery was organized pursuant to the following resolution of the academic board of December 5, 1856:

"6. That the portion of the present course of artillery which comprises the science of gunnery, and what is known in our service as ordnance, be disconnected from that which relates to tactics merely, and be made the subject of a separate department, and that the additional time necessary for the development and improvement of this department be taken from that now given to practical engineering in October."

And on December 9, 1856, the course was finally arranged as follows: "Ordnance and gunnery from 11 a. m. to 1 p. m. from October 1 to end of the first week in March, alternating every other week day with cavalry tactics during October and two weeks in November, and with riding during the remainder of the term."

Paragraph 5, of the Academic Regulations of 1857, provides for the detail of the instructor of ordnance and gunnery, and by paragraph 9, same regulations, he is constituted a member of the academic board.

Under these provisions Capt. James G. Benton, Ordnance Department, was assigned to duty at West Point and became the first instructor of ordnance and gunnery. A list of the instructors in this department is given below with dates of service:

List of instructors of ordnance and gunnery.

Name.	Rank and department.	From—	To—
James G. Benton	Captain, Ordnance Department	Feb. 27, 1857	Apr. 26, 1861
Stephen V. Benét	First lieutenant, Ordnance Department	Apr. 26, 1861	Feb. 1, 1864
Thomas J. Treadwell	Captain, Ordnance Department	Feb. 11, 1864	Sept. 13, 1864
George T. Balch	Captain, Ordnance Department	Sept. 22, 1864	July 12, 1865
Alfred Mordecai	Captain, Ordnance Department	July 12, 1865	Aug. 2, 1869
Theo. Edson	Major, Ordnance Department	Aug. 2, 1869	Nov. 17, 1870
Thomas C. Bradford	Captain, Ordnance Department	Jan. 1, 1871	Jan. 12, 1872
Stephen C. Lyford	Captain, Ordnance Department	Jan. 30, 1872	June 28, 1872
John R. McGinness	Captain, Ordnance Department	July 25, 1872	Aug. 30, 1874
Alfred Mordecai	Captain, Ordnance Department	Aug. 30, 1874	Aug. 28, 1881
Clifton Comly	Major, Ordnance Department	Aug. 28, 1881	Aug. 28, 1886
Henry Metcalfe	Captain, Ordnance Department	Aug. 28, 1886	Aug. 8, 1891
L. L. Bruff	Captain, Ordnance Department	Aug. 17, 1891	To date.

HISTORY OF COURSE.

The early history of the course from the beginning of the Academy up to 1812 has already been given. From 1812 to 1817 General Cullom states "tactics of infantry and artillery were Captain Partridge's delight, and were well taught, but were necessarily limited, owing to the small number of cadets to exercise, and the few pieces of ordnance for drill or target practice."

From this it appears that there was very little theoretical instruction in ordnance proper, but that most of it was practical, belonging rather to the department of tactics than to that of ordnance.

In January, 1820, a committee of the academic board, consisting of Professors Mansfield and Crozet and Assistant Professor Douglas, was appointed to draw up a revised code of the course of studies, and rules for classification. Under the subject of artillery and military science, they state that this course shall consist of "The knowledge and use of the various kinds of ordnance and military projectiles, principles of gunnery, experiments on the strength of powder, and calculation of the initial velocity of balls."

Between this date and 1826 the instruction in the scientific part of the course was transferred to the department of engineering, though the date of transfer is not fixed. It was transferred back to the department of artillery by the following resolution of the academic board of June 26, 1826, viz:

Resolved, That it is expedient to transfer from the department of engineering to that of artillery all instruction included under the head of "Science of artillery."

The following extract from the report of the Board of Visitors for 1833 may prove interesting, and it shows that even at that early date the armament of the post was not entirely satisfactory:

"The Board attended the battalion, light infantry, and artillery drills, and had every reason to be satisfied with the instruction of the cadets in their field exercises. They were present likewise in the laboratory when the cadets exhibited their proficiency in pyrotechny, and they subsequently saw them throw shells and fire at the target with light and heavy pieces of artillery; all which they executed with a precision rarely equaled, and not surpassed in any school of practice in Europe.

"This is the more remarkable from the state of the pieces used for practice. They are very defective, and the Board recommend that the several pieces of ordnance which are required for the instruction of the cadets by their able and scientific instructor should be furnished of the best quality and most approved construction.

"Much credit is due to the officer charged with the instruction of the cadets in this department. He has compiled a practical treatise on military pyrotechny and translated an excellent elementary treatise on the forms of cannon and various systems of artillery, and another on the theory and practice of gunnery, from the French of Professor Persy, of Metz; all of which, with numerous plates illustrating the subjects, have been published in the lithographic press of the Academy."

In 1839–40 a programme of studies was drawn up by direction of the chief engineer and the course in artillery was as follows:

"*Pyrotechny.*—Under this head the instruction is both theoretical and practical and extends to the making of slow match, quick match, portfires, priming tubes, cannon cartridges, musket, rifle, and pistol cartridges, canister shot, grape shot,

strap shot, leaden balls, fuses, rockfire, light balls, fireballs, incendiary balls, the mousse, sulphur matches, thundering barrels, carcasses, and signal rockets; to the loading of bombs, howitzers, and grenades, and putting up ammunition for transportation. The manner of making petards, powder sacks, smoke balls, suffocating balls, alarm signals, congreve rockets, and parachute rockets is studied, but not applied to practice.

"*Artillery tactics.*—Under this head the organization of a field battery and of the company of artillerists required for its service. The school of the gunner, school of the piece, and school of the battery are learned theoretically and practically. The evolutions of the batteries are studied, but not practiced in the field.

"*Gunnery.*—The theory of gunnery is studied and applied to practice with guns, howitzers, and mortars.

"*Manufacture of gunpowder, percussion powder, cannon, and projectiles.*—Under this head the studies include the preparation of materials for gunpowder; the manufacture and inspection of gunpowder; the proof of gunpowder; the proof of gunpowder by the mortar eprouvette, spring eprouvette, ballistic pendulum, cannon pendulum, and rotary machine; the storage and preservation of gunpowder; the restoration of damaged gunpowder; the inflammation and properties of gunpowder; a description of the principal of the different fulminating powders; the manufacture of percussion caps and wafers; the preparation of metals used in the fabrication of arms; the manufacture of cannon of cast iron, wrought iron, and bronze; the inspection and proof of iron guns, howitzers, and mortars; the inspection and proof of guns, howitzers, and mortars of bronze; the preservation of cannon; the manufacture, inspection, and proof of shot and shell.

"*General subject of artillery.*—Under this head are included the different kinds of guns, howitzers, and mortars; a description of the different kinds of hollow projectiles and of the manner of filling and preserving them; the description and nomenclature of gun carriages, caissons, etc., with an explanation of their forms; propositions with respect to strength and ease of draft; the manner of spiking and unspiking cannon; the manner of repairing and destroying the material of artillery; the theory of firing; the manner of determining initial velocities; the effects of recoil; the aiming of guns, howitzers, mortars, and stone mortars; the firing of grapeshot, congreve rockets, and grenades; the throwing of hand grenades; the different modes of firing; the manner of firing by night; the causes of deviation in firing; the effect of rifling in correcting the inaccuracy of small arms; the effects produced by balls, howitzers, bombs, grapeshot, etc.; the composition of siege trains; the construction of siege batteries; the manner of battering in breach and counter battering; the construction of coast batteries and the defense of coasts.

"*Text-books.*—Instructions Theorique de L'Artillere, par Thiroux, upon the general subject of artillery; Exercise and Instruction of Field Artillery, a system prepared by a board of officers at Washington in 1826, by order of the Secretary of War, upon the subject of artillery tactics.

"The remaining parts of the course are taught from notes prepared and lithographed at the Military Academy."

The course, according to the Regulations of 1853, is as follows:

"Par. 31. *Artillery.*—Nomenclature and description of the different kinds and parts of artillery, gun carriages, caissons, and other artillery carriages, of artillerists' implements, and military projectiles; exercise of the fieldpiece and of mortars, howitzers, siege, garrison, and seacoast guns; manœuvers of a field battery of artillery; mechanical manœuvers.

"*Gunnery.*—Theory of gunnery, target practice with the gun, howitzer, and mortar.

"*Pyrotechny.*—Making of all kinds of musket, rifle, pistol, cannon, and howitzer cartridges; preparation of strap, grape, and canister shot, priming tubes, fuses, slow and quick match, portfire, rockets, carcasses, fireballs, light balls, and incendiary composition; loading shells, shrapnel shot, and grenades, casting musket balls; putting up stores for transportation; loading caissons, and the manner of proving powder.

"Par. 50. *Manner of giving instruction in artillery.*—Artillery tactics shall be taught according to the most approved system. The instructor will be assisted in the drill by the cadets best qualified acting as commissioned and noncommissioned officers. Select passages from the best works in the different subjects of the course shall be studied and recited. A course of practice shall be connected with the study of gunnery.

"The cadets shall be taught in the laboratory its various duties, and shall by practice acquire facility and correctness in performing them."

In 1857 the course was as follows:

"Par. 27. *Ordnance and science of gunnery.*—Nomenclature and description of the different kinds and parts of artillery, gun carriages, caissons, and other artillery carriages, of artillerists' implements, and military projectiles.

"*Gunnery.*—Theory of gunnery.

"*Pyrotechny.*—Making musket, rifle, pistol, cannon, and howitzer cartridges, preparation of strap, grape, and canister shot, priming tubes, fuses, slow and quick match, portfire, rockets, carcasses, fireballs, light balls, and incendiary composition, loading shells, shrapnel shot, and grenades; making musket balls; putting up stores for transportation; loading caissons, and the manner of proving powder, shot, and shells, inspecting guns, etc.

"Par. 53. *Ordnance and the science of gunnery and laboratory duty.*—For instruction in this branch the first class shall be divided into sections when commencing the subject according to general merit, and after the January examination according to merit in this study.

"Practical instruction in the duties of the laboratory shall be given to the first class during a part of the period of the encampment and to the fifth class between the 1st of April and the 15th of May."

In this year, as already noted, the department of ordnance and gunnery had been organized and hence the tactical part of the course had been transferred to the department of tactics.

The course in 1873 was as follows:

"Par. 32. *Ordnance and gunnery.*—This course will comprise:

"*Ordnance.*—(1) The theory and preparation of gunpowder, cannon, artillery carriages, projectiles, implements, machines, small arms, ammunition, and military fireworks. (2) Practical instruction in making musket, rifle, pistol, cannon, and howitzer cartridges; preparation of strap, grape, and canister shot, fuses, slow and quick match, portfire, signal rockets, carcasses, fireballs, light balls, and incendiary composition; loading shells, shrapnel shot, and grenades; putting up stores for transportation; loading caissons; in determining pressure on the bore of a gun; in determining the initial velocity of projectiles; in the manner of proving powder, and, when circumstances will admit of it, the operation of casting cannon solid and hollow, casting of projectiles and the usual method of testing gun metals will be witnessed.

"*Gunnery.*—Embracing the study of the movements of projectiles; the theory of pointing firearms; the different kinds of fires and their effect; the art of breaching and the composition of batteries.

"Par. 59. *Ordnance and gunnery and laboratory duty.*—For instruction in this branch the first class shall be divided into sections in September according to general merit, and after January examination according to merit in ordnance and gunnery.

"Practical instruction in the duties of the laboratory shall be given to the first class during a part of the period of the encampment and to the third class at such times as the superintendent may direct."

The course in 1883 was as follows:

"Par. 32. *Ordnance and gunnery.*—This course will comprise:

"1. The theoretical course of ordnance and gunnery, as follows: Ordnance: The theory and preparation of explosives, projectiles, cannon metals, cannon and portable arms, artillery carriages, harness, and machines. Gunnery: The theory of the motion of projectiles within and without the piece, and their effects. The use of range finders.

"2. The practical course will comprise instruction in the duties of the arsenal and experiments in gunnery. When circumstances will admit of it, the operation of fabricating ordnance material will be witnessed.

"Par. 39. *Ordnance and gunnery.*—Two to four every other week day, Saturdays excepted, alternating with law. The month of April to be devoted to the practical part of the course, explanation of instruments, models, etc.

"Par. 60. *Ordnance and gunnery and laboratory duty.*—For instruction in this branch the first class shall be divided into sections in September according to general merit, and after the January examination according to merit in ordnance and gunnery.

"Practical instruction as prescribed in paragraph 32 of these regulations shall be given to the first class during the month of April, or at such times as the Superintendent may direct."

The following list of text-books in use in the department has been obtained from the best available sources, and is very imperfect, especially at the beginning of the history of the department:

Text-books in artillery.—Sheele's Treatise on Artillery.

1841. Anderson's United States Artillery Tactics; Kinsley's Pyrotechny; Thiroux's Instruction Théorique et Pratique d'Artillerie; Knowlton's Notes on Gunpowder, Percussion Powder, Cannon, and Projectiles.

1842. United States Artillery Tactics; Kinsley's Pyrotechny; Thiroux's Instruction Théorique et Pratique d'Artillerie; Knowlton's Notes on Gunpowder, Percussion Powder, Cannon, and Projectiles.

1850. Tactics for Garrison, Siege, and Field Artillery; Kinsley's Pyrotechny; Thiroux's Instruction Théorique et Pratique d'Artillerie; Knowlton's Notes on Gunpowder, Cannon, and Projectiles; Mordecai's Experiments on Gunpowder by means of the Gun and Ballistic Pendulum.

Text-books in ordnance and gunnery.—1859. Thiroux's Instruction Théorique et Pratique d'Artillerie; Ordnance Manual; Mordecai's Experiments on Gunpowder; Notes on Fabrication of Cannon and Projectiles.

1863 and 1864. Benton's Course of Ordnance and Gunnery.

1865 to 1870. Benton's Ordnance and Gunnery.

1870 to 1886. Benton's Ordnance and Gunnery; Mordecai's Notes and Pamphlets; Bruff's Exterior Ballistics.

1886 to 1896. Metcalfe's Ordnance and Gunnery; Metcalfe's Notes and Pamphlets.

1896 to ——. Bruff's Ordnance and Gunnery.

The development of the course of ordnance and gunnery has been as follows: First, the whole subject, under the head of artillery, was taught by the department of tactics. In the early days of the institution very little scientific knowledge on the subject of artillery and ordnance was in existence. Hence the subject was taught at first practically, great attention being given to drill and very little to the principles. As knowledge upon the subject increased more time was devoted to the theory of the subject, and somewhere between 1820 and 1826 this knowledge had increased so greatly that it was deemed proper to transfer instruction in it to another department, where more time could be given it. It was transferred back again, however, for reasons not given, and in 1839 the course as laid down deals extensively with the theory of artillery, the determination of initial velocity, proof of gunpowder, rifling, causes of deviation in firing, etc.

The greatest step in the development of the course was undoubtedly its division in 1857 into two parts, the one practical and belonging to the department of tactics, the other theoretical and belonging to ordnance proper, or the study of the theory of gunpowder, pressures, velocities, and the effect of these upon the building of guns and upon their projectiles; also the numerous questions relating to pointing, metal for guns, manufacture of ordnance stores, and many others of this class became for the first time the subject of a separate course.

The great ability of the first instructor of ordnance and gunnery, Col. (then Capt.) J. G. Benton, Ordnance Department, gave an organization and an impetus to the department that it has always felt. His text-book, Benton's Ordnance and Gunnery, is well-known almost to the present time as a model book, and it has furnished the basis of most of the subsequent revisions.

The first of these was made by Col. Alfred Mordecai, Ordnance Department, who published a series of pamphlets, taking up the different chapters of Benton in detail and correcting them to date. His intention was upon the completion of the work to publish it in book form, but unfortunately he was relieved from duty before this work was accomplished.

The course for some years after his tour of duty consisted of his pamphlets and those parts of Benton which still applied, supplemented by notes published by Maj. Clifton Comly, of the Ordnance Department, who succeeded him. It was during this time that the old system of exterior ballistics, Didion's, was replaced by a more modern one, Niven's.

Capt. Henry Metcalfe, who succeeded Major Comly, found that the course needed a thorough revision, and he proceeded with the work with untiring energy, and finally published his Ordnance and Gunnery, which remained a text-book up to the present year, 1896.

When Captain Metcalfe's book was written the artillery system of the United States was in embryo, and also the subject of small arms and some others. Shortly after his relief from duty, in 1891, all these factors in the ordnance problem assumed definite shape. The system of artillery, guns, and carriages became fixed, a new small arm was adopted, smokeless powders came into vogue, and many other minor changes were made.

These changes necessitated a revision of the course again, and resulted in the text-book at present adopted by the academic board and compiled by the present instructor of ordnance and gunnery.

The present course is contained in one text-book, entitled Ordnance and Gunnery, Bruff, and a ballistic table, compiled by Capt. James M. Ingalls, First Artillery, U. S. A., whose title is Ballistic Tables, Ingalls.

The list of subjects taught is as follows:

1. *Gunpowder and interior ballistics.*—Under this head is given the composition and manufacture of gunpowder, the laws of its burning in air and in a gun, formulas by which the velocity of a projectile and the pressure in the bore of a gun can be calculated, pressure curves in a gun, and a general outline of the characteristics of powder, such as is generally comprehended under the head of interior ballistics.

After the theory of powder is understood the practical methods of determining the velocity of projectiles and the pressure in the bore of a gun are taught, both theoretically and by practical use of the instruments themselves.

2. *High explosives and smokeless powders.*—This includes a description of the general properties of high explosives, and of each particular explosive used for military purposes, giving its preparation, properties, uses, etc. The manufacture of smokeless powder is explained, the reason why it is superior in ballistic properties to ordinary powder, and a description of the principal well-known smokeless powders is given. This is supplemented by the exhibition of samples of nearly all the known smokeless powders.

3. *Guns.*—This subject is quite extensive, and includes various subordinate subjects.

First. Gun steel, the metal of which all modern guns is made, is described with regard to its properties, chemical and physical. Its manufacture is then explained in detail, together with the various modern processes of treatment, such as fluid compression, hydraulic forging, oil tempering and annealing, and the rationale of the process of hardening, tempering, and annealing.

Second. A general outline of the principles of machines is next given, with the various methods of transmitting and modifying power in use in shops; the general arrangement of machine shops, and a description of the various machines in common use, such as the lathe, planer, shaper, etc., and the tools used by them.

Third. Practical operations in the manufacture of guns, under which head are described the various operations at the gun factory in building a modern gun, including the preparation of the parts for assembling, the heating, shrinking, and cooling of the parts, thus forming the assembled gun, and the final operations of finish boring rifling, etc.

Fourth. After the manufacture of the gun is understood, the reasons for the processes are given under the head of "Elastic strength of guns."

This subject includes a discussion of the strains and stresses which act on a gun, the laws of their distribution through the metal composing it, and the methods by which the structure may be strengthened to best withstand the strains. It is an outline of the modern method of gun construction. Wire guns are also treated of, and their construction illustrated by examples.

Fifth. The discussion of the elastic strength of guns having shown the necessity for accurate measurements of all the parts, the subject of measurements in gun construction is next considered, and the instruments and methods employed are described.

Sixth. The student is now in condition to understand the completed gun, and under the next head are described all the guns in the United States service, with their breech mechanism. In this description, the reasons are given for the arrangement of the various parts, and their functions and action clearly explained. The foreign variations are also described here.

4. *Projectile and armor.*—Under this head are described the various field, siege, and sea-coast projectiles in use in the United States service; their methods of manufacture, inspection, and tests; the circumstances under which each is best employed; the laws with respect to bursting charges, and the use of high explosives in shell; the development and use of shrapnel; law of rotation of an oblong projectile, and its sectional density as affecting its accuracy and range; rifling, its use and laws, form of rifling curve, and kinds of twists employed; the history and development of rotating devices, both muzzle and breech loading; rule for determining the weight of oblong projectiles; the kinds of armor and their relative value; effect of projectiles on armor; backing and fastenings for armor plates, and the principal formulas for penetration of projectiles in armor.

5. *Fuses and primers.*—The various fuses used in projectiles, with their requisites, are explained here, and also the common or friction and the obturating primers.

6. *Exterior ballistics.*—The subject of this head is the motion of projectiles in air; and the formulas giving the laws of resistance of the air, and those by means of which the various elements of the trajectory may be calculated, are deduced, and their application to practice explained and illustrated by numerous examples. The problems which are most likely to be met with in practice are treated only, leaving the more extended application of the principles to be taught at the schools of application.

7. *Artillery carriages; theory of recoil.*—The modern artillery carriage is a very complex structure, and requires much study of the principles of recoil and of the stresses acting on it. The principles of wheeled carriages are described, and the various brakes used to diminish recoil, together with the draft of the horse, his mode of attachment, and the harness. A description of the various wheeled carriages for the field and siege services is then given, followed by a description of the seacoast carriages for the guns and mortars, and also a brief mention of the older forms of carriage found in the service.

The principles governing the recoil of guns are then discussed, and the laws of recoil in the first and second periods deduced. This having shown the necessity for

brakes or buffers, they are next discussed, and formulas deduced by which the elements of a hydraulic brake may be calculated.

8. *Pointing; probability of fire.*—Under this head are considered the different cases which may arise in pointing, due to difference of level of target and trunnions of gun; the method of calculating the height of rear sight and the correction for drift is explained, and also the methods of indirect pointing. The causes of deviations in firing are then considered, and the methods of estimating distances to targets explained, together with the general principles of range finders. These principles are illustrated by a description of one of the best known instruments. The sights for the service guns, field, siege, and seacoast are then explained. The laws of deviation of projectiles are then discussed, and the methods of calculating their deviations explained and illustrated. The doctrine of "probability" is then briefly considered and applied to the case of firing, and the laws of accidental error deduced and applied to finding the probability of committing certain errors and of striking objects of given dimensions, and these laws are illustrated by examples.

9. *Portable arms.*—This subject includes, first, a description of the various hand arms, the sword, saber, bayonet, etc., together with the principles upon which they depend, and, second, a discussion of the modern small arm. This discussion explains first the reason for the reduction of the caliber of the modern rifle and the ballistic advantages obtained by it. A description in detail is then given of the various parts of the Springfield rifle and of the caliber .30 rifle recently adopted. In this connection the general principles of breech mechanism are discussed, and the requisites of a good mechanism given, so that each system described may be compared with the general conditions and the advantages and defects of each made evident. The sights for small arms are also described, together with the various minor parts which make up the gun. The magazine or repeating arms are then discussed, the reason for using a magazine arm being explained, and the conditions which a good magazine arm should fulfill are given. The different magazine systems are then described in detail, and the advantages and defects of each pointed out. Finally the magazine system of the United States rifle, caliber .30, is explained in detail, with the reasons for its adoption. Metallic ammunition for small arms is next explained, a general history of its development being given and the reasons for the various changes and improvements pointed out.

10. *Machine and rapid-fire guns.*—The principles upon which the various machine guns are built are here explained, and also their advantages and disadvantages in general, and their use and the requirements which a good machine gun should fulfill. The best known machine guns are then described in detail, with their working and peculiar advantages and disadvantages, and each gun is shown, and explained from the gun itself. After the guns have been studied and their working understood they are fired a number of rounds at targets, so that their actual working may be seen.

The same course is pursued with the rapid-fire guns, their general principles being first explained, then each gun is studied in detail, and the gun itself used to explain any doubtful points; and after being thoroughly studied they are fired to show their working.

All parts of the course except those purely descriptive are illustrated by problems which are solved as a test of the thoroughness with which the principles taught are understood. The total number of lessons in the course is as follows:

Advance	54
Review	27
Practical instruction	6
General review	16
Total	103

The average length of lessons is 12 pages advance, 24 pages review, 40 pages general review. The time allowed for the course is as follows: "From 11 to 1 o'clock every other week day from September 1 to June 1, alternating with riding, and during February with drill regulations, except Saturdays from September 1 to December 1 and from March 15 to June 1."

The class is divided for instruction in ordnance and gunnery into two halves. The first half attends riding or drill regulations, while the second half attends ordnance, and alternates next day with the first half. Thus one-half the class in any one week will recite either twice or three times, except during the time from December 1 to March 15, when each half recites three times. Each half class is divided into four sections, and the number in each section varies, of course, with the size of the class, being generally from five to ten men.

The department is organized as follows: The head of the department has the official title of "Instructor of ordnance and gunnery." He is generally a captain of Ordnance detailed by the Secretary of War for four years upon the recommendation

of the Chief of Ordnance. The detail is not limited to captains, as shown by the list of instructors. Two assistants have been for some years allowed to the department, one a lieutenant of Ordnance and the other detailed from the line of the army.

The lieutenant of Ordnance is the senior assistant instructor of ordnance and gunnery, and in addition to his duties as instructor he is attached to the ordnance detachment at the post and is required to assist in the duties pertaining to that detachment, such as the care and preservation of the batteries at the post, mounting and dismounting guns and carriages, etc.

The junior assistant is not attached to the detachment, and his duties are those of instruction only as a general rule, but he may be called upon to assist the senior assistant in the performance of any of his duties.

Each of the assistants instructs from 11 a. m. to 1 p. m. daily, except the Saturdays before mentioned, and his duties as instructor also require about two hours daily correcting problems and arranging models, drawings, and subjects for the next recitations. The necessary time must also be given to the preparation of the lesson for the daily recitations.

The duties of the head of the department are a close supervision of the instruction, explanations of models, and occasionally lectures, preparation of the new matter for the course to replace such as may become obsolete, procuring of models, and preparation of drawings for different parts of the course when required. In addition he has charge of all the ordnance and ordnance stores of the post, and is responsible for the condition of the batteries and their ammunition, for the care and preservation of the various stores used in mechanical maneuvers, and for the target supplies of cadets. He has command of the post ordnance detachment and regulates their duties.

The ordnance section rooms are located on the third floor of the new academic building in the curtain facing the area, and are numbered 311, 313, and 315. The two latter are section rooms, while 311 is the office where consultations are held, marks and standing arranged, models kept and exhibited, and books arranged for reference. The office and one of the section rooms, 313, have each a small fireplace of stone built into the wall and communicating with a flue for burning powder. Each room also contains a glass case filled with samples of gunpowder and of smokeless powder. These samples are kept in glass bottles, properly labeled.

The section on entering the section room finds the instructor seated at his desk, and after the members of the section have reached their seats and while they are still standing the section marcher places himself in front of the instructor, salutes, and reports "All are present, sir," or "Cadet Blank is absent, sir," etc. The members of the section then take their seats.

All absentees are noted and reported on the class reports at the end of the week. The section being seated, the instructor asks, "Are there any questions, gentlemen?" when any member of the section may ask for an explanation of any point in the lesson which may not be thoroughly understood by him. Very frequently there are models illustrating some subject in the lesson. In this case the model is explained by the head of the department or by the instructor before recitation begins. These explanations may occupy from five to fifteen minutes. The names of the members of the section are then called and subjects in the lesson assigned to them for recitation. These subjects are printed and numbered, and each subject is assigned by its number.

As a rule, not more than six recitations can be completed in the hour assigned to each section, and hence if there are more than six cadets in the section, as is generally the case, the seventh takes his place on the floor in front of the instructor and is questioned by him upon some subject in the lesson, and this questioning continues till one of the cadets at the blackboard is ready to recite. If there are more than seven members in the section, practical problems pertaining to the lesson or to some previous part of the course are given them, which they are required to work out at their seats, being furnished with pencil and paper for that purpose. These problems are folded and indorsed with the name of the cadet and his section and turned in to the instructor, by whom they are corrected and returned to the cadet at the next recitation.

The cadets at the blackboard write first their name in the upper right-hand corner, and also the number of the subject assigned them. They also write any mathematical formulas which may be given them to aid in their discussion and make such notes as may assist them in reciting. When prepared for recitation, the cadet takes his pointer in his right hand and faces the instructor. The instructor then calls him by name, upon which the cadet begins his recitation by stating "I am required to discuss the subject of ———." He then proceeds with his discussion. Any errors which he may make are noted by the instructor, and if they are not very grave he is allowed to proceed. Grave errors, however, which vitiate the reasoning or impair the clearness of the discussion are corrected at once. At the conclusion of the recitation the instructor calls the attention of the cadet to the errors he may have committed,

questions him upon the subject generally to bring out any points in which the knowledge of the cadet may have appeared defective, and endeavors to impress upon him the general principles underlying the subject and their connection with principles previously taught.

In the meantime those cadets who have prepared for recitation take their seats and attend to the recitation and the explanation going on.

As each cadet finishes his recitation, the next in order is called by name by the instructor, takes his place at the blackboard, and proceeds as explained above. In some cases a cadet who has had a subject assigned to him will state that he is unable to discuss the subject. In this case the reason is generally that he has mistaken the lesson or has had other duty such that he was unable to study that particular part of the lesson. In such case a second subject is given him, and his mark for the recitation divided by 2, as it is impossible to admit excuses of this kind without injustice to other members of the section who may have been equally circumstanced and who have prepared their lessons.

All recitations and problems are marked on the following scale: Thorough, 3; good, 2.5; indifferent, 2; bad, 1.5; very imperfect, 1; complete failure, 0. By using the various gradations of this scale the instructor is enabled to express very accurately the value of the cadet's performance in the section room.

At the end of each week the names of each section are written on a blank form prepared for the purpose, and opposite each name is written the mark made by the cadet at each recitation during the week. The maximum for the week is the greatest possible total that could be made by the cadet who has recited most frequently. For instance, if the section recites three times a week the maximum possible for any cadet is 9. This, then, is the maximum for the week, and if a cadet has recited three times, his maximum is the sum of his marks, as, for instance, $2.3+2.8+2=7.1$, maximum, while if he has recited twice and his marks are 2.4, 2.8, his maximum will be the average of these two marks multiplied by 3, or $2.6 \times 3=7.8$, maximum, and similarly for one recitation.

The marks thus written out for each section are transmitted by each instructor to the head of the department and by him handed to the Superintendent in person, when he makes any remarks or explanations upon the progress of the individual cadet for the week. The progress of the class is also noted on the report, as "from page — to page —," giving the name of the text-book, and whether it is advance, review, or general review.

The class reports above explained, after being handed to the Superintendent, are conspicuously posted in the halls of the academy building, where they are accessible to all the cadets. Any cadet who thinks his instructor may have erred in his mark upon any particular recitation has the privilege of requesting permission to speak about it, and to explain fully to the instructor his reasons for thinking the mark erroneous. If it appears to the instructor that his reasons are sound, the mark, with the consent of the head of the department and the permission of the Superintendent, is changed.

At the end of each week the total mark of each cadet is entered in a column opposite his name, and these marks are arranged in each section in the order of magnitude. Whenever the difference between the lowest man in an upper section and the highest man in the next lower section exceeds 1.5, a transfer is made of the cadet from the lower to the higher section, and vice versa. By this means the class is always arranged according to their marks.

The head of the department alternates in visiting sections. He endeavors to hear each section at least once a week, and more frequently if possible. The object of his visits is to become thoroughly acquainted with the cadets, and their methods of recitation, and mental habits; also to note the methods of the instructors, and to make such corrections or suggestions to them as may establish as nearly as possible a uniform method of instruction throughout the department.

To further this end the sections change their instructors every two weeks. This enables any inequality in the method of marking to be eliminated, and the sections also alternate every two weeks in hours of attendance, so that each cadet may have as far as possible the same advantages and disadvantages in this respect.

In studying the subject of ordnance and gunnery there are necessarily many objects described which are complicated and difficult to understand thoroughly without the use of models and drawings. Hence the department has endeavored to procure models of all the different machines, guns, carriages, etc., referred to in the text. These are kept in the section rooms during recitation upon the particular subject to which they refer, and the recitation is made from them.

Drawings of all the more difficult and complicated parts of the different objects are also prepared beforehand, and are used in the recitations.

After six advance lessons have been studied they are reviewed in three lessons, and at the end of each six months' course in December and May, the whole of the previous course is reviewed generally.

The examinations have so far been oral, owing to changing text-books and lack of facilities during the erection of the new academic building, but it is believed in future that at least one of the examinations should be written, and that frequent written recitations should be held during the course. The oral examinations are conducted in the presence of a committee of the academic board, and do not differ from an ordinary recitation in the section room. If a cadet fails upon the subject assigned him, or fails to establish his proficiency to the satisfaction of the committee, he is given a second subject, and his examination is continued until his proficiency or deficiency is established. In case he is proficient after such first failure, his standing is determined by the mark given him upon his first subject. In case he fails to establish his proficiency he is subjected to a written examination, the questions for which are approved by the committee. The result of this written examination fixes his proficiency or deficiency, and is reported to the academic board.

The oral examination has the weight of three recitations, or 9, and the final standing of the cadet is determined as follows: The sum of all the marks made by each cadet before general review is determined. To this is added the sum of the general review marks multiplied by two.

In the department of ordnance and gunnery, owing to the alteration of hours and of instructors as previously explained, and also to the fact that the whole class takes the same course, the cadets are arranged according to their total marks as given above, and this determines their standing before examination.

After examination, the mark made by each, multiplied by three, is added to his previous total before examination, and the cadets are then arranged according to this grand total, which fixes the standing after examination. This process is followed in January and June. For any cadet, the sum of his standing in January and June, properly weighted, gives his final standing.

In reviewing the present course in ordnance and gunnery and comparing it with former courses, it is thought that the following points have been kept in view:

1. It has been simplified. The mathematical parts of the course, though necessarily more extensive than formerly, have been worked out more in detail. Every equation is deduced plainly and nothing left to puzzle the student. Furthermore, as a general rule all the equations introduced have some direct practical use and bearing upon ordnance, and this use and bearing are pointed out.

In the recitations no memorizing of equations or of mathematical steps is required. Every equation which is to be used in a given discussion is printed with the subject which is given to the cadet, and in case equations are to be deduced from those given, the various steps in the process are given in the form of a synopsis, unless these steps are perfectly obvious. The reason for this is that the object of the course is to teach ordnance and not mathematics, and in order that all the time may be given to understanding and applying the principles taught. With the description of guns, carriages, small arms, etc., the object has been to confine the description to few objects and to make the description of each thorough and general, the idea being that it is more advantageous to understand one carriage or one gun thoroughly than to have a vague idea of many. The descriptions are illustrated by copious drawings and by models, so that there is no difficulty in thoroughly understanding what is taught.

2. It has been extended to cover generally the whole ordnance field. This statement may be regarded as somewhat rash, seeing that the ordnance field covers so much at the present day, but it is safe to assert that after going over the present course there is very little on the subject of ordnance that the graduate would feel ignorant of. Many subjects have been treated to a very limited extent, but the general principles of each have been given, and it is believed there is enough of each to build upon. Care has been taken that nothing shall be taught which must be unlearned, and especial attention has been given to our own systems. But as a general rule principles are taught rather than details, wherever possible, and in describing details the reasons for them and the principles on which they depend are pointed out.

3. The instruction is at present more thorough than formerly. This is entirely owing to the fact that the department has at present, and has had for some years, two instructors instead of one. This enables the head of the department to watch the instructors constantly, to criticise and correct defects wherever they may occur, and to assist in the instruction wherever he may deem it necessary. It virtually gives three instructors instead of two, with greatly increased efficiency.

When the class is small the sections are small, and the instruction all that could be asked. With large classes the sections become large, and the thoroughness necessarily diminishes, owing to lack of time to be given to each cadet. But the advantage of two assistants over one is maintained for all classes.

It is difficult to compare the instruction in this department with that in any other institution, as there is really no corresponding department in any other institution. The department of ordnance and gunnery at the Naval Academy is the nearest

approach to it, and that, it is understood, includes both the scientific instruction in ordnance and gunnery and practical instruction. In other words, it corresponds more nearly to the old department of artillery here. So far as the scientific part of the course goes, an examination of the text-books in use at the Naval Academy indicates that the two courses are very nearly alike. In general the same subjects are taught, and to the same extent at both places, with the exception that field artillery and small arms are taught at the Military Academy in the place of torpedoes and some other subjects exclusively naval at the latter academy.

In conclusion it may be said that the object of the course in ordnance and gunnery, like that of other courses at the Academy, is to teach general principles and their application in this country to our service, so that the cadet upon graduation will be enabled to take his place as an officer, with the practical knowledge which an officer should possess of the weapons he is called upon to handle, and beyond this, with a broad foundation upon which future knowledge of the subject may rest.

O.

UNITED STATES MILITARY ACADEMY,
West Point, N. Y., August 31, 1896.

SIR: I have the honor to submit the following report in accordance with the provisions of Circular No. 35, Headquarters United States Military Academy, West Point, N. Y., August 3, 1896:

The growth of the library during the year ending August 31, 1896, is shown in the following statement:

Number of volumes in library September 1, 1895		38,203
Number of volumes purchased up to August 31, 1896		630
Number of volumes presented to the library up to August 31, 1896		779
Making a total of		39,612
Returned to the War Records Office, by direction of the War Department, duplicates in excess of two copies of the Records of the Rebellion	347	
Transferred one complete set to the department of engineering	99	
Transferred to philosophical department duplicate philosophical works	9	
Transferred to Mr. John S. Pierson, in exchange	16	
Total loss		471
Total volumes in library September 1, 1896		39,141

Of the 779 volumes donated to the library during the year, Mr. John S. Pierson, of New York, presented 169 volumes, which related mainly to the war of the rebellion. He also contributed 34 pamphlets of the same class of literature.

There have been added to the library during the year 218 pamphlets, which make a total of 6,132 pamphlets at present in the library. The card cataloguing of the books and pamphlets of the library has been continued, and at present the most important branches of literature have been completed.

I most earnestly urge that application be made for an increased compensation to the assistant librarian, Dr. Otto Plate, so that he may receive $1,500 per annum. His services and ability are such that this compensation is the least that should be given him, and his value to the Military Academy is much beyond that which he receives at present. His predecessor, who was not a man of culture or training in the conduct of a library, received for many years over $1,400 per annum, and it is certain that Dr. Plate is entitled to at least the same compensation.

The library building is in exceedingly bad repair, but it is hoped that provision will be made at the next session of Congress to renovate it in accordance with the plans which have been prepared by the architect.

Very respectfully, your obedient servant,

P. S. MICHIE,
Professor, U. S. M. A., Librarian.

The ADJUTANT UNITED STATES MILITARY ACADEMY.

P.

UNITED STATES MILITARY ACADEMY,
SURGEON'S OFFICE, CADET HOSPITAL,
West Point, N. Y., August 31, 1896.

SIR: In compliance with the requirements of Circular No. 35, dated United States Military Academy, August 3, 1896, I have respectfully to submit the following statement of the work done in the medical department of the post of West Point, N. Y., during the fiscal year ending June 30, 1896.

The mean strength of the command for the year is shown in the following table:

Officers	50.83
Cadets	296.77
Enlisted men	330.78
Civilians—officers' families, etc	300
Civilians—soldiers' and employees' families	481.60

The number of sick treated during the year was as follows:

Officers	35
Cadets in hospital	1,011
Cadets in quarters	3,504
Enlisted men treated in hospital and quarters	488
Civilians and officers' families who have received treatment from the cadet hospital	3,209
Civilians and soldiers' families who have received treatment from the soldiers' hospital	1,416
Number of recruits examined	117
Accepted	81
Rejected	36
Births	23
Discharged for disability	4

The number of deaths was as follows:

Officers	2
Cadet	1
Enlisted men	0
Civilians	2

One officer, not included in this statement, died at Fort Monroe, Va., while absent on sick leave.

Besides the cases of sickness in the above statement, there were many others of minor importance which do not appear of record except in the form of a prescription entry in one of the dispensaries of the post.

The health of the garrison during the past year must be regarded as unsatisfactory, whether the number of admissions to the sick report be considered, the number constantly sick, or the number of deaths, as the rates which represent these are higher than those of the previous year and the corresponding rates for the previous decade.

The principal causes of admission were malarial diseases, ephemeral fever, epidemic influenza, acute pharyngitis, acute tonsilitis, and injuries, the larger proportion of which consisted of contusions and sprains.

One case of typhoid fever was admitted to the cadet hospital for treatment.

During the winter months measles prevailed as an epidemic among the civilians residing at the post. This disease was almost immediately followed in the spring by an epidemic of whooping cough, which also affected the same class of patients. Fortunately there was no extension of either of these diseases to the members of the Corps of Cadets.

The epidemic of malarial fever, which has added such a large percentage to the sick rate of the post for the year, began in July, 1895, increased in severity and numbers in August and September, and declined in November. During the winter months the post was free from this disease. In December, March, and April a large number of cases were admitted to the sick report suffering from ephemeral fever. In January and February the majority of admissions were due to epidemic influenza.

The ephemeral fever of the spring months yielded to malarial fever in April, when this disease again became epidemic, continuing as such to this date.

The management of these epidemics did not interfere with the ordinary routine work of the medical department of the post.

There has been no change during the year in the personnel of the medical officers on duty at West Point.

Very respectfully,

GEO. H. TORNEY,
Major and Surgeon, U. S. A.

The ADJUTANT UNITED STATES MILITARY ACADEMY.

Q.

HEADQUARTERS UNITED STATES MILITARY ACADEMY,
OFFICE TREASURER, QUARTERMASTER AND COMMISSARY OF CADETS,
West Point, N. Y., August 10, 1896.

SIR: I have the honor to submit the following relative to my duties as treasurer of the United States Military Academy, quartermaster and commissary of cadets, for the fiscal year ending June 30, 1896, referring to each duty under its heading, viz:

TREASURER OF THE UNITED STATES MILITARY ACADEMY.

The business of the treasurer's office during the year necessitated the keeping of 28 separate accounts, which were settled and inspected every two months, and which are enumerated in Statement No. 2 of this paper. The following statement, No. 1, was the last one made in this office prior to the expiration of the fiscal year 1894–95, and shows the treasurer's assets and liabilities at date when made, viz, May 21, 1895:

ASSETS.		LIABILITIES.	
Assistant treasurer United States	$32,130.83	Athletic Association	$226.93
Cadet cash	19.50	Cadet hospital	232.66
Dentist	115.00	Cadet laundry	1,749.10
Bonds	20,000.00	Cadet quartermaster's department	10,885.93
Cash on hand	1,176.94	Cadet subsistence department	355.15
		Corps of Cadets	8,618.05
		Deposits	100.00
		Equipment fund	31,040.00
		Y. M. C. A	50.49
		Dialectic Society	149.92
		Miscellaneous fund	33.74
Total	53,441.97	Total	53,441.97

The following statement, No. 2, enumerates the 28 separate accounts, exhibits the total receipts and disbursements under each between date of Statement No. 1, above given, and Statement No. 3, that of date May 21, 1896, the last one made prior to the end of the fiscal year 1895–96, and shows fully the financial work of the office, viz:

No.	Designation.	Receipts.	Disbursements.
1	Assistant treasurer	$167,335.38	$169,750.92
2	Athletic Association	1,355.50	1,488.86
3	Balances paid	17,543.18	17,543.18
4	Barber	600.30	600.30
5	Cadet cash	10,168.08	10,156.08
6	Cadet hospital	2,282.07	2,514.73
7	Cadet laundry	10,270.95	10,763.03
8	Cadet quartermaster's department	71,744.08	73,735.29
9	Cadet subsistence department	61,694.83	61,269.01
10	Confectioner	136.00	136.00
11	Corps of Cadets	194,509.65	193,126.27
12	Damages, ordnance	11.58	11.58
13	Dancing	526.22	526.22
14	Dentist	840.00	855.00
15	Deposits	16,872.20	16,872.20
16	Y. M. C. A	114.00	152.94
17	Equipment fund	14,432.00	11,500.00
18	Dialectic Society	483.71	469.74
19	Expressage	37.30	37.30
20	Gas	1,054.56	1,266.86
21	Hops and german	1,443.77	1,443.77
22	Miscellaneous funds	23.27	76.32
23	Miscellaneous items	857.91	857.91
24	Oaths	53.50	53.50
25	Paymaster	169,756.92	169,756.92
26	Periodicals	8.15	8.15
27	Photographer	90.00	90.00
28	Policing barracks	5,592.41	5,592.41

The foregoing disbursements under accounts 2, 4, 6, 7, 8, 9, 10, 12, 13, 14, 16, 18, 19, 20, 21, 23, 24, 26, 27, and 28 exhibit the purposes for which the pay of the cadets is expended for their support, and the total amount expended under each account during the year.

The following statement, No. 3, dated May 21, 1896, was the last one made during the fiscal year ending June 30 last, and exhibits the assets and liabilities of the treasurer, Military Academy, at the date given, viz:

ASSETS.		LIABILITIES.	
Assistant treasurer	$34,546.37	Athletic Association	$93.57
Cadet cash	7.50	Cadet laundry	1,257.02
Dentist	130.00	Cadet quartermaster's department	8,894.72
Miscellaneous fund	19.31	Cadet subsistence department	780.97
Bonds	20,000.00	Corps of Cadets	10,001.43
Cash on hand	784.37	Deposits	100.00
		Y. M. C. A	11.55
		Equipment fund	33,972.00
		Dialectic Society	163.99
		Gas fund	212.30
Total	55,487.55	Total	55,487.55

The graduates of this year, 73 members, received on final settlement of their accounts $17,731.63, an average per man of $227.83.

Sixty-nine furlough men received $7,668, an average of $111.13.

The 109 new cadets who entered this year deposited $10,256.29, an average per man of $94.09.

The expense to the Corps of Cadets on account of the cadet hospital for the year ending April 30, 1896, was $2,514.73, an annual cost to each cadet of $7.21, or an average monthly cost of 60.8 cents per man.

CADET QUARTERMASTER'S DEPARTMENT.

The following exhibits the work of the department in reference to the manufacture and repair of clothing, viz:

Articles.	Number manufactured.	Number repaired.	Articles.	Number manufactured.	Number repaired.
Dress coats	304	333	Officers' dress coats	1	.....
Overcoats	158	283	Officers' capes	4	11
Fatigue coats	496	704	Trousers, civilian	4	169
White jackets	214	49	Coats, civilian	3	169
Gray trousers	504	943	Vests, civilian	3	169
White trousers	924	1,310	Waiter jackets	34	40
Flannel trousers	112	.....	Socks, pairs of	.....	2,835
Riding trousers	67	.....	Gloves, pairs of	.....	153
Officers' trousers	63	.....	Crape, pieces of, sewed on	.....	656
Officers' blouses	43	.....	Shoes, pairs of	.....	1,986

CADET SUBSISTENCE DEPARTMENT.

Prior to November 1, 1887, the cost of subsistence of cadets in the cadets' mess included the cost of cadets sick in hospital. Since that date the two accounts have been kept separate, the cost of the subsistence of sick cadets, after the accounts of the surgeon have been audited by the board of inspectors of supplies and have been approved by the Superintendent, being paid by the treasurer of the Academy, who divides the expense each settlement, pro rata, against all cadets on the rolls of the Academy, whether they are present or absent. The following exhibits the annual and daily cost of subsistence per cadet of subsisting cadets in both mess and hospital for the period July 1, 1870, to June 30, 1887, the end of the last fiscal year prior to the commencement of keeping the two accounts separately, a period of seventeen years, viz:

Fiscal year.	Annual cost per cadet, mess and hospital.	Average daily cost per cadet, 365 days.	Fiscal year.	Annual cost per cadet, mess and hospital.	Average daily cost per cadet, 365 days.
1870–71	$243.81	$0.668+	1879–80	$183.50	$0.503—
1871–72	227.00	.622—	1880–81	188.50	.516+
1872–73	238.30	.653—	1881–82	215.00	.589+
1873–74	270.40	.741—	1882–83	215.00	.589+
1874–75	248.00	.680	1883–84	210.00	.575+
1875–76	233.00	.638+	1884–85	196.00	.537—
1876–77	199.00	.545+	1885–86	192.00	.526+
1877–78	195.50	.535+	1886–87	197.00	.539+
1878–79	182.00	.499—			

The following shows the annual and daily cost of subsistence in both mess and hospital for the fiscal year 1887-88, during the first four months of which the hospital expenses were merged with the mess expenses, and for the last eight months of the year were separate, viz: Annual charge, $195.96; average daily charge, 53.7 cents.

The following exhibits separately the annual charge per cadet for subsistence in the cadet mess, the annual charge against each cadet in the corps for the subsistence of sick cadets in the hospital, the totals of both, and the average daily charge per cadet for both for the period, fiscal years 1888–89 to 1895–96, inclusive, a period of eight years, viz:

Fiscal year.	Annual charge, mess.	Annual charge, hospital.	Total charge.	Average daily charge.
1888–89	$192.06	$5.25	$197.31	$0.540+
1889–90	190.30	9.54	199.84	.547+
1890–91	183.35	8.39	191.74	.525+
1891–92	181.03	7.34	188.37	.516+
1892–93	190.70	7.24	197.94	.542+
1893–94	189.30	7.79	197.09	.539+
1894–95	184.40	8.63	192.93	.528+
1895–96	186.50	7.57	194.07	.531+

From the foregoing the following facts of interest are evident:

During the twenty-six years last past the highest charge for subsistence, including cost of sick cadets in hospital, was, per cadet per day, 68 cents. The lowest similar charge was 49.9 cents. The average similar charge was 56.8 cents. The average similar charge for the last eight years prior to July 1, 1887, was 54.6 cents. The average similar charge for the last past eight years was 53.2 cents.

The variation in the annual cost of subsistence in the cadet mess from year to year is due chiefly to the variation in the number of cadets present and in the variations of the cost of provisions.

A Pasteur-Chamberland filter of 40-tube power has been placed in the mess, and so connected that an abundant supply of filtered water, chilled, is furnished at each meal.

The variety, quality, and character of food supplied is essentially the same as that heretofore furnished, with the exception of milk, which article, for sanitary reasons, has been discontinued as a potable article of diet. Coffee, chocolate, and water are furnished at breakfast; water at dinner; coffee, tea, and water at supper, with boiled milk for the coffee and tea.

CADET LAUNDRY.

The following exhibits the work done at the laundry during the year for individuals, viz:

Bathing suits	34	Jackets, white	1,947
Belts, shoulder	17,723	Pillowcases	13,189
Belts, sword	2,550	Sheets	21,936
Belts, waist	20,597	Shirts, white	26,993
Blankets, single	276	Shirts, night	11,848
Clothes bags	2,627	Shirts, under	34,263
Collars	97,939	Socks, pairs of	39,315
Comfortables	107	Towels	64,922
Cuffs, pairs of	64,039	Trousers, gray	153
Drawers	34,170	Trousers, white	31,360
Fatigue coats	30		
Gloves, pairs of	32,442	Total	582,728
Handkerchiefs	64,268		

During the same period there was laundried for the cadet hospital—

Bandages	6	Sheets	2,956
Bedspreads	320	Shirts, hospital	30
Blankets, single	1	Tablecloths	257
Mattress covers	13	Towels	3,363
Napkins	1,484		
Pillowcases	2,243	Total	10,673

The five washers now in the laundry are brass, of the latest and most improved pattern, and an effort is being made to produce first-class work.

Very respectfully, your obedient servant,

WM. F. SPURGIN,
Captain, Twenty-first Infantry, Treasurer U. S. M. A., Quartermaster and Commissary of Cadets.

The ADJUTANT UNITED STATES MILITARY ACADEMY.

R.

WEST POINT, N. Y., *August 18, 1896.*

SIR: In accordance with instructions I have the honor to submit the following report of the principal operations in the department of ordnance and gunnery at the United States Military Academy during the fiscal year ending June 30, 1896:

LABORATORY.

The routine work at the laboratory includes the care and preservation of two light batteries, the seacoast battery, and battery Knox, and the siege and mortar batteries. The guns and carriages belonging to these batteries have been painted, lacquered, and kept in repair during the year. It has been found necessary to dismount the mechanism of the 8-inch steel B. L. rifle and the 12-inch mortar, as they were constantly interfered with by unauthorized persons. The rapid-fire and machine guns have been placed in the ordnance museum, where they can be exhibited and used for cadet instruction, and where they can be kept in better condition.

The ammunition for gallery practice and the necessary targets for cadet practice have been prepared and attendance upon the same furnished, and also the care and repairs of the implements used in mechanical maneuvers, repairs of cadet arms and equipments, and the care and preservation of the trophy guns have received due attention. The skidding of guns on Trophy Point will be continued.

A model lathe one-fourth size has been made for use in cadet instruction and for exhibition in the museum. The cuts for the text-book of ordnance and gunnery have been completed, and the book has been published and is now ready for use by the present first class. Pamphlets containing lists of subjects and practical problems for the course and also the lessons for the entire year have been prepared and published.

Considerable work has been done upon the new museum in fitting up the various models, and all the varnishing of the woodwork has been done by the members of the ordnance detachment.

MUSEUM.

The models, flags, etc., belonging to the museum have been arranged during the year in proper cases and upon stands and the room opened to the public. This has been the principal work of the year. The models had been stored for nearly four years in various places, and it was impossible to have access to them for the purpose of cleaning them. It was found, consequently, that many of them were in bad condition, and they have all been thoroughly overhauled, cleaned, and placed in proper condition. Four handsome cases of plate glass contain most of the battle and trophy flags, hermetically sealed and numbered, and the remaining trophy flags will be placed in a large case of sufficient length to contain them. All models have been mounted on oak stands provided with friction rollers, and they can be moved readily and used for purposes of instruction. The model Mexican mine has been thoroughly repaired and placed in proper condition. The work in the museum is still incomplete and has been suspended during the summer. It is the intention to continue the work during the fall and winter.

SMALL ARMS, ETC., RECEIVED.

During the year the following additions to the small arms have been received: One Spanish Mauser rifle, caliber .276; one cadet rifle, caliber .45; one cadet rifle, caliber .30; one carbine, service, model 1895, caliber .30; one rifle, service, model 1895, caliber .30; two rifles, service, model 1893, caliber .30.

These are used in cadet instruction and also for exhibition in the museum.

The ordnance department has also furnished one Gatling gun, caliber .30, model 1895; one carriage and limber for same; one 8-inch steel armor-piercing shot.

MODELS.

The following models have been received during the year: One 5-inch siege carriage, one-tenth size; one 7-inch siege howitzer carriage, one-tenth size; one 8-inch Buffington-Crozier disappearing carriage, one-tenth size.

These models are exact reproductions of the service carriages, and are very useful in cadet instruction. Work is in progress upon other models, and at the conclusion of the present year the department will have a working model of every service gun and carriage.

There have also been received from the Ordnance Department a number of sample boards containing fuses and primers, a number of samples of shrapnel, showing their manufacture, and from Messrs. E. I. Du Pont De Nemours & Co., of Wilmington,

Del., a handsome case containing samples of the different kinds of gunpowder and smokeless powder manufactured by them. This case was presented to the department through the kindness of the above firm.

Very respectfully, your obedient servant,

LAWRENCE L. BRUFF,
Captain, Ordnance Department, U. S. A., Instructor Ordnance and Gunnery.

The ADJUTANT UNITED STATES MILITARY ACADEMY.

S.

WEST POINT, N. Y., *September 7, 1896.*

SIR: I have the honor to report as follows upon the different branches of work assigned to me for the year from September 1, 1895, to August 31, 1896:

PRACTICAL MILITARY ENGINEERING.

During October, 1895, and April, 1896, the classes of 1896 and 1897 were under instruction, and during July and August, 1896, the classes of 1897 and 1899.

The class of 1896 received instruction in bridge by successive pontoons, fascine, hurdle, hoop-iron gabion, brush gabion, gabion revetment, sand-bag revetment, barrel revetment, wire entanglement, simple trench (one-sixth scale), simple trench (full scale), flying trench (one-sixth scale), flying trench (full scale), shelter trenches (various types), Russian gun pit, full sap, making palisading, planting vertical palisading, planting inclined palisading, planting fraises in scarp, planting fraises in counterscarp, gun platform, mortar platform, signaling with telegraph, explaining model bridge train, use of reconnoissance instruments, mounted reconnoissance.

The class of 1897 received instruction in school of the boat, making knots and lashings, bridge by successive pontoons, assembling and launching canvas pontoons, trestle bridge on land, single lock spar bridge, double lock spar bridge, single sling spar bridge, fascine, hurdle, hoop-iron gabion, brush gabion, gabion revetment, sand-bag revetment, barrel revetment, wire entanglement, simple trench (one-sixth scale), simple trench (full scale), flying trench (one-sixth scale), flying trench (full scale), shelter trenches (various types), Russian gun pit, single full sap (one-sixth scale), double full sap (one-sixth scale), epaulement for breech-loading gun (one-sixth scale), making palisading, planting vertical palisading, planting inclined palisading, planting fraises in scarp, planting fraises in counterscarp, gun platform, mortar platform, profiling, defilading, signaling with flag, signaling with heliograph, signaling with telegraph, and use of explosives.

One member of the class of 1898 attended instruction with the class of 1897 during part of last July.

The class of 1899 received instruction in school of the boat, bridge by successive pontoons, assembling and launching canvas pontoons, trestle bridge on land, fascine, hurdle, hoop-iron gabion, brush gabion, fascine revetment, gabion revetment, wire entanglement, signaling with flag (sending and receiving), and use of explosives.

COMPANY E, BATTALION OF ENGINEERS.

This company has furnished throughout the year a daily guard detail of from ten to twelve men; has kept its barrack and barrack ground in repair and police; cultivated its garden; kept the two pontoon trains and the cadet boats in repair; completed two new pontoon boats, and has kept the seacoast, siege, and mortar batteries, with Fort Clinton and Battery Knox, in order. It has assisted in the instruction of the cadets in practical military engineering, preparing the bridge and siege material. In connection with the extension of the waterworks, it has also furnished field parties for the survey and construction, and from one to three noncommissioned officers at a time as overseers of working parties. It has also furnished from two to three teachers for the post school for soldiers' children, and a like number for the post school for enlisted men.

The company is now eight below its allotted strength. Four desertions occurred during the year, the company in each case being the gainer. The physical condition of the men has continued excellent, and the discipline of the company good.

Attention is invited to the accompanying table, which contains a résumé of the company's duties by months.

WATER SUPPLY AND PIPE LINE.

The summer of 1895 was a rather favorable one for the water supply, but on account of a dry September the level of Round Pond was reduced to 7.45 feet by October 22,

the last day of drawing for 1895. Last spring this pond failed to fill by 1.6 feet, an unfortunate feature, accentuated by dry weather in April and May, which resulted in drawing upon the pond at the unusually early date of May 25. The drought has since continued with practically no intermission, until the stage of about 9 feet was recorded on August 31, ultimo. The stage on the corresponding day last year was 14.5 feet, and as low a stage for that day has not been recorded since 1886.

The consumption of water has apparently increased since the inauguration of the new swimming pool and the new cadet bathrooms. The attendant at the filter house is positive that the increase is considerable. An opportunity to test the matter arose during the latter part of August, when the siphon from Round Pond was temporarily out of service. During six days Delafield Pond lost water at an average rate of 417,000 United States gallons daily, the greatest loss being nearly 436,000 gallons on the day ending at 5 p. m., August 24 (Monday). A small percentage of this loss is possibly due to leakage, which it is impracticable to recover, but the fact remains that the daily consumption or loss of water at this post is much greater than it should be, and to meet it without inconvenience the new reservoir must be made to hold the greatest practicable volume.

The deficiency of rainfall during last July and August, coupled with the failure of Round Pond to fill last winter and spring, may possibly require a closer restriction than usual of the daily consumption, until the brooks begin to run their customary fall volume.

The pipe line has fulfilled all demands upon it without trouble, except in a recent instance, when temporary repairs were required in the siphon at Round Pond. In this portion of the line several joints have been distorted, apparently by the action of ice upon the cribs last winter. Further repairs will be needed as soon as the siphon can be put out of service for the purpose of making them.

NEW RESERVOIR.

Work on the north dam was suspended for the winter on December 14, 1895, the core wall having been carried up to the level of the temporary roadway (about 318 M. L. W.). The 6-inch pipe connection had previously been completed between the new reservoir and the Round Pond pipe line, intersecting the Delafield pond-filter house and Cro' Nest pond-filter house pipe lines en route. This new pipe line is laid through the core wall of the north dam at about the elevation of 309 M. L. W. At the same elevation four lengths of 12-inch pipe are laid, also piercing the core wall, and allowing a future connection of larger size to be made between the new reservoir and the Cro' Nest ridge without breaking through the core wall. I believe that the said larger connection will undoubtedly be necessary in the near future.

Work on the main dam was suspended on December 28, 1895, the body of the structure having been completed and somewhat more than half the coping set. Stonecutting was suspended for the winter on January 8, 1896, but was again renewed on April 20 following, and completed about June 6, 1896. The north and south faces of this dam were thoroughly cleaned and pointed during May, June, and July, 1896. The work yet to be done upon this structure includes parapet walls, the paving of the carriageway on top, the building of the overflow and spillway, and the road connections at the ends.

During last March and April the water in the new reservoir rose to the elevation of about 317 M. L. W., fairly testing the tightness of the main dam, which was then in an unpointed state. The structure appeared to be entirely free from leaks.

REMOVAL OF SOIL AND PEAT.

Under the appropriation for this purpose work was commenced by day labor July 1, ultimo, and on August 31 about one-third of the entire marsh had been stripped of the objectionable material. The commencement of this work was expensive, a deep drainage ditch having to be driven through a deposit of bowlders, and plank roads having to be provided to support the teams and vehicles used in hauling. The work is now proceeding at a fairly satisfactory rate, and it is hoped to have the reservoir in condition for storing water by December 1 next.

FILTERS.

My last annual estimates included an item of $35,000 for covered filter beds, of capacity sufficient to filter the entire consumption at any season of the year.

This item did not reach Congress, and thus no appropriation was made. The item was not presented by me until several years' study and observation had satisfied me that thorough filtration was necessary. During the summer just closed an examination into the sanitary condition of the water supply by Maj. Charles Smart, Medical

Department, United States Army, resulted in a strong recommendation of filtration upon the lines previously covered by the estimates and recommendations above referred to. This item will appear in my estimates for the coming fiscal year.

NEW SUPPLY MAIN.

No appropriation was made for this work by Congress at its last session. The estimate will be renewed this fall.

MEMORIAL HALL.

The supervision of certain features of the work on this structure was committed to me last April. The work progressed rapidly until about August 1, since which time there has been some delay, apparently without sufficient justification.

The character of the work done seems to be entirely satisfactory.

Very respectfully, your obedient servant,

JAS. L. LUSK,
Captain, Corps of Engineers, Instructor Practical Military Engineering.

The ADJUTANT UNITED STATES MILITARY ACADEMY.

	1895.				1896.							
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
Average strength of company	88	87	89	91	94	96	96	93	92	91	92	92
Average strength of guard detail	12	12	12	12	12	12	12	12	12	12	12	12
Fatigue days	25	27	26	26	27	25	26	26	25	26	27	27
Infantry drills	2	10	3	4	4	4	4	4	14	2	13	6
Signal drills	1	10	3	4	4	4	4	3	1	2	14	5
Engineering drills	2	9	3	5	5	4	5	3	1	4	6	7
Gymnasium drills	0	6	5	9	9	8	9	7	1	3	0	0
Average attendance at drills	38	35	33	38	36	43	44	37	43	42	36	34
Target practice, days	12	0	0	0	0	0	0	0	0	0	0	0
School days	0	0	18	21	20	20	22	0	0	0	0	0
Average attendance at school	0	0	17	21	18	20	19	0	0	0	0	0

T.

QUARTERMASTER'S OFFICE, U. S. MILITARY ACADEMY,
West Point, N. Y., August 31, 1896.

SIR: I have the honor to submit herewith the following report of the operations of the quartermaster's department at West Point, N. Y., for the fiscal year ending June 30, 1896, prepared in accordance with instructions from your office, dated August 3, 1896:

QUARTERMASTER'S DEPARTMENT, UNITED STATES ARMY.

The duties pertaining to this department are enumerated in paragraph 972, Army Regulations, 1895. The amounts received, disbursed, etc., under the various heads of appropriation are shown in accompanying statement, marked A.

The following contracts for furnishing fuel, forage, and straw were entered into and were satisfactorily fulfilled:

Clark & Wilkins: 200 cords hard wood, 20 cords soft wood.

Dickson & Eddy: 600 tons egg coal, 1,100 tons stove coal, 300 tons chestnut coal.

William E. Dante: 600,000 pounds oats.

John Moonan: 20,000 pounds middlings, 40,000 pounds bran, 400 tons hay.

Charles L. Rickerson: 95 tons straw.

William McMeekin: Flagstaff.

It is imperative that the number of quartermaster's animals at this post be increased by at least six. In connection with this I desire to call attention to the increased demands on the transportation by the increased size of the post, and the corresponding increase of work and special attention to the increased work on the transportation during nearly four months of the busiest season by the use of the range at this post by troops from the harbor. No allowance whatsoever has been made for the necessary work which must be done for these troops in hauling their property, camp and range equipage.

QUARTERMASTER'S DEPARTMENT OF THE UNITED STATES MILITARY ACADEMY.

My duties in this branch are defined in paragraph 15 of the United States Military Academy Regulations, 1894.

Contracts entered into during the year and made in previous years and remaining in force in the fiscal year to which this report relates were as follows:

No.	Contractor.	Date.	Purpose.
1	Thomas J. Gilroy	June 26, 1894	Unmarried officers' quarters.
2	John Fox	May 21, 1895	8-inch gas pipe.
3	Davis, Reed & Alexander	May 25, 1895	Tile floor, cadet mess.
4	Warren Foundry and Machine Co	June 11, 1895	6-inch water pipe.
5	Westmoreland Coal Co	June 27, 1895	1,700 tons gas coal.
6	Dickson & Eddy	June 28, 1895	4,600 tons coal.
7	Warren Foundry and Machine Co	July 23, 1895	12-inch water pipe.
8	Empire Paving and Construction Co	Sept. 23, 1895	Granolithic pavement.
9	The Mason & Risch Vocalion Co	Sept. 7, 1895	Organ for chapel.
10	Probst Construction Co	Jan. 22, 1896	Memorial Hall.

The contract with Thomas J. Gilroy, deceased, for unmarried officers' quarters has been closed, final payment having been made to the administrators by the Treasury Department.

The following buildings have been repaired, either by special appropriation therefor or from the appropriation for repairs and improvements: Cadet mess building, cadet laundry, cadet quartermaster's department, gymnasium, cadet guardhouse, cadet barracks, cadet hospital, soldiers' hospital, band barracks, quartermaster's stable and barn, Company E, engineer barracks. The barracks of army service detachment was completed sufficient for occupancy about April 1, 1896. Some minor details of work on outside of building remain to be completed with the appropriation available for fiscal year ending June 30, 1897. All officers' quarters given such repairs as were necessary, new organ placed in the chapel, granolithic pavement laid around the new Academy building, and the roads in that vicinity regraded and macadamized. The picket line at the cavalry stables was also macadamized. Iron fence was built around the soldiers' hospital. A new gas main laid below the present south gate. Stone wall on west side of road from the crossroads to Highland Falls was built by the men of the army service detachment, some 1,000 linear feet.

During the past fiscal year the post has suffered severely from storms, and much unforeseen work has been necessitated. The retaining wall of road east of cemetery was undermined and fell down. This amounted to some 3,600 cubic feet of stone wall to rebuild. The retaining wall of road to east of Fort Clinton was undermined and required rebuilding. This amounted to some 1,500 cubic feet of stone wall. The roof of the quartermaster's stables was twice blown partially off. All roads were badly eroded and many trees blown down and uprooted. Two sets of married soldiers' quarters in Logtown were pulled down, having been condemned as uninhabitable.

Attention is invited to the present method of paying civilian employees which was adopted July 1. The duty of paying the additional pay to officers, the extra-duty pay to enlisted men, and the pay of civilians provided for by the act making appropriations for the support of the Military Academy was then transferred to the pay department. The transfer of the first two appears desirable, as it relieves this office of the necessary clerical work of preparing the rolls and vouchers and does not materially increase the clerical work of the companies, requiring only the additional note on the muster and pay rolls to cover the payment of the extra-duty pay. The transfer of the payment of the civilian employees is not, in my opinion, advisable, as it unnecessarily increases the work both of this office and that of the paymaster designated to make the payment without corresponding advantage.

Prior to this year all the regular civilian employees were paid on the monthly rolls with those temporarily hired, such as painters, carpenters, and mechanics of all kinds, as well as the laborers. The money was drawn from the Treasury at the same time and one pay day answered for all, the 27 permanent employees entailing very little additional work over the several hundred men paid. Under the present arrangement rolls (in triplicate) must be prepared by this office and the signatures thereon be obtained as before. These are then forwarded by the Superintendent to the paymaster, who is obliged under the regulations to put each man's pay in a separate envelope, marking the envelope with the man's name and its contents, etc., and then forward same to the Superintendent. He transmits the package to the disbursing officer, who distributes the envelopes to the employees, seeing that each envelope is correct.

This system, it will be seen, makes the work performed by the pay department entirely additional and unnecessary, and at the same time increasing the work of this office.

I would recommend that the matter be brought to the attention of the Adjutant-General, with a view of having the civilian employees paid, as heretofore, by this office.

Statement of the receipts and disbursements for the fiscal year ending June 30, 1896, accompanies this report, marked B.

GAS WORKS, UNITED STATES MILITARY ACADEMY.

As director of the gas works, I am charged with providing the necessary illuminating gas for the needs of the post. In order to properly light the buildings and grounds of the Academy, Congress appropriated for the last fiscal year the sum of $5,000 for the purchase of gas coal, oil, candles, lanterns, matches, chimneys, and wicking for lighting the Academy chapel, library, cadet barracks, mess hall, shops, hospital, offices, stables and riding hall, sidewalks, camp, and wharves. As the gas consumed costs more than the amount appropriated, all that which is consumed at places not enumerated in the act is sold at actual cost of manufacture with a small increase for contingencies, which includes a portion of the deficiency above named, and also provides for contingent repairs, which experience has shown to be necessary from time to time. The remainder of the deficiency is charged to cadets, who pay for gas at the rate of 35 cents per month for the time they are actually present. The sale of gas as above, of coke, coal tar, etc., constitutes a fund known as the "contingent fund," which is expended under the direction of the Superintendent of the Academy in the purchase of additional gas coal when necessary, retorts, gas fixtures, and repairs of same, pay of labor employed in making gas, and such other expenditures as pertain to the gas-making plant of the Academy.

The receipts and disbursements are shown in the statement of the contingent fund herewith, marked C.

SPECIAL CONTINGENT FUND, UNITED STATES MILITARY ACADEMY.

This fund is derived from the rent of certain buildings on the post and from the sales of gas, coke, coal tar, etc.

Statement of the receipts and disbursements under this head accompanies this report and is marked C.

Respectfully submitted.

J. B. BELLINGER,
Captain and Assistant Quartermaster, United States Army,
Disbursing Officer, United States Military Academy.

The ADJUTANT UNITED STATES MILITARY ACADEMY.

A.—*Statement of funds pertaining to the Quartermaster's Department, United States Army, for the fiscal year ending June 30, 1896.*

Balance on hand July 1, 1895	$1,259.82
Received since:	
Regular supplies	25,965.86
Incidental expenses	12,545.71
Army transportation	4,874.82
Clothing and equipage	2.00
Sales to officers	4,281.78
Sales at auction	582.63
Total to be accounted for	49,512.62
Disbursed:	
Regular supplies	25,930.58
Incidental expenses	12,446.23
Army transportation	4,761.49
Clothing and equipage	2.00
Deposited	5,072.87
Balance on hand June 30, 1896	1,299.45
Total	49,512.62

B.—*Statement showing receipts and disbursements, etc., pertaining to the appropriations for the support of the United States Military Academy for the fiscal year ending June 30, 1896.*

Date.		Current and ordinary expenses.	Miscellaneous items and incidental expenses.	Buildings and grounds.	New academic building.	Memorial Hall.	Total.
	CR.						
	By balance on hand fiscal year—						
July 1, 1895	1889				$59,055.20		$59,055.20
Do	1894	$4,856.19	$53.15	$3,519.20			8,428.54
Do	1895	16,864.04	5,276.50	20,950.58			43,091.12
Do	1895–96	600.00		8,124.49			8,724.49
Do	Memorial Hall					$5,000.00	5,000.00
	Received since fiscal year—						
June 30, 1896	1889				153.33		153.33
Do	1895	3,000.00		8,000.00			11,000.00
Do	1896	79,867.10	29,310.00	50,451.25			159,628.35
Do	1895–96			97.50			97.50
Do	Memorial Hall					35,000.00	35,000.00
	Total	105,187.33	34,639.65	91,143.02	59,208.53	40,000.00	330,178.53
	DR.						
	Disbursed fiscal year—						
June 30, 1896	1889				59,208.53		59,208.53
Do	1894	1,413.87	3.12	447.47			1,864.46
Do	1895	14,263.08	4,426.28	25,981.26			44,670.62
Do	1896	62,178.46	25,531.79	47,168.50			134,878.75
Do	1895–96	600.00		8,221.99			8,821.99
Do	Memorial Hall					8,366.75	8,366.75
	Deposited fiscal year—						
Do	1894	3,442.32	50.03	3,071.73			6,564.08
Do	1895	5,600.96	850.22				6,451.18
Do	1896	1,293.19					1,293.19
	Balance on hand fiscal year—						
Do	1895			2,969.32			2,969.32
Do	1896	16,395.45	3,778.21	3,282.75			23,456.41
Do	Memorial Hall					31,633.25	31,633.25
	Total	105,187.33	34,639.65	91,143.02	59,208.53	40,000.00	330,178.53

C.—*Statement of receipts and expenditures pertaining to the special contingent fund, United States Military Academy, from July 1, 1895, to June 30, 1896.*

	Gas works.	Rents, etc.	Total.
Balance on hand July 1, 1895	$2,182.72	$810.18	$2,992.90
Received since:			
By rent of—			
West Point Hotel		2,000.00	
Post-office		150.00	
Stables		75.00	
Store (retiring house)		350.00	
By sale of—			
Gas	5,185.11		
Coke	817.50		
Coal tar	442.74		
Junk		123.50	
Miscellaneous		196.24	
	6,445.35	2,894.74	9,340.09
Total to be accounted for			12,332.99
Disbursed	8,041.82	2,865.65	10,907.47
On hand June 30, 1896	905.99	519.53	1,425.52
Total accounted for			12,332.99

SIXTH REPORT OF THE BOARD OF ORDNANCE AND FORTIFICATION.

REPORT OF THE BOARD OF ORDNANCE AND FORTIFICATION.

WAR DEPARTMENT,
Washington, D. C., October 31, 1896.

The SECRETARY OF WAR.

SIR: In compliance with the provisions of the act approved February 24, 1891, the Board of Ordnance and Fortification has the honor to submit for transmission to Congress its annual report for the year ending October 31, 1896, as follows:

NEW LEGISLATION AFFECTING THE BOARD.

1. By the provisions of the act approved June 6, 1896, an appropriation was made for continuing the work of the Board, as follows:

Board of Ordnance and Fortification.—To enable the Board to make all needful and proper purchases, experiments, and tests to ascertain, with a view to their utilization by the Government, the most effective guns, small arms, cartridges, projectiles, fuses, explosives, torpedoes, armor plates, and other implements and engines of war, and to purchase or cause to be manufactured, under authority of the Secretary of War, such guns, carriages, armor plates, and other war material as may, in the judgment of the Board, be necessary in the proper discharge of the duty devolved upon it by the act approved September twenty-second, eighteen hundred and eighty-eight; to pay the salary of the civilian member of the Board of Ordnance and Fortification provided by the act of February twenty-fourth, eighteen hundred and ninety-one, and for the necessary traveling expenses of said member when traveling on duty as contemplated in said act; for the payment of the necessary expenses of the Board, including a per diem allowance to each officer detailed to serve thereon when employed on duty away from his permanent station, of two dollars and fifty cents a day; and for the test of experimental guns, carriages, and other devices procured in accordance with the recommendation of the Board of Ordnance and Fortification, one hundred and fifty thousand dollars: *Provided*, That before any money shall be expended in the construction or test of any gun, gun carriage, ammunition, or implements under the supervision of the said Board, the Board shall be satisfied, after due inquiry, that the Government of the United States has a lawful right to use the inventions involved in the construction of such gun, gun carriage, ammunition, or implements, or that the construction or test is made at the request of a person either having such lawful right or authorized to convey the same to the Government.

That all material purchased under the foregoing provisions of this act shall be of American manufacture, except in cases when, in the judgment of the Secretary of War, it is to the manifest interest of the United States to make purchases in limited quantities abroad, which material shall be admitted free of duty.

2. *Howell counterpoise carriage.*—By the same act the following contingent appropriation was made:

To enable the Board of Ordnance and Fortification, in its discretion, to procure and test one ten-inch counterpoise carriage of the type patented by Commodore J. A. Howell, United States Navy, the Secretary of War is hereby authorized and directed to contract with the licensee of said Howell patents for said carriage, without advertising, which shall be constructed according to the plans and specifications

prepared by said J. A. Howell, and said carriage shall be capable of an all-round fire, and the details of said plan may be modified, changed, and improved in the discretion of the contractors: *Provided*, That the ten-inch carriage herein authorized to be contracted for shall be subjected to the same tests as the Buffington-Crozier ten-inch carriage will be subjected to with respect to ease of maneuvering, rapidity of firing, of traversing, and raising to the firing position; and the sum of fifty thousand dollars, or so much thereof as may be necessary, is hereby appropriated for the purchase of said Howell ten-inch carriage, including the erection of foundations and platform, the expense incident to its mounting, and the ammunition for its test. Eighty-five per centum of the amount herein appropriated shall be paid in partial payments as the work progresses, and the remainder upon the completion and test of said carriage by the Board of Ordnance and Fortification and the work found to be done according to contract.

By the terms of the act the procurement of this carriage was left to the discretion of the Board, and at the July meeting it was decided to allot the amount appropriated for this purpose, subject to the approval of the Secretary of War, which was given July 10, 1896.

The Chief of Ordnance has therefore entered into contract with the licensee of the patents of Commodore Howell, and it is expected that the carriage will be ready for test some time in the ensuing year.

The cost of constructing the foundations and platform and the expenses of the test of the carriage are, by the act of Congress, included in the appropriation. The Board fixed 20 rounds as the least number that would constitute a proper test of the system, and the contractor was required to furnish that number.

The Board also imposed the conditions that the loading angle should not exceed 5 degrees and that the cover should be at least 7 degrees.

3. *Emery loading apparatus.*—The act approved June 6, 1896, also contained the following:

That in the act making appropriations for fortifications and other works of defense, for the armament thereof, for the procurement of heavy ordnance for trial and service, and for other purposes, approved February eighteenth, eighteen hundred and ninety-three, the paragraph beginning with the words, "Of the one hundred and ten thousand dollars," and providing for terms of payment for the twelve-inch elevating gun carriage to be contracted for with A. H. Emery under the provisions of said act be, and is hereby, amended to read as follows:

Of the one hundred and ten thousand dollars to be paid for the carriage and its foundations, eighty-five per centum shall be paid in partial payments as the work progresses, in accordance with the proposals submitted by A. H. Emery to the Board in his letter of January twenty-first, eighteen hundred and ninety-three. And no bond shall be required for the return of this money if the carriage is not accepted, nor shall the said Emery be required to return the money paid, and the carriage shall belong to the United States when the tests are completed. The balance of the one hundred and ten thousand dollars shall be paid as soon as said carriage shall have been completed in all respects according to contract and shall also have undergone and endured a test satisfactory to the Board of Ordnance and Fortification. Of the twenty thousand dollars to be paid for the testing of the carriage three-eighths shall be paid the contractor when the preliminary tests are completed, and the other five-eighths shall be paid to him proportionally as the fifty rounds for proof are furnished. And the Secretary of War is hereby authorized and directed to enter into a supplemental contract with the contractor for this carriage, for the supply by him of a loading apparatus to go with and belong to the carriage and to be furnished therewith as a part thereof; and the carriage shall be so constructed that a part of the work of recoil can be used for the horizontal traverse of the carriage and the working of the loading apparatus; and the payment for the work so furnished under this supplementary contract shall be ten thousand dollars, which sum shall be due and payable when said loading apparatus is completed in all respects according to contract, and shall also have undergone and endured said test hereinbefore mentioned, to make which payment the sum of ten thousand dollars is hereby appropriated.

The extra amount appropriated was allotted by the Board July 2, 1896, as required by the act.

The position taken by the Board in regard to amending the act approved February 18, 1893, which made the original appropriation of

$130,000 for the construction of the 12-inch Emery elevating carriage, was defined at the March meeting in reply to a letter of the Hon. E. J. Hainer, chairman Subcommittee on Fortifications, United States House of Representatives, as follows:

The Board of Ordnance and Fortification does not recommend the enactment of the amendments proposed by Mr. Emery for the following reasons:

First. With reference to the amendment in regard to the 12-inch elevating carriage. By the act approved February 18, 1893, the Board of Ordnance and Fortification was required to allot out of its funds $130,000 for the construction and proof of a 12-inch carriage of Mr. Emery's design. The plans for this carriage were not completely worked out at the time the appropriation bill was passed and were never approved by the Board. In its action of January 25, 1893, the Board stated as follows: "In view of the doubts in the mind of the Board as to the successful working of this carriage, as expressed in its action of December 29, 1892, it is of opinion that if Congress deem it advisable to authorize and direct the construction, the appropriation should be so worded as to make the cost of the carriage and foundations payable only after their successful test and acceptance by the War Department." The Board still adheres to the opinion thus expressed. Should the proposed amendment become a law, $93,500 might be paid to Mr. Emery for preliminary work on a carriage the plans of which have never been approved by experts on this class of work and the patents for which are not transferred to the United States, although it should prove of no value whatever after completion.

Other amendments proposed by Mr. Emery were also discussed at the same time, but as they were not adopted it is unnecessary to give the action of the Board.

The report of Mr. Emery on the progress made in the construction of his carriage will be found on page 12.

4. *Gatling 8-inch gun.*—The following appropriation was also made by the same act:

To enable the Board of Ordnance and Fortification to procure and test one eight-inch caliber high-power gun, cast in one piece, on the plan of R. J. Gatling; and the Secretary of War is hereby authorized and directed to contract with said Gatling for said gun, without advertisement, which gun shall be constructed according to the plans and specifications prepared by said Gatling, and under his supervision, and to be subjected to the same test now applied to the built-up gun of the same caliber, and the sum of forty thousand dollars is hereby appropriated to pay for said gun; of which sum eighty-five per centum shall be paid in partial payments as the work progresses, in accordance with the contract to be entered into between the Secretary of War and the said Gatling, and the remainder upon the completion and test of said gun: *Provided,* That before said contract is entered into, the plans and specifications for said gun shall be deposited with the Secretary of War, which plans and specifications may be modified in the discretion of said Gatling, from time to time as the work progresses: *And provided further,* That the said gun shall conform in general form and dimensions to modern ordnance, and shall not therefore differ materially in form and dimensions from service guns, in order that it may admit of being mounted on a service carriage and in a service emplacement or fortification.

The act being mandatory, the Board recommended the allotment required July 2, 1896.

APPROPRIATIONS AND ALLOTMENTS.

In compliance with the act of February 24, 1891, which requires the Board to "give a detailed statement of all contracts, allotments, and expenditures made by the Board," an exhibit, marked Appendix A, is attached to this report, giving this detailed statement from October 31, 1895, to October 31, 1896.

No contracts are entered into by the Board, as they are made by the chief of the department to which the work pertains, under the direction of the Secretary of War.

The following table gives a summary of the appropriations which have been made for the work of the Board since its organization, the

amounts which have been allotted therefrom, and the balances unallotted at the date of this report:

Summary of appropriations for the Board of Ordnance and Fortification and allotments from September 22, 1888, to October 31, 1896.

Act.	Total appropriations.	Total allotted, etc.	Total balances on hand.
Fortification act, September 22, 1888	$3,972,000	$3,966,607.40	$5,392.60
Army appropriation, March 2, 1889	56,000	3,156.20	.....
		52,843.80	.....
Fortification act of—			
March 2, 1889	1,233,594	1,204,819.00	14,775.00
August 18, 1890	3,832,935	3,831,579.31	15,355.69
February 24, 1891	2,290,803	2,290,803.00	.....
July 23, 1892, February 18, 1893, August 1, 1894, March 2, 1895, and June 6, 1896	835,000	682,645.08	152,354.92
Total	12,220,332	12,032,453.79	187,878.21

Total allotments	$11,935,051.61
Total expenditures for necessary expenses of Board	44,558.38
Total turned in to Treasury	443.80
Total reverting to Treasury by lapse of appropriation	52,400.00
Grand total	12,032,453.79

GENERAL OPERATIONS.

The general operations of the Board during the year have comprised the examination of a large number of devices that have been brought to its attention; the development of a system of fire control with the necessary position finders, instruments for transferring the data and means of communication; the supervision of the tests of such guns and carriages as are still in an experimental stage, and the investigation of smokeless powders and high explosives.

A large number of projects and suggestions have engaged the attention of the Board during the year. The majority of the devices suggested by inventors, as was to be expected, have not proved worthy of trial at the expense of the United States, but all have been carefully investigated with a view to utilizing everything of real value.

SUBJECTS CONSIDERED.

The following is a list of the varied subjects that have been before the Board, with the action briefly stated in each case:

New subjects considered by the Board during the past year.

Subject.	Proposed by—	Action.
Method of packing ammunition	F. L. Hagadorn	Trial recommended, but disapproved by Secretary of War.
Plane tables, with specially made telescopes for Sandy Hook Proving Ground.	Chief of Ordnance	Purchase recommended.
Standard base-end instruments	Range Finder Board	Allotment made.
Gerdom breech mechanism	Chief of Ordnance	Allotment to adapt to Hotchkiss 12 cm. gun.
Breeching battery	Edwin Gomez	Not recommended.
Fuse train	....do	Do.
Vertical base range finder (Fiske)	Western Electric Co	Do.
Equipoise disappearing gun carriage	Commodore J. A. Howell, U. S. N.	Contracted for.
10-inch Brown segmental wire gun	Brown & Munsell	Action not completed.
Machine gun	A. Demeulle	Not recommended.
Powder pneumatic gun	Sims-Dudley Co	Under investigation by a committee of the Board.

New subjects considered by the Board during the past year—Continued.

Subject.	Proposed by—	Action.
Lance-edge steel bullet	F. P. Cobham	Not recommended.
Rapid-fire gun	Driggs Ordnance Co.	Action postponed.
Method of gun construction	John Schnepf	Not recommended.
Method of firing high explosives	Maxim Powder and Torpedo Co	Under investigation by a committee of the Board.
Cast-steel 8-inch rifle	R. J. Gatling	Allotment made in compliance with act of Congress.
Cast-steel mortar	do	Allotment made.
Pneumatic dynamite guns	Pneumatic Torpedo and Construction Co.	Under investigation by a committee of the board.
Gyroscopic projectile	Eugene Turpin	Not recommended.
Method of constructing forts	E. L. Dudley	Do.
Floating battery	T. L. Sturtevant	Do.
Invention for increasing destructive energy of projectiles.	M. H. Holdorf	Do.
Electric torpedo	J. M. Davis	Do.
Pneumatic torpedo	do	Do.
System of coast defense	Arthur Hubbard	Do.
Shell for high explosives	F. P. Cobham	Do.
Mushroom lance bullet	do	Do.
Projectile	G. H. Gray	Do.
Torpedo system	W. F. Brewster	Do.
Slide rule correction table	Lieut. E. A. Miller	Trial recommended.
Center pintle disappearing gun carriage 10-inch.	Chief of Ordnance	Construction and trial recommended.
Antifriction projectile	Norman Wiard	Not recommended.
System of torpedo	S. B. Smith	Do.
Method of coast defense	E. C. Coombs	Do.
Projectile	M. C. Hargrove	Do.
Impregnable armor plate	do	Do.
Method of coast defense	W. H. Parker	Do.
Telemeter	E. Cuenod	Awaiting additional information.
System of coast defense	W. W. Hastings	Not recommended.
Projectile	G. H. Gray	Do.
Submarine boat	G. L. Pesce	Referred to Navy Department.
12-inch disappearing gun carriage	Chief of Ordnance	Allotment made.
Method of testing symmetry of shells	Peter Glaser	Not recommended.
Plan for harbor defense	Henry Fatic	Do.
Range finder	W. E. Crump	Do.
Horizontal base range finder	American Artillery R. F. and Relocator Co.	Do.
Type rapid-fire gun, 5 inch	Chief of Ordnance	Construction and trial recommended.
Rapid-fire gun	Sponsel R. F. Gun Co	Postponed.
Device for directing fire of heavy guns	C. E. Burnap	Not recommended.
Military balloon	M. Knickerbocker	Do.
Visual target indicator	Lieut. A. Murray	Purchase recommended.
Plan for signaling ranges and azimuths	Western Electric Co	Not recommended.
Pneumatic gun	D. M. Mefford	Under investigation by a committee of the Board.
Device for transmitting angular or linear measurements.	Lieut. S. E. Allen	Provision for development made.
Projectile	Mrs. M. E. Klaeber	Not recommended.
Deviation indicator	American Artillery R. F. and Relocator Co.	Trial recommended.
Rocket torpedo	Benton Halstead	Not recommended.
Flying machine for military purposes	Wagner & Heyer	Do.
Torpedo for harbor defense	E. C. Sooy	Do.
Boom for harbor defense	C. O'Brien	Do.
"Flying battery"	O. A. Sutcliffe	Do.
High explosive	W. E. Gibbs	Awaiting additional information.
Detonator	do	Not recommended.
Projectile	W. Mottram	Do.
Shell for high explosives	R. J. McKeone	Do.
Gun	D. C. Carter	Do.
"Semisubmarine double-acting dynamite shell."	C. F. Shedd	Do.
Floating gun	A. C. J. H. McIntosh	Do.
Battering-ram	do	Do.
Experimental parapet	Col. P. C. Hains	Allotment made.
Emergency defense for guns and magazines.	do	Report filed.
Steel shield for infantry	N. W. Herring	Not recommended.
Submarine net for harbor defense	Peter McMillan	Do.
Method of coast defense	W. H. Bradbury	Do.
Do	M. W. Griswold	Do.
Fuse	Capt. G. G. Greenough	Do.
Range finder	do	Awaiting additional information.
Wind-allowance device	do	Do.
Dial telegraph	Lieut. I. N. Lewis	Allotment for test made.

New subjects considered by the Board during the past year—Continued.

Subject.	Proposed by—	Action.
Howell torpedo	American Ordnance Co	Not recommended.
System of communication	Interior Telephone Co	Allotment for installation made.
Breech sight	Lieut. C. W. Hobbs	Trial recommended.
Projectile	Alex. Harroun	Not recommended.
Method of coast defense	B. N. Kuhns	Do.
12-inch Gordon carriage	Morgan Engineering Co	Final action not determined.
Torpedo	Lieut. N. J. Halpine, U. S. N.	Purchase recommended.
System of fire control	Board on Regulation of Seacoast Artillery.	Adoption for service recommended.
6-inch rapid-fire gun	Board of Ordnance and Fortification.	Under consideration by Secretary of War.
Armor plate	H. Burlich	Referred to Navy Department.
Method of coast defense	A. F. Sweet	Not recommended.
Multiplying scale	Lieut. W. C. Rafferty	Allotment for construction and test.
Air ship for coast defense	Dr. A. De Bausset	Not recommended.
Elevation indicator	Lieut. W. C. Rafferty	Final action not yet determined.
Quadrant	Lieut. I. N. Lewis	Allotment for purchase.
"Angleometer"	H. E. Bishop	Not approved.
Range finder	Capt. D. D. Gaillard	Final action not yet determined.
Harbor defense by means of naphtha flame.		Discussion by H. H. Rogers. Filed.
Method of assembling armor plates	P. McMillan	Not recommended.
Method of constructing foundations for turrets.	G. Blanchard	Do.
Method of manufacturing steel	L. Launay	Filed.
High explosive	G. Blackman	Not recommended.
Pneumatic gun (small arm)	Alex. Klinger	Do.
Automobile torpedo	E. D. Peerstone	Do.
Shield for infantry	Chas. Coltrin	Do.
"Megaphones" for artillery use	Maj. C. A. Woodruff	Final action not determined.
Telephotoscope	Lieut. G. N. Whistler	Do.
Electrobuoyant deep-water torpedo	T. R. Owen	Not recommended.
Projectile	G. F. Cole	Do.
Disappearing gun carriage	Lieut. Col. S. M. Mansfield, U. S. A.	Final action not yet determined.
Method of firing high explosives	A. E. Carlyle	Not recommended.
"Aluminium aerial torpedo boat"	T. J. Brown	Do.
Projectile	D. M. Mefford	Do.

In addition to an investigation of these new subjects, the Board has also devoted considerable time to the following, which have been previously under consideration, viz, the Millar converter board; the Fiske stadimeter; the Rafferty relocator; the Lewis, Fiske, Zalinski, Ruckman-Crosby, Unge, Nolan, Aide-Tireur, Weldon, and Watkins range finders; the Ericsson and Sims-Edison torpedoes; the Emery elevating carriage; the pnuematic, Adams, and Gordon disappearing gun carriages; the gun-lift battery; the Haskell multicharge gun; the manufacture of one hundred 8, 10, and 12 inch guns by the Bethlehem Iron Company; the Parkhurst and Best telescopic sights; the system of plotting and directing the fire of batteries at moving targets, devised by Lieut. E. M. Weaver; and the Best system of range finding.

In connection with the consideration of these subjects, the Board has granted to the inventors presenting them twenty-six hearings during the year.

EXPERIMENTAL GUNS.

The Crozier wire-wound 10-inch B. L. rifle.—At the date of the last report this gun had been fired 230 rounds. It has since been fired 44 rounds. The bore is so much eroded that it has been decided not to fire it again until it is relined. This gun, with the exception of the erosion referred to above, is in perfect condition, and is the only wire-wound gun that has been successfully tested in this country. It possesses the quality of longitudinal stiffness to a remarkable degree.

The 8-inch Haskell multicharge gun.—The gun is in the same condition as at the date of the last report. It is ready for the test as soon as the projectiles and powder are obtained. An estimate of the cost of the ammunition was received from the company, May 26, 1896, and an allotment was made for the purchase of 20 rounds, the number fixed by the Board for the preliminary test. The delay in testing this gun has been due entirely to the failure of the Haskell Gun Company to furnish the necessary data in regard to the ammunition, which was called for by the Board three years ago. It is understood that the estimate has been delayed by the long-continued illness of Mr. Haskell. It is expected that the gun can now be tested within a few months.

CONTRACT GUNS.

The hundred-gun contract.—Under this contract twenty-five 8-inch, fifty 10-inch, and twenty-five 12-inch guns are to be made by the Bethlehem Iron Company. The progress on this contract is shown by the report of the company, dated October 8, 1896:

SOUTH BETHLEHEM, PA., *October 8, 1896.*

REPORT OF PROGRESS IN THE CONSTRUCTION AND EQUIPMENT OF THE GUN-FINISHING PLANT OF THE BETHLEHEM IRON COMPANY AND OF THE MANUFACTURE OF 100 FINISHED GUNS UNDER CONTRACT WITH THE CHIEF OF ORDNANCE, UNITED STATES ARMY, NOVEMBER 7, 1891.

[Supplementing report dated September 7, 1895.]

MACHINE TOOLS AND EQUIPMENTS.

No material additions in the way of machine tools have been made to the assembling plant during the past year. A number of new boring and special tools, especially for the manufacture of the 12-inch guns, have been provided.

PRESENT CONDITION OF GUNS BEING MANUFACTURED UNDER THIS CONTRACT (OCTOBER 3, 1896).

Twenty-five guns, 8-inch caliber.

Guns Nos. 1 to 10, inclusive.—Shipped.
Guns Nos. 11, 12, 14, 15, and 16.—Completed, except muzzle marking and fitting of sights.
Guns Nos. 17 to 22, inclusive.—Complete, except threading and slotting breech recess. Mechanism complete.
Guns Nos. 13, 23, 24, and 25.—Complete, except inserting bushing, threading, and slotting same, proof firing, muzzle marking, and sight fitting. Mechanism complete.

Fifty guns, 10-inch caliber.

Guns Nos. 26 to 30, inclusive.—Shipped.
Guns Nos. 31 to 40, inclusive.—Accepted and ready to ship; waiting for slight additions to consols.
Gun No. 41.—Assembled, except A, B, and D rows; other forgings machined for assembling.
Guns Nos. 42 to 48, inclusive.—C row assembled; other forgings machined for assembling.
Guns Nos. 49 and 50.—C row assembled, other forgings machined for assembling, except D hoops, which are not accepted on tests.
Guns Nos. 51 to 56, inclusive.—Of the 66 forgings (exclusive of those for breech mechanisms) required for these guns, all but 9 hoops are forged and rough machined. All tubes, 3 jackets, and 23 hoops are accepted as to physical qualities.
Guns Nos. 57 to 62, inclusive.—Tubes, jackets, and trunnion hoops forged.
Guns Nos. 63 to 68, inclusive.—Jackets and trunnion hoops forged.
Guns Nos. 69 to 72, inclusive.—Trunnion hoops forged.
Mechanism for guns Nos. 51 to 75, inclusive, about one-eighth completed.

Twenty-five guns, 12-inch caliber.

Guns Nos. 76, 79, and 80.—Tube, jacket, A, C, and D hoops assembled; other forgings (except trunnion hoop) machined for assembling.

Gun No. 77.—Tube, jacket, C and D hoops assembled, other forgings (except trunnion hoop) machined for assembling.

Guns Nos. 78 and 81 to 85, inclusive.—Of the 66 forgings (exclusive of those for breech mechanisms) required for these guns, all but 3 tubes, 3 jackets, and 3 hoops are forged and accepted as to physical qualities, and 29 of them are machined ready for assembling.

The act of Congress authorizing this contract provided that one type gun of each caliber shall be subjected to such tests in respect to accuracy, range, power, endurance, and general efficiency as the Board of Ordnance and Fortification shall have prescribed.

As stated in the last report, it was decided in the case of the 8-inch guns to submit one to a partial test and then decide whether it is necessary to proceed with the exhaustive test ordinarily required of a type gun. This was done, and the performance of the gun was satisfactory. Only the regular proof tests will therefore be required of these guns in future.

As the 10-inch guns are subject to the same conditions as the 8-inch, being constructed on the plans of the Ordnance Department and under the inspection of an ordnance officer, it was decided to submit them to the usual proof firing only.

HEAVY RAPID-FIRE GUNS.

The report of the ordnance member of the Board gives the full particulars in regard to the progress of the test of these guns and is transcribed in full:

MAY 6, 1896.

GENERAL: As the representative of the Board of Ordnance and Fortification at the firings of the various guns purchased under allotments of the Board, I have the honor to submit the following summary:

The 4.72-inch guns purchased were the Armstrong, Canet, Hotchkiss, and Schneider, with their mounts. The general programme for the test of these guns was prescribed by the Board. It contemplated an examination of the strength and number of parts of the mechanisms, the general efficiency of the systems, especial attention being paid to the action of the firing pin and extractor, and the position of the cartridge when it can be pushed home by the breechblock. The guns were also to be fired for velocity, accuracy, rapidity, rapidity with accuracy, with defective cartridges, and with charges to get excessive pressures. The guns were also to be tested after dusting and rusting.

Such guns as successfully passed the above tests were to be further fired with shrapnel and canister against steel plates; and for dispersion, as well as for accuracy, against a moving target.

The Armstrong became disabled at the thirtieth round. A defective primer caused a "blow back," or escape of gas through the primer back into the interior of the breechblock, through the firing-pin hole in face of the block. The firing mechanism was completely disabled, and the block itself could only be opened by repeated blows on the locking lever.

The Schneider.—The action of the mechanism of this gun in manipulation and deliberate firing was satisfactory. The number of parts of its mechanism, 61, including 9 springs, is, however, greater than is usually found in the best modern mechanisms for rapid-fire guns. The extractor has very little surplus power and is not on the whole entirely satisfactory. One objection to this gun is that its extractor guide extends 11 inches to the rear of the breech. The operator in manipulating the block is liable to stand close to the end of this guide. Should, in the excitement of rapid firing, the pin be discharged while he was in this position, a probably fatal blow would be received from the guide during the recoil of the piece. The devices for preventing premature discharge, or till the block is closed and locked, appear to be efficient and satisfactory. With a charge of 18¾ pounds of B. N. smokeless powder a velocity of 2,537 feet per second was obtained with a pressure of about 33,000 pounds. The gun stood the tests for accuracy and excessive pressure satisfactorily, but not those for rapidity, dust, and defective cartridges. A "blowback" destroyed the firing pin and spring. The rapidity was noticeably affected by the lack of power in the extractor, and the fact that it was necessary to push the projectile well up

into the rifling in order to close the block, and the care required before pulling the lanyard to see that the man operating the block was out of the way of the extractor guide.

The Canet.—The number of parts of the mechanism of this gun (39, including 4 springs), although nearly one-half less than that of the Schneider and not excessive, is still considered greater than is consistent with the simplicity and certainty of action required in a rapid-fire gun. The extractor is not satisfactory. It has little surplus power over that required in the normal condition, and a separate tool is required for the extraction of cases which have stuck in the chamber. In case the necessity of the use of this tool is not discovered in time, the extractor will probably be overstrained and therefore bent and distorted in its efforts to receive the cartridge case. This piece stood the test for velocity, accuracy, and rapidity satisfactorily. In the test for rapidity with accuracy a premature explosion occurred, resulting in the death of two and wounding of the remaining four of the detachment working the gun. This unfortunate accident was caused by the faulty seating of the coned portion of the firing pin in the recess prepared for it in the mechanism of the block, so that when the latter was quickly closed the protruding pin struck the primer a blow sufficient to explode the cartridge before the block closed. The breechblock being completely destroyed, the test of the gun closed.

The Hotchkiss had been fired about four times when an explosion occurred, resulting in the carrying away of the whole breech of the gun and the death of the officer superintending the firing.

An allotment was made for the purchase of the *Seabury gun* (4.72-inch), provided it stood certain tests. This gun was removed some months since from the Proving Ground for certain alterations, and has not yet been returned for trial. Last fall the *Driggs-Schroeder Company* submitted a 4-inch rapid-fire gun, and the Board allotted money for its test. The programme was the same as that adopted for all guns of this class. The mechanism consists of 15 parts. They are securely housed and protected from exposure to the weather. This enabled the gun to stand very satisfactorily the rust and dust tests. Twenty-one rounds were fired in two minutes, and 25 in two minutes and thirty-five seconds, and this under somewhat adverse circumstances due to the direction of the wind, which blew the smoke into the faces of the gunners. The mechanism worked well under increasing pressures up to 47,000 pounds per square inch. The results of the firing with this gun of 4-inch caliber were so satisfactory that one of 5-inch caliber has been recommended by the Chief of Ordnance and allotted for by the Board. One of the great advantages of this system is that the gunners in loading and firing stand to one side of the gun and not in its rear, and are thus protected from the liability to such accidents as occurred at the trial of the Canet gun.

Gruson minimum port carriage for 12-inch rifle.—Since the report of the Board of 1894 (p. 10), a new cast-steel transom was furnished by the company and the test satisfactorily completed. After one preliminary round 10 rounds were fired, 7 with 467 and 3 with 465 pounds brown prismatic powder, at elevations varying from + 12 degrees to — 1 degree, the carriage in every case running smoothly into battery. The carriage was traversed by the motor from left to right through 20 degrees in twenty-five seconds, and from right to left, 14 degrees, in eleven seconds. Later it was traversed twice through 22 degrees in sixteen and fifteen seconds, respectively. This trial could have been bettered if the main traverse circle had not settled. It was depressed from + 20 degrees to — 2 degrees in forty-three seconds and elevated from — 2 degrees to + 12 degrees in fifty-six seconds. To run into battery occupied six and four-fifths seconds.

The carriage having satisfied the conditions imposed by the contract it was accepted and has been paid for. *The Haskell* gun has been ready for firing for a long time, but nothing can be done further toward its test till Mr. Haskell complies with the instructions of the Board to furnish information as to the powder he desires for the initial and accelerating charges.

Very respectfully, your obedient servant,

FRANK H. PHIPPS,
Major, Ordnance Department, United States Army.

Gen. NELSON A. MILES,
President Board of Ordnance and Fortification, Washington, D. C.

RAPID-FIRE FIELD GUNS.

The field guns that were fitted with various systems of breech mechanism under allotments of the Board, have been delivered at the proving ground and are undergoing test. They are the Seabury, Dashiell, Fletcher, and Gerdom. All failed on the blow-back test, but the Gerdom was readily repaired and has since passed that test successfully,

as well as the others prescribed by the test programme. The test of the other guns is still in progress.

GUN CARRIAGES.

Emery 12-inch elevating carriage.—The following report from Mr. A. H. Emery as to the progress made upon his carriage has been received by the Board:

STAMFORD, CONN., *October 1, 1896.*

GENTLEMEN: I am in receipt of yours of September 24, asking me to report progress made in the construction of my 12-inch elevating gun carriage contracted for March 17, 1893.

The requirement of the contract that I give bonds to return the moneys advanced thereon prevented me from getting suitable parties to build the carriage, as they did not like to take the risk of building the carriage and the additional risk of returning the moneys if necessary. For this reason I was obliged to go to Congress for relief, which was given me in the act approved June 6, 1896, which not only relieved me from the bond, but provided for a supplementary contract, under which I am to furnish a loading apparatus to go with this carriage, and which is to be a part thereof, the whole to be so arranged that I can make use of the recoil of the gun in traversing the carriage and in loading the gun.

The supplementary contract has been made and a large amount of material for the carriage has been contracted for, principally the gun-iron castings and most of the steel castings.

As soon as I can get these castings the work will be pushed rapidly in the shops.

Yours truly,

A. H. EMERY.

The BOARD OF ORDNANCE AND FORTIFICATION,
War Department, Washington, D. C.

The second 10-inch pneumatic carriage.—This carriage was contracted for in compliance with the act of Congress approved August 1, 1894, and should have been delivered at the Sandy Hook Proving Ground June 7, 1895.

The carriage is not yet finished. The following report from the Pneumatic Gun Carriage and Power Company has been received:

WASHINGTON, D. C., *October 6, 1896.*

DEAR SIR: In reply to the letter of the Board of September 23 last, making inquiry as to the progress in the construction of our improved 10-inch pneumatic disappearing gun carriage, I have to state that the carriage has been finished and is now being assembled in the shop of the Cramp Shipbuilding Company. As soon as it is assembled we will mount upon it the 10-inch gun which is at the Cramps works and test it as far as possible in the shop. We expect to have it shipped to Sandy Hook by November 1 proximo, and have the official trial take place about the 15th of December.

The delay has been caused by the failure of seven or eight castings of the cylinder. I respectfully request that your Board will, in its report to the Secretary of War, include its estimate of $50,000 for possible premiums on this carriage which your Board made to the Secretary in its report dated October 21, 1894. (See p. 32 of said report contained in Ex. Doc. No. 136, Fifty-third Congress, third session.)

On January 9, 1895, we addressed the following letter to Hon. Wilkinson Call, chairman of the Subcommittee of Appropriations having in charge the fortifications appropriation bill:

"DEAR SIR: I beg to call your attention to page 32 of the inclosed report of the Board of Ordnance and Fortification, from which you will see that there is an estimate of $50,000 for the purpose of paying premiums on our 10-inch disappearing carriage provided for in the fortifications appropriation act approved August 1, 1894, copy inclosed. It will be seen that the Board gives the section of the act covering our carriage the construction Congress intended, viz, that we are to receive the same benefits that are given to our rivals, the Gordon carriage. We understand Captain Gordon has received about $50,000 in premiums. We therefore ask that the amount estimated by the Board, viz, $50,000, to cover premiums that may be earned by our carriage, be inserted in the pending fortifications appropriation bill.

"Very respectfully,

"C. E. CREECY,
"President of the Pneumatic Gun Carriage and Power Company."

I appeared before the committee in person and asked that the appropriation be made, but as I could not assure them as to the time of completion, the committee decided to postpone the appropriation until after the premiums were earned. The reason why I now ask that the estimate be repeated is because the official trials will take place before adjournment of the next session of Congress, and the estimate of the Department will avoid a technical point that the estimate should have been made with the estimates for next Congress. We are confident that in firing rapidity we shall excell the performances of both the Gordon and the Crozier 10-inch carriages.

Very respectfully,

C. E. CREECY,
President of the Pneumatic Gun Carriage and Power Company.

Maj. Gen. NELSON A. MILES, U. S. A.,
President of the Board of Ordnance and Fortification, War Department.

The following action was taken by the Board on this letter October 20, 1896:

The Board considered the letter of the Pneumatic Gun Carriage and Power Company, dated October 6, 1896, reporting progress made in the construction of their second pneumatic disappearing carriage. The report was directed to be filed.

In reply to the request of the company that the Board "will in its report to the Secretary of War include its estimate of $50,000 for possible premiums on this carriage," it is recommended that the company be informed that the Board declines to make such an estimate. In the action of the Board on the original request of the company that a contract be entered into pursuant to the act of Congress approved August 1, 1894, the whole subject of the requirements of the act was discussed and it was recommended that the legal questions involved "be referred to the proper legal authority and a decision obtained before a contract be drawn." This was not done, but the contract was drawn without containing any reference to a premium for rapidity of fire and so accepted by the Pneumatic Gun Carriage and Power Company. In the absence of a legal decision as to the meaning of the act of Congress the Board does not interpret it to authorize any premiums whatever, and will not recommend any payments not specified in the contract.

The Gordon modified 10-inch disappearing carriage.—The Morgan Engineering Company, the manufacturers of the two Gordon carriages, submitted at the January meeting a working model of a 10-inch Gordon carriage, with certain modifications calculated to overcome the objectionable features of the previous designs. The changes consisted, first, in overcounterweighting the carriage, so as to do away with the pneumatic feature of the carriage by which air was compressed by the recoil and used to raise the gun to the firing position; and, second, in compelling, by means of slots and guides, the counterweights to rise vertically under the force of recoil and thus causing them to be gradually accelerated. The company was requested to submit an estimate of the cost of altering the modified carriage at Sandy Hook so as to embody these features. This was done, and at the February meeting it was decided to make the alteration and use this carriage for a conclusive test of the Gordon system.

The carriage has an all-around fire and a cover of about 13 degrees. It is expected that it will be ready to test in a short time.

The Adams center-pintle disappearing carriage.—After careful examination of all the plans for disappearing carriages, the Board decided not to recommend the construction of a type carriage according to this system.

Twelve-inch disappearing carriage.—At its March session the Board recommended an allotment of $45,000 for the construction of a disappearing carriage for the 12-inch B. L. rifle, after the Buffington-Crozier design, which has proved so successful in the carriages for the 8 and 10 inch rifles. This was approved by the Secretary of War, and the carriage is now being constructed at the Watertown Arsenal.

Center-pintle disappearing carriage for 10-inch B. L. rifle.—In order to test the efficiency of a modification of the Buffington-Crozier system of

disappearing carriages, designed to permit an all-around fire, the Board allotted, March 12, 1896, $25,000 for the construction of a type carriage on the plans of the Chief of Ordnance. It is expected that this carriage will be ready for test during the coming year.

Rapid-fire gun mounts.—With the 5-inch type rapid-fire gun, which is being constructed at the Watervliet Arsenal under an allotment of the Board, a slight modification of the pillar mount is to be used. The mount consists of the usual form of rapid-fire carriage on a steel cylinder, which is counterpoised and drops into a pit in the platform. It is raised and lowered by means of a lever working suitable gearing. In action the gun is elevated above the parapet and remains in that position during the firing. When not in action it is lowered behind the parapet and no evidence of its position is displayed to the enemy.

DUTIES OF THE BOARD AND ADOPTED TYPES.

The following letter was received by the Board from the Secretary of War:

WAR DEPARTMENT, *January 7, 1896.*

SIR: A careful examination of the act of September 22, 1888, creating the Board of Ordnance and Fortification, and of the subsequent acts governing its operations, convinces me that there has been a certain amount of confusion of opinion as to the duties devolved upon the Board under the law and the method in which its operations should be conducted.

While it is true, as stated in its first annual report, that "the Board is only advisory to the Secretary of War," those words do not adequately convey the real meaning and purpose of its creation. The Board was created at a time when Congress was taking the first step in the execution of a project that involved an ultimate expenditure of more than $100,000,000.

A most important object in view, doubtless, was that the Secretary of War, in the elaboration of the proposed system of fortification and armament, might have the advice of an organized body of experts in addition to but separate from the special bureaus which already existed for that purpose in the War Department.

But beyond this and perhaps more important than this was another object, viz, that of inspiring Congress with confidence in the conclusions and recommendations of the War Department. Recent years had witnessed a rapid evolution in war material. Foreign nations had armed and rearmed at short intervals. Costly material had been manufactured; much of it to be thrown away as defective or because outclassed by superior inventions on the part of a possible enemy.

In this country, owing to a general absence of expert knowledge of such matters among the people, there were great differences of opinion. Whether 16-inch guns could be successfully built, or whether they were needed even if they could be built; whether guns should be mounted in turrets; whether guns and mortars should be built-up and all-steel, or of cast iron and steel, or all cast iron. These and many other important questions were and some still remain subjects of dispute.

Congress knew that every year it would be asked to appropriate millions of dollars for the purchase or manufacture of war material in regard to which all men would not agree. But it determined that when it gave the money it should have every possible guaranty that the articles purchased would be the best of their kind. In other words, it determined that it would not give money to buy anything in quantity until the best type of that thing had been determined by the judgment of experts. For that purpose, and for that purpose alone, it created the Board of Ordnance and Fortification.

The creating act (September 22, 1888) declared that the "Board shall be under the direction of the Secretary of War and subject to his supervision and control in all respects, and shall have power to provide suitable regulations for the inspection of guns and materials at all stages of manufacture to the extent necessary to protect fully the interests of the United States, and generally to provide such regulations concerning matters within said Board's operations as shall be necessary to carry out to the best advantage all duties committed to its charge."

The Board rightly interpreted these words as vesting in it the power and duty to establish types. In its first annual report it appears that, in connection with the contract for 100 heavy guns, it prescribed all the conditions to which these guns should conform, these conditions being those of the best types known to it. And so in many other cases.

By the creating act and subsequent ones, including the one of February 27, 1891,

the Board was vested, to a varying degree, with the control of expenditures for fortifications and the armament thereof. After the above date the Board was relieved of this duty.

By the creating act and all those subsequent to the one of August 18, 1890, it was made the duty of the Board "to make all needful and proper purchases, experiments, and tests to ascertain, with a view to their utilization by the Government, the most effective guns, small arms, cartridges, projectiles, fuses, explosives, torpedoes, armor plates, and other implements and engines of war. * * *"

The two paragraphs quoted above endow the Board with all the powers that it may lawfully exercise. Its duty is "to ascertain, with a view to their utilization by the Government, the most effective guns, * * * and other implements and engines of war." These, being determined, become the types to which all other things of the same kind must conform, until, by a similar process, another type is determined. Nor does Congress contemplate that the War Department shall make estimates for the purchase of any one of these "implements and engines of war" until its type shall have been determined. The process by which the type is determined is defined by law, viz, by making "all needful and proper purchases, experiments, and tests," and by providing "suitable regulations for the inspection of guns and material at all stages of manufacture."

In performing this duty, I do not find that any exact method has been adopted and closely adhered to. I find, from the reports of the Board, that in some cases funds have been allotted for the construction and tests of types, and that upon the recommendation of the Chief of Ordnance funds have been allotted for purchase in quantity. I find, in other cases, that funds have been allotted for construction and tests of types, and that then, without further reference to or recommendation from the Board, estimates have been submitted for purchase in quantities.

The result is that it is now difficult, when estimates are submitted for the approval of the Department, to know whether they are for articles of which the standard type had been established or not. It is a matter of importance that this cause of embarrassment be removed, and I therefore submit, through you, to the Board, the following for its consideration and action:

(1) I desire that the Board prepare and submit to the Secretary of War a list which shall show seriatim all the implements and engines of war which the Board considers to come within the scope of the duty devolved upon it, for which, in the judgment of the Board, satisfactory types have been determined.

(2) In order that the above list in the office of the Secretary of War may be kept corrected to date, I desire that the following method of procedure be followed: It is assumed that the tests of implements and engines of war will be conducted as it is understood that they have been in the past, i. e., by the Board of Ordnance, at Sandy Hook or elsewhere, or under the immediate supervision of officers of the Ordnance Department; in either case, with or without the immediate presence of the Board of Ordnance and Fortification. But, in any case, the tests will be conducted in accordance with suitable regulations prescribed by the Board. After a sufficient test of any article has been made and the report of the officers who have conducted it, together with the recommendations and criticisms of the Chief of Ordnance, have been received by the Board, and the latter has arrived at its conclusion, if this conclusion be favorable to the adoption of the article tested, as the type, the Board will make a specific recommendation for its adoption to the Secretary of War, and upon approval by him this article will become the standard type of all others of the same kind to be thereafter procured for service, and will remain the type until superseded by another one determined in the above manner.

If the Board of Ordnance and Fortification desires to suggest a method of procedure which, in its judgment, is preferable to the one indicated above, the Secretary of War desires that it will submit its views thereon to him in sufficient time to receive his consideration and action prior to the adjournment of its present session.

Very respectfully,

DANIEL S. LAMONT,
Secretary of War.

THE PRESIDENT OF THE BOARD OF ORDNANCE AND FORTIFICATION.

This letter was considered by the Board January 10, 1896, and the following action taken in reply to it:

When the large appropriations for the Engineer and Ordnance departments, which were made at the time of the organization of the Board, were under its supervision, designs for batteries, guns, etc., were submitted and allotments were made after examination and approval. Suitable regulations for the inspection of guns and material were also prescribed, which are still in force.

By the terms of the appropriation acts of 1890 and 1891 the work of the Engineer Department was removed from the supervision of the Board, and by the act of 1892 most of the work pertaining to the Ordnance Department was also removed.

Congress having seen fit to appropriate funds in some instances for constructions by the two departments without giving the Board any supervision over them, the Board can not be officially acquainted in all cases with the progress of the work.

It is believed that the following may be considered as a correct list of constructions for which satisfactory types have been determined:

LIST OF IMPLEMENTS AND ENGINES OF WAR FOR WHICH SATISFACTORY TYPES HAVE BEEN DETERMINED.

12-inch steel B. L. rifle. Now under construction, model 1888 and model 1891.
10-inch steel B. L. rifle. Model 1888.
8-inch steel B. L. rifle. Model 1888.
12-inch steel B. L. mortar.
12-inch cast-iron mortar hooped with steel.
7-inch siege howitzer. Model 1890.
5-inch siege rifle. Model 1890.
3.6-inch field gun. Model 1891.
3.2-inch field gun. Model 1890.
3.6-inch field mortar. Model 1890.
3-inch Hotchkiss mountain gun.
12-inch nondisappearing barbette carriage.
10-inch nondisappearing barbette carriage
8-inch nondisappearing barbette carriage.
12-inch spring return mortar carriage.
8-inch disappearing carriage. Crozier-Buffington type.
10-inch disappearing carriage. Crozier-Buffington type.
Carriage for 7-inch siege howitzer.
Carriage for 5-inch siege rifle.
Carriage for 3.6-inch field gun.
Carriage for 3.2-inch field gun.
Carriage for 3.6-inch field mortar.
Carriage for 3-inch Hotchkiss mountain gun.
Caissons for field guns.
Combined battery wagons and forges for field guns.
Armor-piercing projectiles for seacoast guns.
Shell and shrapnel for field guns.
Torpedo casemates and cable galleries.

This Board has allotted $266,850 for the construction of a gun lift for two 12-inch guns at Sandy Hook, now Fort Hancock. This lift has been constructed, the guns placed in position, and the experimental trials have heretofore been reported. While the lift worked satisfactorily, in view of the great expense of this system, of the complexity of the mechanism, of the liability to get out of order, and of the probability of securing a more simple, economical, and efficient method of mounting guns of this caliber, the Board does not recommend at the present time its adoption as a type.

In regard to the selection of rapid-fire and machine guns and other patented articles, of which there are many systems of nearly equal excellence, it is not always desirable to designate one as a definite choice of the Government until it is in a position to purchase or manufacture in large quantities.

It is evident that such published selection would naturally advance the price of the article should it become known that the manufacturer practically had a monopoly.

The method of procedure suggested by the Secretary of War as to future tests appears to the Board to be proper, and will be followed so far as the jurisdiction of the Board extends.

MORTAR-STEEL MORTARS.

Under the provision of the act of Congress approved March 2, 1895, requiring "that whenever any party shall present for test a completed breech-loading mortar of 12 inches caliber, of not more than 4,000 pounds weight, built of mortar-steel, with a proper supply of ammunition therefor, not exceeding 200 rounds, such mortar shall be tested by the Board of Ordnance and Fortification," etc., no mortar has been presented during the year.

RANGE AND POSITION FINDERS.

The reports of the Board to Test Range and Position Finders to the Board of Ordnance and Fortification are appended (Appendix B), and show the progress made during the year in the development of position finders for the artillery service.

The Lewis depression position finder.—Upon the report of the Range Finder Board, and as the result of actual trial by the Board of Ordnance and Fortification, this instrument was recommended for adoption as the type for range finders having a vertical base. The recommendation of the Board was approved by the Secretary of War February 8, 1896. It was also recommended that steps be taken to acquire the right to use this instrument upon such terms or at such rate of compensation as may, to the Secretary of War, seem just and equitable.

This instrument takes the distance from its level to that of the water for its base, and, after proper adjustment, an observation on the water-line of a ship or other object by means of a powerful telescope gives directly on a dial the distance in yards. The azimuth of the object is given by means of another dial as an arm in the vertical plane of the telescope moves on an iron table. The dials are very easily read, and experiment has shown the instrument to be accurate within about 1 per cent for distances under 10,000 yards. The three instruments stated in the last report to have been ordered by the Board have been sent to San Francisco, Cal., Fort Monroe, Va., and Fort Adams, R. I.

Horizontal base range finder.—As yet the Board has not recommended the adoption of any range finder using a horizontal base. Several forms are under consideration. The Fiske, at Fort Hamilton, has given very good results; the Ruckman-Crosby is being developed at Fort Monroe; and the Gaillard is under consideration by this Board.

The underlying principle of all horizontal base range finders is the same, namely, the solution of a triangle of which the apex is the object whose distance is desired, and the efforts of inventors lie in the direction of simplifying the means of communication between the ends of the base line or automatically indicating the intersection of the lines of sight of the two telescopes upon a plotting board.

In order to provide a standard of comparison for range finders under trial, the Board allotted funds for the construction of a pair of special azimuth instruments, and their installation at Fort Hamilton, New York Harbor. These instruments are connected by telephone, and have given excellent results. In combination, they form a practical range and position finder, though not so rapid as some of the automatic devices.

BOARD ON REGULATION OF SEACOAST ARTILLERY FIRE.

The reports of this Board are appended (Appendix C) and show substantial progress. At the June meeting a proposed system of fire control for the United States seacoast artillery service was submitted and approved by the Board of Ordnance and Fortification. The system is based upon the use of polar coordinates, and is given in full in the appendix.

The following recommendations were made in connection with this report:

(1.) In the construction of the emplacements for the batteries now being placed in position, that due consideration be given to the importance of providing for a system of fire control and communication between batteries and for all other necessary appliances.

(2) That we especially recommend that appliances for this system be provided at Fort Monroe, Fort Hancock, and San Francisco Harbor, where high-power guns, pneumatic guns, and mortar batteries are now in position or under construction.

(3) And furthermore, the Board recommends that a system of regulations and tactics, based upon the report herewith submitted, be formulated and published to the Army for the instruction, information, and guidance of the artillery service.

In addition to the devices for the improvement of the seacoast artillery service mentioned in the last annual report as an outgrowth of the work of this Board, the following may be enumerated: A multiplying scale, by Lieutenant Rafferty; a replotting arm for attachment to the Lewis position finder, by Lieutenant Lewis; a sliding scale for the correction of certain errors in gun laying, by Lieutenant Millar; a visual range and azimuth indicator, by Lieutenant Murray; and a modification of the service sight for predicting the position of a vessel, by Lieutenant Hobbs.

Relocating instruments.—Two instruments for transforming the data obtained by the position-finder into corresponding data at the gun have been procured under allotment by the Board during the year—the Rafferty relocator and the Millar converter board. In the test both proved efficient and no decision has yet been reached as to the adoption of either for service.

One of the most difficult problems to determine is the subject of communication between the officers of a fire command, the range-finding stations, and the guns. Two systems of telephones and a printing telegraph are now installed at the Narrows. An electrical method in which the parallelism of two or more arms is indicated by the galvanometer needle is being developed by Lieut. S. E. Allen, Fifth Artillery; and a mechanical transmitter or dial telegraph devised by Lieut. I. N. Lewis, Second Artillery, is in process of construction.

The work of the Board on the Regulation of Seacoast Artillery Fire is very important and will be encouraged by this Board during the coming year. It is hoped that before another annual report is submitted a complete and efficient system of fire control can be presented to the War Department for installment at our seacoast forts.

HIGH EXPLOSIVES.

This subject has been in charge of Maj. Frank H. Phipps, Ordnance Department, as a committee of the Board.

The following report gives a résumé of the experiments made and the work accomplished by the committee and is considered to be of sufficient general interest to warrant its being embodied in full.

REPORT OF COMMITTEE ON HIGH EXPLOSIVES.

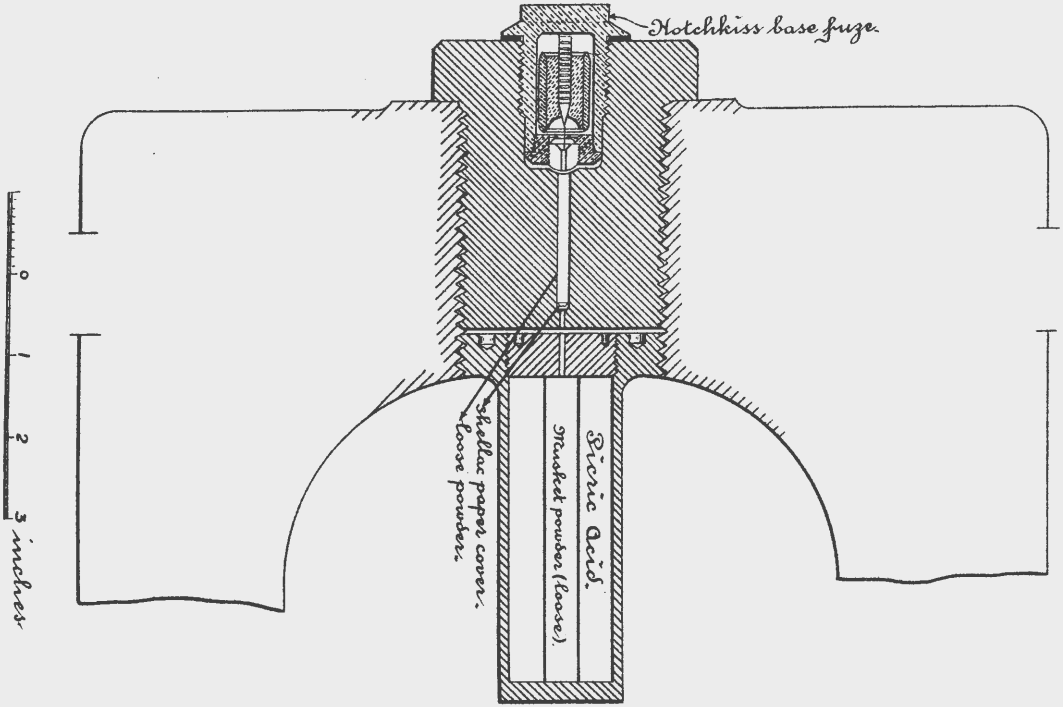
GOVERNORS ISLAND, N. Y., *October 12, 1896.*

GENERAL: The committee on high explosives has the honor to report that during the past year no new explosive compounds have been submitted or tested. The further test of emmensite, recommended in previous reports, has been unavoidably delayed, but an 8-inch high-power breech-loading rifle will soon be available for use, and experiments will be continued to test the safety of firing emmensite and wet gun-cotton with higher velocities and pressures than have heretofore been possible.

A communication of March 25 last from Mr. W. E. Gibbs, in which he referred to a nitroglycerin composition, and also submitted drawings of detonators, was referred to your committee. Mr. Gibbs was informed that it was a rule of the committee to make no test of compounds the composition of which was not fully known. The detonators do not, it is believed, possess sufficient merit to justify tests at the expense of the Government.

A further test of jovite was asked for by the Jovite Manufacturing Company, and permission given for the test, but no sample has as yet been submitted by the company under this authority. In February last, however, the Hathaway High Explosive Company, by permission of the Chief of Ordnance, fired at Sandy Hook five shells from the 6-pounder Driggs-Schroeder rapid fire gun. The shells weighing 6 pounds (empty) were filled with 7¼ ounces of jovite.

The propelling charge was 1 pound of powder, which gave an average pressure of



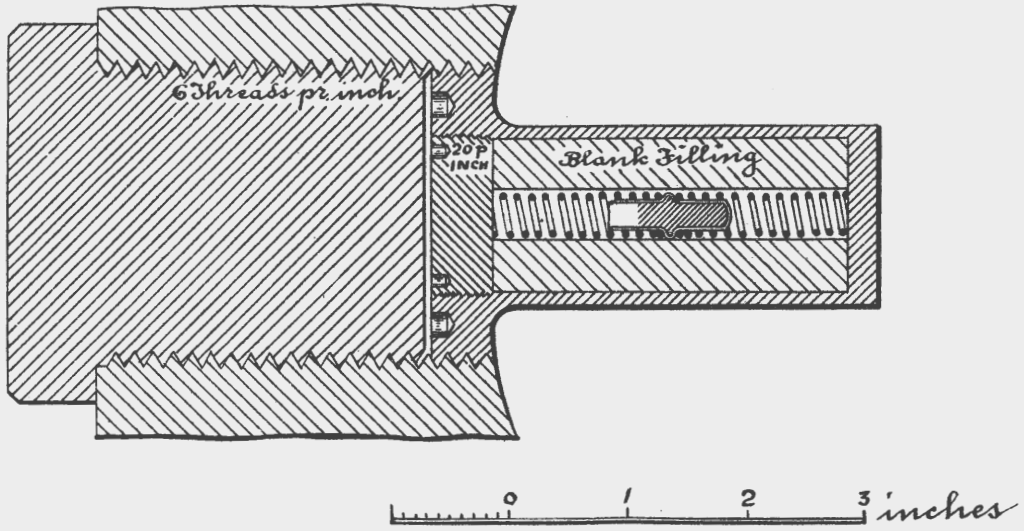
No. 1.

Picric Acid Fuze for
12 Inch B.L. Mortar Shell.

War 54 2

Morrison Gun Cotton & Fulminate Fuzes for 12 Inch Mortar Shell.

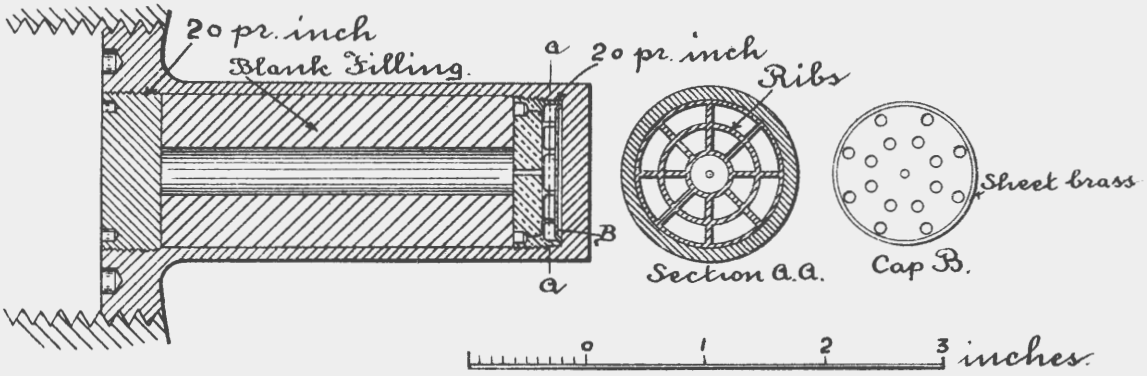
H. No 2.



War 54 2

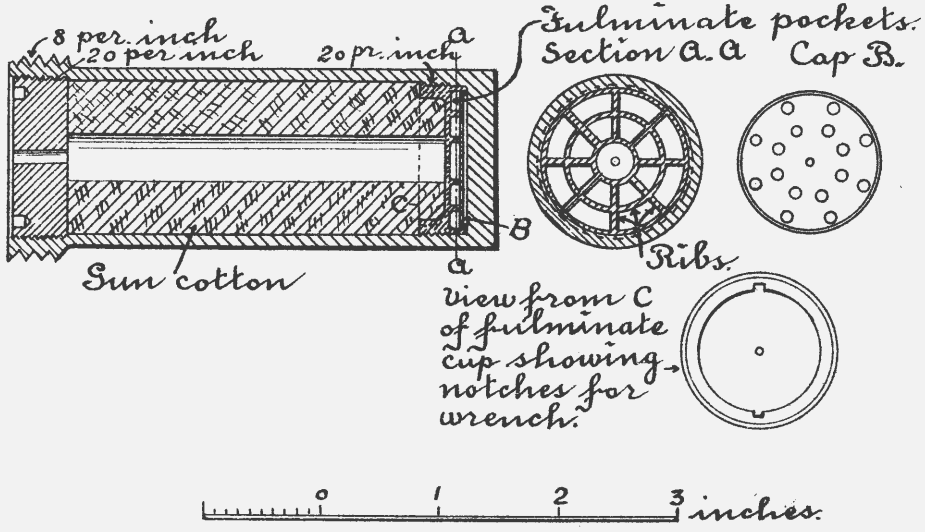
Morrison Gun Cotton & Fulminate Fuzes for 12 Inch Mortar Shells.

No. 3.



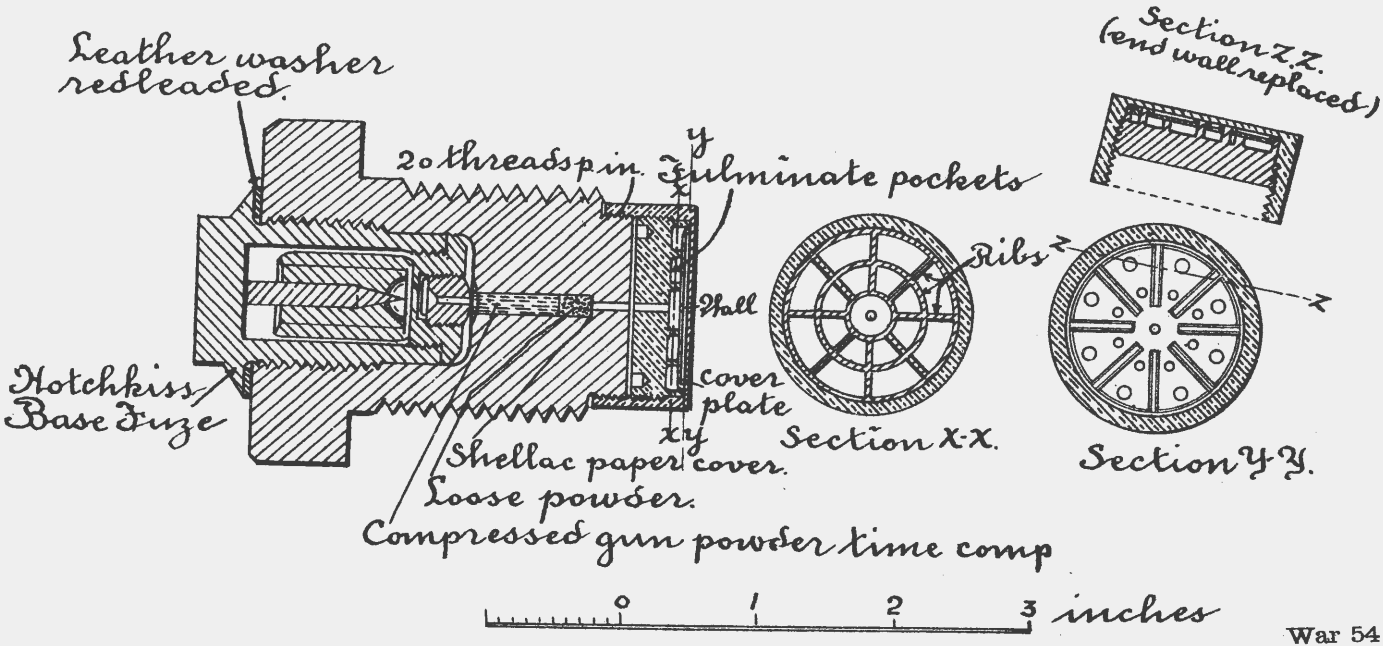
War 54 2

No. 4. Morrison Gun Cotton & Fulminate Fuzes for 7" Shell

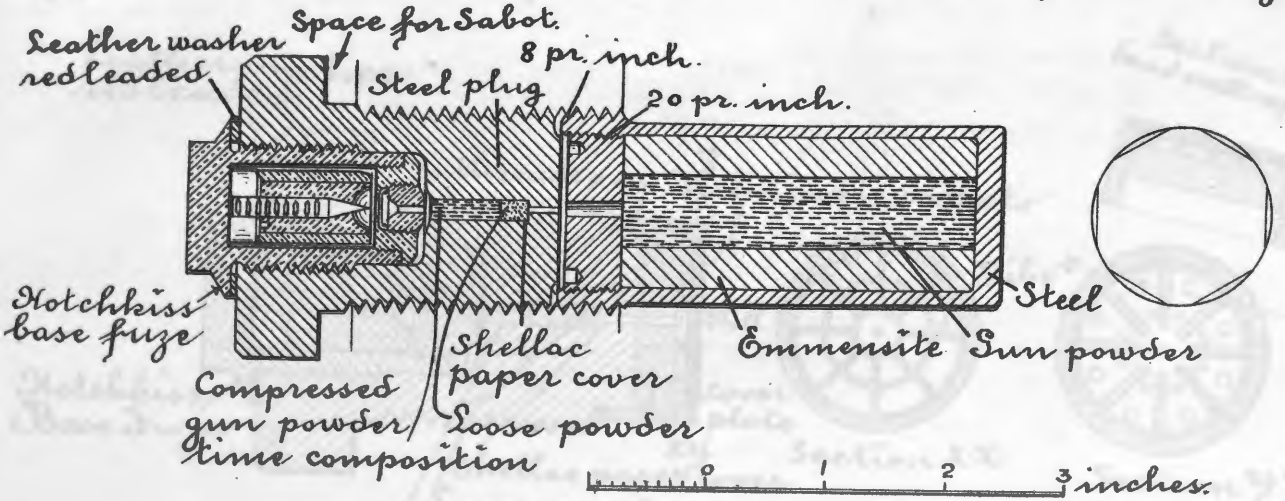


No 5.

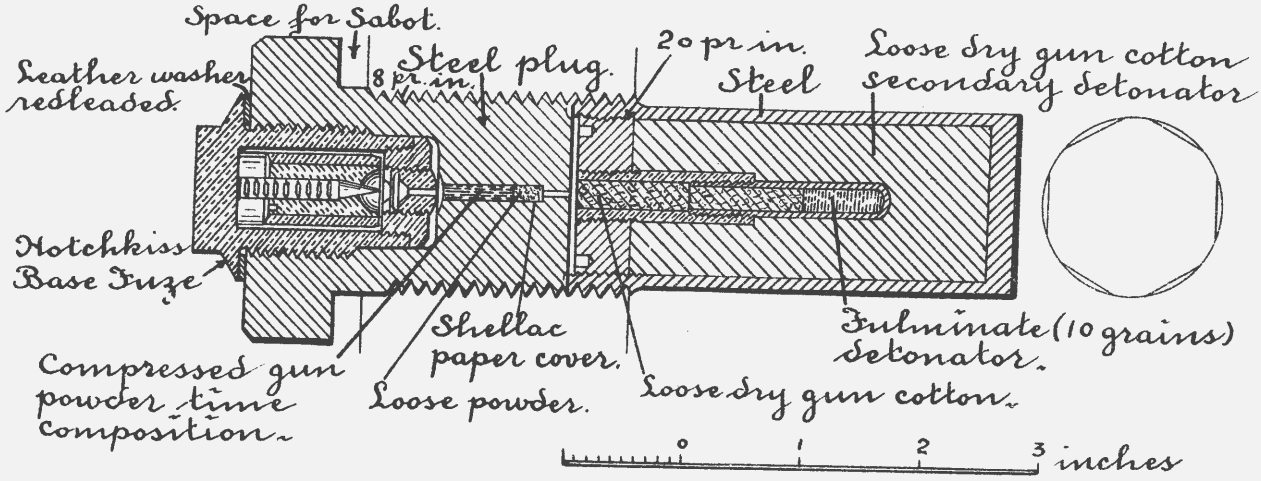
Morrison Gun Cotton & Fulminate Fuzes for 7" Shell.



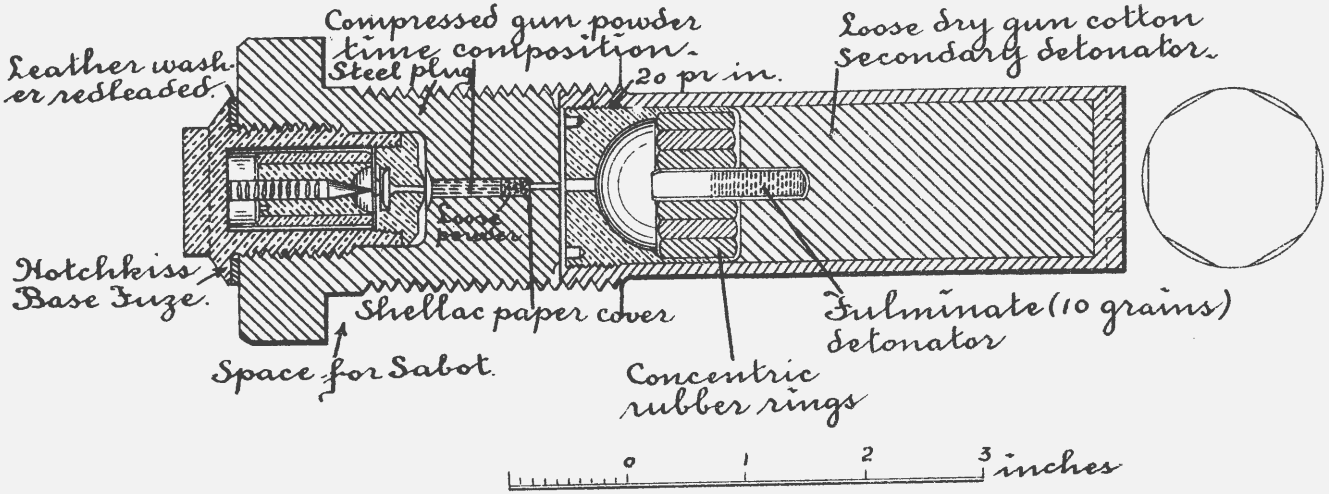
No. 6. Fuzes for High Explosives Modified for Base Ignition



No. 7. Fuzes for High Explosives Modified for Base Ignition.

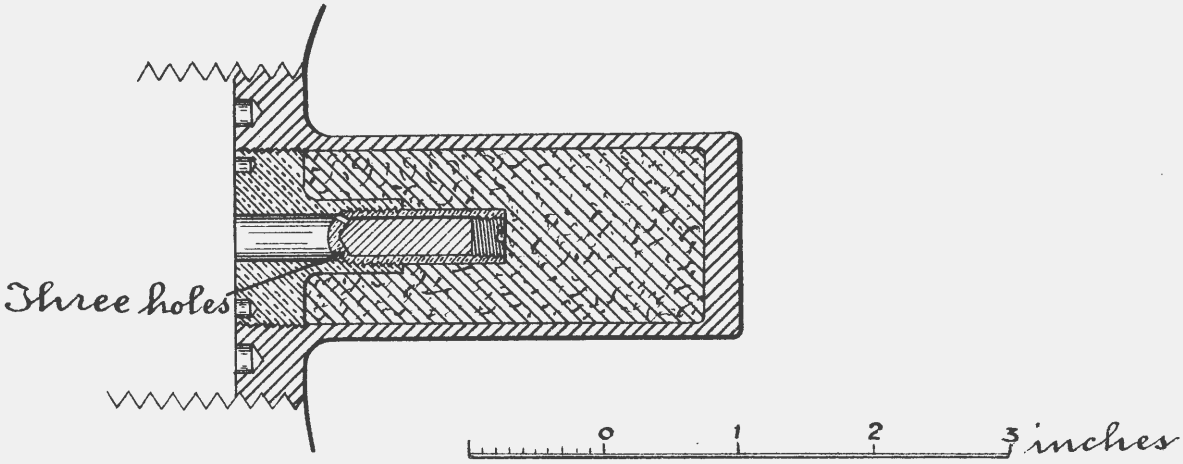


No. 8. Fuzes for High Explosives Modified for Base Ignition

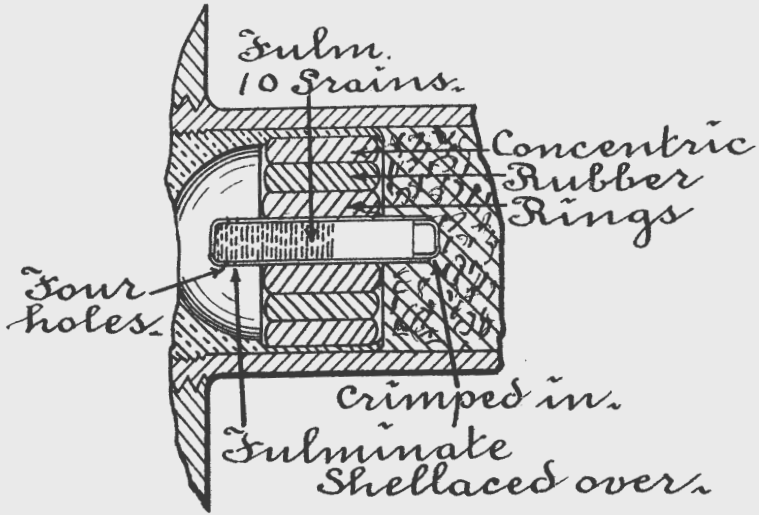


War 54 2

No. 9. Fulminate Fuze. Modification of No. 2.

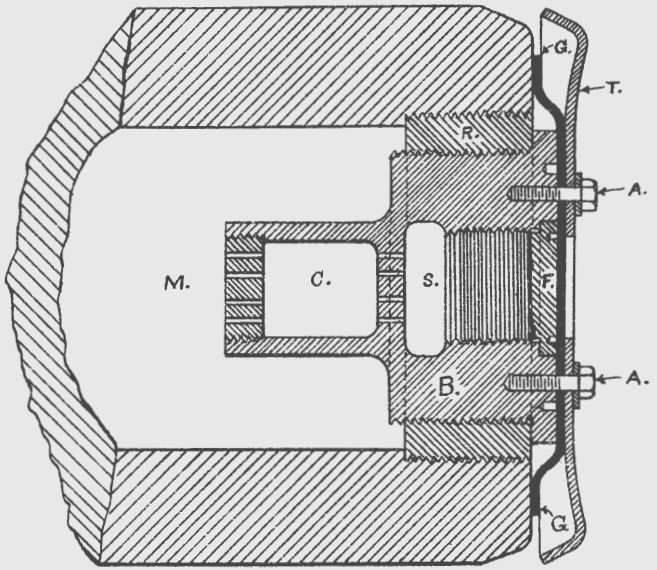


No 10. Modification of No 8 & 7



War 54 2

Plate 11. Maxim Detonator.



Legend.

R. Ring.
C. Detonator.
S. Fine grained powder.
B. Base plug.
G. Rubber gasket.
A. Cap bolts (2).
T. Sabot (cooper)
F. Navy fuze.
M. Maximite.

29,300 pounds per square inch. The jovite was said to be of the same composition and proportions as the N. S. powder tested by your committee last year, and reported on page 5 of the report of the Board for 1895. The shells were fired against a 1½-inch steel plate, having a 3-inch oak backing, and it was intended to demonstrate the insensitiveness of the jovite to shock, friction, and impact, and also that it could be destructively detonated by the Hathaway compound, the exact composition of which is unknown to your committee.

In no case was there a detonation, but the explosions were of a low order, a considerable amount of unexploded jovite being found in front of the butt. The shells penetrated plate and backing, and were, with one exception, found intact, except that the fuse had been blown out by the jovite. One shell evidently broke on impact, from weakness of the shell itself, there being but three or four pieces. The last shell was fired without fuse or detonator, a blank fuse being used to close the fuse hole in rear of shell. No explosion of shell was observable after striking the plate, but after recovery from butt the blank fuse and the jovite were found to have blown out.

The ideal explosive for a shell charge is one which can safely withstand the shock of firing and impact; the friction due to rotation in the gun; is safe to handle; does not deteriorate in storage or by the extremes of heat and cold, and when properly detonated produces an explosion of a very high order. Such a compound requires a very powerful detonating fuse to produce the proper effect. Efforts have been repeatedly made to accomplish this without the use of fulminate of mercury, but unsuccessfully, at least so far as is known to your committee.

The detonator must, like the composition it is intended to instantaneously explode, not be liable to premature explosion, endangering the gun. It should be sufficiently insensitive to permit the shell to penetrate a vessel's armor, waiting for the action of the percussion or delayed-action fuse, that the explosion may occur behind the plate rather than on it. Fulminate of mercury is very sensitive to a blow, and it has been a difficult matter to so carry or cushion it in the shell, as to prevent premature explosion.

The accompanying plates, 1 to 11, show the methods tried at Sandy Hook Proving Ground. The drawings are so plain that a description of them seems unnecessary. A base percussion fuse was used to explode the detonator, compressed gunpowder being used for delay action. None of these detonators worked satisfactorily.

A series of experiments have been made with one designed by Lieutenant Pierce, Ordnance Department, with great promise of success, and it is hoped that tests yet to be made will demonstrate its adaptability for service.

Respectfully submitted.

FRANK H. PHIPPS,
Major of Ordnance, United States Army.

Gen. NELSON A. MILES,
President of the Board of Ordnance and Fortification.

Special methods of throwing high explosives.—Five methods of throwing high explosives have been under consideration by the Board during the year, viz:

1. *The Sims-Dudley system.*—The Sims-Dudley powder pneumatic gun for discharging high explosives consists of three tubes parallel to one another and in the same plane. The middle tube is the largest, and in it is inserted from the rear the projectile, the breech being closed by an ordinary slotted screw breech mechanism. The two side tubes together form the reservoir. The right-hand tube is chambered to receive the powder charge, and is closed at the rear by a second breechblock similar to that used in the main barrel. This tube is united at the front end to the left-hand tube, which opens at the rear end into the main barrel in rear of the projectile. The theory of the gun is that the explosion of the powder charge compresses the air in the tubes, which forms the slow propelling force for the projectile.

The projectile is a cylindrical case, having a suitable head and fuse and a base terminating in a winged tail to steady the shell during flight. What little recoil is developed is absorbed by a pair of springs encircling the side tubes, the three tubes being free to move to the rear against the springs through the trunnion band.

Five shells, containing 15 pounds of explosive gelatin each, were successfully discharged from the gun in the presence of the Board at the company's range at Glen Cove, Long Island, but in firing at a target the third shell, loaded with 4 pounds of rifle powder, was

exploded in the gun, probably by the premature action of the fuse. The gun burst violently, and fragments were scattered in every direction.

No further experiments have been made with this system.

2. *System of the Maxim Powder and Torpedo Company.*—This consists in the use of slow-burning Maxim smokeless powder in a gun of great length of bore. The powder was successfully used to discharge shells containing high explosives from a 7-inch Ames rifle, but owing to the shortness of the gun only low velocity and pressure could be obtained.

3. *The system of the Pneumatic Torpedo and Construction Company.*—This is represented by the two batteries of three guns each at Sandy Hook and San Francisco. Compressed air alone is used in this system, and it has been shown by experiment that charges of 200 pounds of explosive gelatin can be safely projected with accuracy to a distance of 4,000 yards, and a charge of 500 pounds to a distance of 2,000 yards.

The company asks that their method of throwing high explosives be made a part of the defensive system of the United States.

4. *The Mefford pneumatic gun.*—Mr. Mefford proposes to use compressed air simply, but modifies the method of introducing it into the chamber, and claims to avoid "cyclonic action" and obtain increased range for his gun. Only a gun of small caliber has been constructed on this principle and its performance has not been exhibited to the Board.

5. *The Justin system.*—This consists in the use of a carrier for the explosive inside the shell. A part of the Board witnessed some experiments with the Justin projectile June 5, 1896, but they were not successful. Some projectiles were afterwards discharged in the presence of the president of the Board with more success.

No definite conclusion as to these rival systems has been reached, but the whole subject of discharging high explosives from guns is under investigation by committees of the Board.

Halpine torpedo.—The importance of adopting some form of dirigible, automobile torpedo for the auxiliary defense of our harbors has long been appreciated by the Board. After a careful examination of the Halpine system it was deemed worthy of trial, and an allotment was made for its test under the supervision of the Engineer Department. This torpedo is propelled by an electric storage battery and guided electrically by means of a wire from the shore or a boat. It has an arrangement, a more particular description of which is withheld, for hurling the charge of high explosive under a ship's net, against her bottom, the most vulnerable part.

It is expected that the trial of the torpedo can be made at Willets Point early next year.

The Gatling cast-steel mortar.—In order to test the system of constructing mortars proposed by Dr. R. J. Gatling, the Board at its May session made an allotment for a 12-inch B. L. mortar. This mortar is to be made of cast steel, cooled from the interior on the Rodman principle. The bore is afterwards condensed by mandrels, operated by powerful machinery, while the mortar is kept at a red heat in a movable furnace.

The Board, in order to protect the Government, required the following proviso:

> That before payment such mortar shall be tested by the Board of Ordnance and Fortification, the ammunition being furnished by the Government, and shall be shown to the satisfaction of said Board by such test to be at least equal in accuracy, range, power, endurance, material, and general efficiency to the service 12-inch steel mortar now in use.

Experimental parapet.—In order to determine the penetration of projectiles into sand and concrete, and to trace their course accurately,

the Board at its May meeting made provision for the erection of an experimental parapet, in the form of the adopted type of battery at the Sandy Hook Proving Ground.

It is designed to utilize the firing for other purposes, such as proving guns, testing carriages, etc., for this experiment, in order to save expense.

Such a parapet has been designed by the engineer member of the Board, and is now nearly completed. It is expected that interesting and useful data will be obtained from the firing.

The polarizing photochronograph.—The new instrument, which was stated to be under construction in the last report of the Board, has been completed and is much superior to the first machine. It has already given valuable results, and important investigations in smokeless powders in high-power guns are soon to be undertaken.

This remarkable instrument has well fulfilled the promise that led the Board to undertake its development. The results obtained with it in the determination of the motion of the projectile, both inside and outside of the bore, and of the motion of the gun in recoil, have been appreciated not alone in this country but by the leading military journals of Europe.

For the earlier dissemination of the information, the Journal of the United States Artillery has been permitted to publish the reports to the Board of the experiments made, and they are therefore not inserted as an appendix.

Smokeless powders.—Decided progress has been made in the production of smokeless powder in this country during the year, and it may now be authoritatively stated that satisfactory smokeless powders, so far as ballistic results are concerned, for all calibers, can now be obtained of American manufacture. The development thus far has been principally at the expense of the manufacturers, but it will be necessary still for the Government to make costly tests in order that the best in all respects may be adopted. Many things have to be considered besides the ballistic results—as the heat developed, the erosion of the gun, the permanency of the powder, the relative cost of different compounds, the effect of heat and cold, moisture and dryness, etc.

The Board has estimated for a considerable sum for experimentation in this field, and it is hoped that during the coming year the problem of a suitable smokeless powder for the service will be definitely solved.

In connection with its regular meeting in November, 1895, the Board visited the Midvale Steel Works, the Bethlehem Iron Works, the Army Gun Factory, and the Army Gun Carriage Factory, with a view to observing the methods in use at those establishments and ascertaining the capacity of their plants for the production of ordnance material.

As the notes may be of value in connection with the memoranda of a similar inspection which were incorporated in the report of the Board for 1892, they are given here.

MIDVALE STEEL WORKS.

The Board spent the afternoon of November 18, 1895, in inspecting the Midvale Steel Company's works.

Among other interesting processes, the Board witnessed the forging of a B hoop for a 12-inch rifle, weighing 10 tons, under the 87-ton hammer used for this purpose. This heavy weight was managed with great ease by the ingenious appliances employed. The method of supporting the mandrel in forging a hoop is novel. A very heavy overhead crane has an overhang on the side toward the hammer fixed upon powerful springs, from which falls an endless chain. This chain supports

the mandrel, and also, when actuated by a steam engine, turns the mandrel and forging when it is desired to apply the blow in a new place. The springs allow a slight play in the mandrel when the blow is delivered. The company designs putting in a powerful press for forging by the hydraulic-pressure method at an early day. A small plant for producing Holtzer armor and deck piercing projectiles has been established, which is to be considerably extended.

The Board was greatly impressed with the handsome appearance of some 12-inch deck-piercing mortar shells that had just been finished. The company has had remarkable success in producing this class of steel shells.

The Board also witnessed the pouring of a 10-ton steel ingot. This was poured from the ladle into a pipe that carries the molten metal into the flask at the bottom. This method is said to give a cleaner and more uniform cast than where the metal is poured into the flask at the top.

Since the last visit of the Board to these works a new machine shop has been erected. This shop is supplied with two electric overhead cranes on separate tracks, one running under the other. The upper and larger of the two cranes has a capacity of 80 tons. In this shop was observed the method of cutting up ingots, taking out test specimens, etc. A recently made casting of a chassis for a 10-inch disappearing carriage was lying on the floor. This shop is designed in such a way as to be capable of extension.

A large steel casting was poured and a D-hoop for a 12-inch gun was oil-tempered during the Board's visit.

The capacity of these works is believed to be as follows:

Holtzer armor-piercing projectiles.—With the present plant, five 10-inch or 12-inch and ten 8-inch armor-piercing shot can be made per day, but under pressure the plant could be increased in from three to six months so as to produce fifty 10-inch or 12-inch and seventy 8-inch armor-piercing shot per day.

Semiarmor-piercing projectiles.—With the present plant, twenty 8-inch and twelve 10 inch or 12-inch semiarmor-piercing shot can be made per day. The plant could be increased in about three months so as to produce one hundred 8-inch and forty 10-inch or 12-inch projectiles per day.

Gun forgings.—The works can now supply 30 sets of forgings for 8-inch guns or 22 sets for 10-inch, or 14 sets for 12-inch guns per year, but the plant could be increased sufficiently in about twelve months to produce 85 sets of 8-inch forgings, 60 sets of 10-inch, or 40 sets of 12-inch forgings per year. A set of forgings for 8-inch gun can be made in thirty days and one set every fourteen days thereafter; for 10-inch guns, first set in forty days and one set every twenty-three days thereafter; for 12-inch guns, first set in fifty days, and one set every thirty days thereafter. Under pressure the time of delivery of first set could be reduced to twenty-four days for 8-inch, thirty-six for 10-inch, and forty-five for 12-inch forgings.

Forgings and castings for disappearing carriages.—These can be produced at the rate of 16 per year for 10 inch. Under pressure 34 sets of each could be turned out. These forgings and castings could be supplied in six weeks, or under pressure in fourteen days.

The Board was received with great courtesy and given every facility to see the works by President C. I. Harrah and his associate officers.

BETHLEHEM IRON WORKS.

Since the last visit of the Board to this place in 1892, forging under powerful hydraulic presses has been substituted for forging under the

hammer. The enormous 125-ton hammer is now idle. In an emergency it could be used, but it was found to be impossible to properly support its anvil. The jar disturbed machinery in all the other shops and could even be felt in residences across the river.

The hydraulic presses work very effectively and give superior results. They are capable of exerting a pressure of 3,500 pounds per square inch, and with the largest press an ingot of 130 tons weight can be forged.

The Board witnessed the forging of a jacket tube for 5-inch guns under one press and the forging of an ammunition tube about 5 feet in diameter under the heaviest press. The engines that work the latter press are said to have a capacity of 15,000 horsepower and to be the largest land engines in the world.

The Board also witnessed the process of casting a steel ingot and compressing it while in the fluid state. The metal was compressed about 23 inches, a pressure of 7,000 tons being imposed. The method of fluid compression is as follows: The piston is stationary and the strong steel flask is made to rise by hydraulic power. The upward motion of the flask is checked for a brief interval as soon as the piston head touches the surface of the metal. The metal in contact with the piston cools and soon forms a sort of packing between the piston head and the cylinder. The plant for harveyizing, oil tempering, and face hardening armor plates was examined. Since the last visit of the Board this process has been perfected, and the Bethlehem plates have been very successful.

Several of the plates of the *Iowa* were seen in various stages of progress.

The Board carefully examined the progress of the work on the 100-gun contract. Ten 8-inch guns were finished and the work on the 10-inch guns appeared to be well advanced (November 19, 1895).

The Board was shown the Leibert system of breech mechanism for an 8-inch gun in which, by an ingenious system of pinions, a continuous turning of the crank in the same direction rotates the breechblock, withdraws it, and swings the tray. By turning the crank in the opposite direction, the reverse operations are successively performed. The company proposes to try the same principle for a 12-inch breech mechanism.

The Board also observed four 10-inch Crozier-Buffington carriages in various stages of advancement. One of them was finished.

A visit was made to the shrinking department, where a trunnion band for a 10-inch gun was shrunk in place.

The Bethlehem Iron Company has a magnificent plant for the manufacture of heavy ordnance which would prove invaluable in supplementing the Army and Navy gun and carriage factories in time of war, and should therefore be sustained by generous orders in time of peace.

The following statement shows the capacity of the works for producing material, under peace conditions and under pressure:

	Peace conditions.	Urgency.
One 8-inch gun.....months..	10	6
One 10-inch gun.....do....	12	8
One 12-inch gun.....do....	16	12
One set of forgings for 8-inch gun.....do....	4	3
One set of forgings for 10-inch gun.....do....	5	4
One set of forgings for 12-inch gun.....do....	8	6
One 8-inch Crozier-Buffington disappearing gun carriage.....do....	6	4
One 10-inch Crozier-Buffington disappearing gun carriage.....do....	6	4
Forgings and castings for one 8-inch Crozier-Buffington disappearing gun carriage.....weeks..	10	7
Forgings and castings for one 10-inch Crozier-Buffington disappearing gun carriage.....weeks..	10	7

APPROXIMATE CAPACITY PER ANNUM.

	Peace conditions.	Urgency.
8-inch finished guns	8	12
10-inch finished guns	8	10
12-inch finished guns	4	5
Total guns per annum	20	27

With their present facilities they can turn out about twelve 10-inch or 8-inch Crozier-Buffington disappearing carriages, and under pressure and with some additional tools this number could be increased to about one and one-half per month of either size. Their annual capacity for forgings and castings for disappearing carriages is, for 8-inch or 10-inch, about two sets per month, and these figures might be increased to about three sets per month, of either size, under pressure.

The total annual capacity of the works at present for the production of gun forgings is about 6,162,000 pounds, and under pressure this might be increased to 9,000,000 pounds. The weight of a set of 8-inch gun forgings is 39,166 pounds; of 10-inch forgings, 82,068 pounds, and of 12-inch forgings, 139,778 pounds.

The Board did not meet the president of the company, Mr. Robert P. Linderman, who was absent from the city, but were received by Vice-President R. W. Davenport, who very courteously threw open the works to the inspection of the Board.

ARMY GUN FACTORY AT WATERVLIET ARSENAL.

The Board was shown through the gun factory by the commanding officer, Maj. I. Arnold, Ordnance Department, and his officers.

The plant has been much improved since the last visit of the Board in June, 1892.

The south wing of this magnificent shop, 1,000 feet in length, is now equipped with machinery, lathes for 16-inch guns, additional traveling cranes, an electric plant, and many new machines have been put in.

The capacity of the arsenal for the manufacture of modern ordnance is per year as follows: Twelve 8-inch guns, twelve 10-inch guns, thirteen 12-inch guns, and fifty field guns.

It is probable that the output of 10-inch and 12-inch guns will reach fifteen and sixteen, respectively, next year, if sufficient appropriations are available. This capacity could be doubled in case of emergency by running the shops overtime. To provide machinery for still further ncreasing the output would take, it is estimated, at least two years.

The time required to completely construct guns after receiving the forgings is as follows: For an 8-inch gun, nine months; for a 10-inch gun, ten months; for a 12-inch gun, eleven months. This, of course, could be reduced by working night and day.

The Board witnessed the shrinking of a 10-inch jacket upon the tube. The heavy weight was handled with ease by the overhead crane, accurately centered above the tube, and dropped home with no apparent difficulty.

Many heavy guns were noticed in various stages of construction, and the operations of turning off the exterior of nearly finished 12-inch guns and rifling them were especially observed.

The enormous lathes erected for the construction of 16-inch guns were examined. These lathes were designed at the arsenal and made by the Pond Machine Tool Company, of Plainfield, N. J., and are the largest ever made in this country.

The gun factory has been in operation about eight years, the new shops only about half that time, and the output of guns is already creditable.

The total* is as follows:

Eighteen 12-inch B. L. steel rifles, including three to be finished December 31.
Forty-two 10-inch B. L. steel rifles, including seven to be finished December 31.
Twenty-five 8-inch B. L. steel rifles, including five to be finished December 31.
Seven 12-inch B. L. steel mortars.
Twenty 7-inch B. L. steel howitzers.
One 7-inch B. L. steel-mortar type.
Twenty-four 3.6-inch B. L. steel field guns.
Sixteen 3.6-inch B. L. steel field mortars.
One hundred and twenty-five 3.2-inch B. L. steel field guns.

The Board is indebted to Major Arnold for his courtesy in furnishing information in regard to the work under his charge and in throwing his shops open to its inspection.

The gun factory is now equipped with the most modern machinery and everything is in excellent condition, and the best class of work is being turned out in a most satisfactory manner.

WATERTOWN ARSENAL.

The Board was received by Maj. J. W. Reilly, Ordnance Department, the commanding officer, and his assistants, who offered every facility for a thorough examination of the works.

The Board first visited the United States testing machine and had its operations explained. The various machines and appliances in the shops and foundry were exhibited to the Board and the several seacoast carriages were manipulated.

The action of an 8-inch Crozier-Buffington disappearing carriage was shown by traversing and elevating it and running it in and out of battery. It worked very smoothly.

Only cast-iron projectiles, principally for test purposes, are made at the arsenal.

With the present plant, which should be largely increased, the capacity of the arsenal is about thirty seacoast carriages per year. This output could be doubled by working day and night, and the plant could probably be duplicated in about a year. The steel forgings and castings are purchased, but the cast-iron parts are made in the arsenal foundry.

The capacity for cast-iron projectiles is about 3,000 per year of all calibers. It takes about ten days to finish a 12-inch projectile. The projectile plant could readily and quickly be increased.

The gun carriage factory has but made a beginning in supplying carriages for modern guns, and only the following had been made at this place, at the date of Board's visit, November 18, 1895:

Four 12-inch gun-lift carriages, including one to be finished December 31 (1895).
Four 12-inch barbette carriages.
Five 10-inch barbette carriages.
Eight 8-inch barbette carriages.
Five 8-inch disappearing barbette carriages, including three to be finished December 31 (1895).

The Board was impressed by its observation of the various establishments visited with the embarrassment and lack of economy that result from the irregularity and uncertainty with which work is carried on under the present system of making appropriations. Many of the processes in gun, carriage, and projectile making are now very scientific

*These figures are given for the time of the Board's visit in November, 1895.

and require the education of a staff and workmen to carry them on successfully. Unless continuous work can be supplied, foremen and workmen must be disbanded, and when work recommences, others have to be trained as before. The Board is more than ever convinced of the wisdom of the recommendation it made in its last annual report (1895), that regular annual appropriations be made for seacoast defenses and their armament. It is not difficult to determine what total amount will be necessary to place our coasts in a proper state of defense, and by apportioning this through a suitable number of years, a fixed annual appropriation could be made that would obviate the disadvantages noted and enable the work to be done with far more economy to the Government.

ESTIMATES FOR THE COMING YEAR.

The Board submits the following estimate of funds that will be required for its work during the ensuing fiscal year:

Proof carriage for 16-inch B. L. rifle	$25,000
Steel plates, projectiles, and other expenses connected with the test of high explosives	30,000
Tests of field and siege material	10,000
For test of experimental guns and carriages	25,000
For experiments with smokeless powder	30,000
For development of a system of seacoast fire control, purchase of range finders and other instruments, installation of means of communication, etc	10,000
Tests of rapid-fire guns and mounts	10,000
Expenses of Board, including salary of civilian member	10,000
Total	150,000

It is recommended that the appropriation be made as heretofore in a single amount to enable the Board to make all needful and proper purchases, experiments, and tests to ascertain, with a view to their utilization by the Government, the most effective guns, small arms, cartridges, projectiles, fuses, explosives, torpedoes, armor plates, and other implements and engines of war, and to purchase or cause to be manufactured, under authority of the Secretary of War, such guns, carriages, armor plates, and other war material as may, in the judgment of the Board, be necessary in the proper discharge of the duty devolved upon it by the act approved September 22, 1888; to pay the salary of the civilian member of the board of Ordnance and Fortification provided by the act of February 24, 1891, and for the necessary traveling expenses of said member when traveling on duty as contemplated in said act; for the payment of the necessary expenses of the Board, including a per diem allowance to each officer detailed to serve thereon when employed on duty away from his permanent station, of $2.50 a day; and for the test of experimental guns, carriages, and other devices procured in accordance with the recommendation of the Board of Ordnance and Fortification.

CONCLUSION.

Under the increased appropriations of the present fiscal year, the work of placing our harbors in a proper state of defense is making good progress, and if only the same sums are appropriated annually for a few years our principal ports will present a formidable front to an attacking fleet. It is hoped, however, that even more liberal appropriations will be made in order that we may sooner be ready for an emergency that may arise at any time. In view of the present serious aspect of European politics, it is only common prudence for this nation to be on

its guard, for should a conflict arise we are liable to be embroiled with some power whose navy, in the present defenseless condition of our coasts, might destroy or exact enormous ransoms from our chief cities.

A war, if it come at all, will come with no warning and no time for preparation. China, with undefended ports and an inadequate navy, was defeated in a few months. In the last war between the great military powers of Germany and France, the surrender at Sedan occurred only forty days after the declaration of war.

The wars of nations occur in cycles of varying length, but seldom does a generation pass without a great conflict. Already more than thirty years have elapsed since our last great war, and another may soon, if the past be a guide to the future, terminate one of the longest intervals of peace we have ever enjoyed.

Our Engineer Department is ready with the most modern plans for fortifications, and our Ordnance Department is prepared with designs for guns and carriages that are equal to any in the world. If Congress will but increase the appropriations to the capacity of those departments for useful and economical work, it will not be long before our coasts are secure against the attack of foreign powers. An effective preparation for war is the best safeguard against war.

NELSON A. MILES,
Major-General Commanding U. S. Army, President of the Board.

ROYAL T. FRANK,
Colonel First Artillery, U. S. Army.

PETER C. HAINS,
Colonel of Engineers, U. S. Army.

FRANK H. PHIPPS,
Major Ordnance Department, U. S. Army.

JOSEPH H. OUTHWAITE,
Civilian Member, Board of Ordnance and Fortification.

J. C. AYRES,
Captain Ordnance Department, U. S. Army, Recorder of the Board.

APPENDIX A.

TABLE SHOWING ALLOTMENTS MADE BY THE BOARD OF ORDNANCE AND FORTIFICATION FROM OCTOBER 31, 1895, TO OCTOBER 31, 1896, INCLUDING STATEMENT OF UNEXPENDED BALANCES UNDER THE SEVERAL APPROPRIATIONS.

ACT OF SEPTEMBER 22, 1888.

Purpose of allotment.	Date.	Amount.
	1896.	
For the purchase of submarine mining material	Mar. 12	$2,500.00
For the construction of a type 5-inch rapid-fire gun with pillar mounting	....do ...	13,349.18
For twenty rounds of ammunition complete for test of Haskell 8-inch multicharge gun	June 1	853.27
Additional for test of Haskell 8-inch multicharge gun	July 1	1,745.60
Total	.....	18,448.05
Revocations of allotment under this act.		
From the allotment of $5,000 (included in sum of $200,000) made Oct. 30, 1888, "for purchase of motors for equipping movable torpedoes in store"	Mar. 12	2,500.00
From allotment of $1,500 made Jan. 10, 1889, "for one carriage for 3.6-inch field gun"	....do ...	1,481.65
From allotment of $385 made June 5, 1889, "for the purchase of two Scott telescopic sights"	....do ...	.55
From the allotment of $600 made Oct. 10, 1889, "for the purchase of two Unge telemeters"	....do ...	157.80
From allotment of $35,000 made Oct. 31, 1888, "for the purchase of material for and the manufacture of one 12-inch hooped steel type gun"	....do ...	28.19
From allotment of $2,000 made Oct. 1, 1890, "to repair damage to the carriage used in the test of the 10-inch B. L. R."	....do ...	564.78
From the allotment of $150 made Nov. 5, 1890, "for the purchase of Bode quadrant sight"	....do ...	126.20
From allotment of $125 made Nov. 8, 1890, "for the purchase of one Watkins infantry range finder"	....do ...	43.61
From allotment of $50 made Feb. 11, 1891, "for Grenfell electric night sights"	....do ...	1.33
From allotment of $4,000 made Feb. 13, 1891, "for altering carriage for 12.25-inch gun"	....do ...	1,217.46
From allotment of $3,500 made Mar. 25, 1891, "for altering a carriage for 12-inch B. L. c. i. R., to be used in test of B. L. rifles"	....do ...	655.22
From allotment of $2,818 made June 15, 1891, 'for completing Woodbridge 10-inch wire-wound gun"	....do ...	1,537.18
From allotment of $500 made Mar. 15, 1889, "for cradle for test of 12-inch B. L. cast-iron mortar"	....do ...	350.00
From allotment of $3,870 made June 12, 1889, "for purchase of 6-pounder Driggs-Schroeder B. L. gun and 500 rounds of ammunition"	....do ...	70.00
From allotment of $2,857 made Dec. 13, 1889, "for the purchase of drawings and forgings and for the manufacture of an experimental 3.2-inch gun to be fitted with the breech mechanism of the Driggs Ordnance Co., including small tools"	....do ...	904.15
From allotment of $51,000 made Dec. 14, 1889, "for completing 12-inch hooped steel type gun"	....do ...	4,602.90
From allotment of $14,000 made June 6, 1890, "additional for the construction of the 10-inch wire-wound rifle of Lieutenant Crozier's design"	....do ...	638.52
From the allotment of $150 made May 5, 1891, "for one Best telescopic sight"	....do ...	50.00
From the allotment of $250 made July 23, 1891, "for further tests of Berdan fuze"	....do ...	89.91
From the allotments of Jan. 21 and 22, 1892 ($2,900 and $2,800, respectively), "for construction of outer and inner platform plates for mounting gun carriages for use at the ordnance proving ground"	....do ...	783.83
From allotment of $131.71 made May 5, 1892, "for procuring and testing Walter combination fuzes (additional)"	....do ...	31.83
From allotment of $1,485 made Feb. 21, 1894, "for the purchase of a 6-pounder Seabury rapid-fire gun"	....do ...	3.00

TABLE SHOWING ALLOTMENTS MADE BY THE BOARD OF ORDNANCE AND FORTIFICATION FROM OCTOBER 31, 1895, TO OCTOBER 31, 1896, ETC.—Continued.

ACT OF SEPTEMBER 22, 1888—Continued.

	Date.	Amount.
Revocations of allotment under this act—Continued.		
From allotment of $60 made June 25, 1894, "to enable the Chief of Ordnance to have tested at Fort Monroe, Va., the system of plotting and directing the fire of batteries at moving targets devised by Lieut. E. M. Weaver"	1896. Mar. 12	$11.07
From allotment of $45,000 made Nov. 6, 1888, "for purchase of one 12-inch barbette gravity return carriage, one 12-inch mortar carriage, and one 12-inch mortar Canet or Raskazoff carriage"	Apr. 14	2,294.06
From allotment of $25,000 made Jan. 8, 1889, "for ammunition for test of Woodbridge 10-inch wire-wound gun"	....do ...	86.87
From allotment of $5,000 made Feb. 12, 1890, "for the purchase of a Raskazoff siege carriage"	....do ...	650.80
From allotment of $11,333.33 made Feb. 13, 1891, "for purchase of aerial subaquatic torpedoes"	....do ...	.01
From allotment of $300 made July 14, 1893, "for preparation of drawings of first Gordon disappearing gun carriage"	....do ...	300.00
From allotment of $2,000 made Dec. 6, 1893, "for mounting 12-inch mortars at Sandy Hook Proving Ground"	....do ...	2,000.00
From allotment of $5,810 made Jan. 9, 1894, "for rifling one 15-inch S. B. gun, etc., for use in connection with experiments with high explosives"	....do ...	.86
From allotment of $60 made Apr. 27, 1894, "for repair of 5-inch rifle fitted with Seabury breech mechanism"	....do ...	60.00
From allotment of $2,500 made Jan. 22, 1892, "for alteration of two 15-inch carriages for mortars"	....do ...	2,098.87
From allotment of $500 made Jan. 22, 1892, "for platforms for these mortars"	....do ...	500.00
Total revocations under this act		23,840.65
Total appropriated under this act		3,972,000.00
Total net allotments		3,966,607.40
Balance available for allotment		5,392.60

ACT APPROVED MARCH 2, 1889.

For the purchase of a Halpine torpedo with five extra-charge cans, July 1, 1896	$10,000.00
Total allotted, expended, and reverting to Treasury to October 31, 1895 (see last report)	1,250,819.00
Allotted from October 31, 1895, to October 31, 1896	10,000.00
Total allotted to date	1,260,819.00
Total appropriated under this act	1,289,594.00
Total allotted, expended, and reverting to Treasury	1,260,819.00
	28,775.00
Reappropriated in act of August 18, 1890 (see first report of Board, p. 37)	14,000.00
Balance available for allotment	14,775.00

This balance is available only for the purchase of movable submarine torpedoes.

ACT APPROVED AUGUST 18, 1890.

	Date.	Amount.
Purpose of allotment.		
For the purchase (including cost of transportation) of one Barr and Stroud fortress range finder	1896. Oct. 20	$1,300.00
Revocations of allotment under this act.		
From allotment of $277.16 made Sept. 25, 1894, "additional to defray freight charges on experimental powders purchased abroad"	Feb. 6	277.16
From allotment of $25 made Nov. 20, 1894, "to enable Chief of Ordnance to purchase a second Weldon range finder"	....do ...	25.00
From allotment of $110 made Sept. 6, 1893, "for purchase of one set of mekometers	Apr. 14	46.74
From allotment of $500 made Oct. 1, 1890, "for drawings and advertising for bids for finishing 8, 10, and 12 inch guns by private parties"	....do ...	440.00
From allotment of $65,000 made Nov. 8, 1890, "for finishing and assembling eleven 8-inch guns by West Point Foundry Co"	....do ...	473.28
From allotment of $3,031 made May 6, 1891, "for test of Brown segmental wire gun"	....do ...	48.00

TABLE SHOWING ALLOTMENTS MADE BY THE BOARD OF ORDNANCE AND FORTIFICATION FROM OCTOBER 31, 1895, TO OCTOBER 31, 1896, ETC.—Continued.

ACT APPROVED AUGUST 18, 1890—Continued.

	Date.	Amount.
Revocations of allotment under this act—Continued.		
From allotment of $3,484 made Jan. 10, 1894, "for test of Brown segmental wire-wound gun"	1896. Apr. 14	$212.84
From allotment of Oct. 25, 1894, $800, "for ten cast-iron projectiles for use in connection with experiments in high explosives"	....do ...	18.00
Total revocations under this act	.....	11,541.02
Total allotted and expended to Oct. 31, 1895 (see last annual report)	.....	3,831,820.33
Net revocations of allotment from Oct. 31, 1895, to Oct. 31, 1896	.....	241.02
Total net allotments to date	.....	3,831,579.31
Total appropriated under this act	.....	3,832,935.00
Total net allotments to date	.....	3,831,579.31
		1,355.69
Reappropriated from act of Mar. 2, 1889 (see first annual report, p. 37)	.....	14,000.00
Balance available for allotment	.....	15,355.69

ACT APPROVED FEBRUARY 24, 1891.

	Date.	Amount.
Purpose of allotment.		
For adapting the Hotchkiss 12-cm. gun to the Gerdom breech mechanism	1895. Nov. 25	$1,500.00
For the alteration and transportation of the modified 10-inch Gordon disappearing gun carriage by the Morgan Engineering Co. (see also acts of 1892, 1893, 1894, and 1895)	1896. Feb. 6	336.49
For construction of a type 5-inch rapid-fire gun with pillar mounting (see also acts of 1888, 1892–1895)	Mar. 12	7,215.38
For the purchase of a completed 12-inch cast-steel mortar constructed on the plans of R. J. Gatling (see also acts of 1892–1895)	May 5	233.24
Total allotments	.....	9,285.11
Revocations of allotment under this act.		
From allotment of $32,000 made May 8, 1891, "for purchase of 12-cm. Hotchkiss gun and ammunition"	1895. Nov. 25	1,815.79
From allotment of $1,500 made May 5, 1891, "for purchase (duty free) of a sample of German brown prismatic powder for trial in the 12-inch B. L. R., steel"	1896. Feb. 6	20.70
From the allotment of $24,000 made May 8, 1891, "for purchase and delivery of one Hotchkiss 12-cm. gun and 500 rounds of ammunition"	Mar. 12	982.50
From the allotment of $35,000 made May 8, 1891, "for the purchase and delivery of one Armstrong 12-cm. R. F. gun and 500 rounds of ammunition"	....do ...	3,373.38
Allotment made Oct. 21, 1891, "for the purchase and transportation of a sample of Nobel smokeless powder for use in the 12-inch B. L. R. steel"	....do ...	2,500.00
From the allotment of $2,000 made Mar. 29, 1891, "to provide for 15 rounds for preliminary tests of pneumatic disappearing gun carriage by the manufacturers"	....do ...	248.00
From the allotment of $200 made Dec. 29, 1892, "additional for the cost of procuring smokeless powder for experimental purposes"	....do ...	16.74
From the allotment of $250 made Sept. 6, 1893, "for the transfer of the Lewis range finder to another position at Fort Wadsworth"	....do ...	21.07
From the allotment of $175 made Oct. 24, 1893, "for test of Robertson 2-barrel .45-caliber machine gun"	....do ...	73.70
From the allotment of $2,150 made Mar. 26, 1891, "for the purchase of samples of smokeless powder from the Cologne powder works"	Apr. 14	78.08
From the allotment of $150 made Feb. 23, 1893, "for the purchase of a Whistler elevating arc"	....do ...	150.00
From the allotment of $175 made Feb. 23, 1893, "for purchase of a Watkin range finder"	....do ...	4.66
From the allotment of $130 made Apr. 14, 1893, for Greeley ink-writing district registers	....do ...	.50
Total revocations	.....	9,285.11
Total net allotments to date (see last annual report)	.....	2,290,803.00
Total appropriated under this act	.....	2,290,803.00

TABLE SHOWING ALLOTMENTS MADE BY THE BOARD OF ORDNANCE AND FORTIFICATION FROM OCTOBER 31, 1895, TO OCTOBER 31, 1896, ETC.—Continued.

FORTIFICATIONS ACTS APPROVED JULY 23, 1892, FEBRUARY 18, 1893, AUGUST 1, 1894, MARCH 2, 1895, AND JUNE 6, 1896.

Purpose of allotment.	Date.	Amount.
For the erection of shelter houses at Forts Hamilton and Wadsworth for the protection of converter boards and relocator instruments (additional)	1895. Nov. 25	$79.63
For the renewal of traverse at Sandy Hook for protection against accident, and for removal of loading magazine to a more secure locality	....do	750.00
For purchase of new plane tables for use in connection with experimental work at Sandy Hook Proving Ground	....do	800.00
For the removal from gun lift at Fort Hancock of the type 12-inch B. L. rifle and for mounting another rifle on gun lift in its stead	....do	1,500.00
For the removal and shelter of 12-inch minimum-port experimental carriage at Sandy Hook	....do	1,000.00
For the construction and installation of two standard base-end instruments, as proposed by Lieut. H. L. Harris	....do	1,500.00
To reimburse Ordnance Department for powder used in test of Driggs-Schroeder 4-inch R. F. gun	1896. Jan. 8	175.66
For the alteration and transportation of the modified 10-inch Gordon disappearing gun carriage by the Morgan Engineering Co	Feb. 6	13,628.51
For the manufacture of a type 10-inch center-pintle disappearing gun carriage of the Crozier-Buffington design	Mar. 12	25,000.00
To enable the Chief of Ordnance to compensate the Consolidated Telegraph and News Co. for extra time and material furnished in connection with the construction of the Millar converter board	....do	214.12
For the manufacture of a type 12-inch disappearing gun carriage and platform of the Crozier-Buffington design	....do	45,000.00
For the construction of a type 5-inch R. F. gun with pillar mounting	....do	435.44
For disbursements under supervision of Chief of Ordnance for such work and material as may be required by Board on Regulation of Seacoast Artillery Fire	Apr. 16	100.00
For the purchase of a completed 12-inch cast-steel mortar, constructed on the plans of R. J. Gatling (see also act of 1891)	May 5	14,766.76
For the construction at Sandy Hook of an experimental butt with the view to tracing the course of a projectile in sand or concrete	....do	5,000.00
For the procurement of certain special material required in connection with the experimentation and construction of the polarizing photochronograph	May 6	1,420.00
For the procurement of a replotter arm, as designed by Lieut. I. N. Lewis	....do	50.00
For the procurement and installation at Fort Wadsworth of a set of dial telegraph instruments, as proposed by Lieut. I. N. Lewis	....do	500.00
For the installation at Forts Hamilton and Wadsworth of the system of the Interior Telephone Co., for test	May 7	35.00
For certain expenses already incurred in the construction of the Parkhurst telescopic sight, and to procure labor and material for the purpose of completing the instrument	June 1	245.24
Ammunition for trial of Haskell 8-inch multicharge gun (see also act of 1888)	July 1	1,286.13
For construction of another platform at Sandy Hook Proving Ground for test of disappearing gun carriages	July 2	4,000.00
Purchase of a 10-inch Howell disappearing gun carriage	....do	50,000.00
Construction of a Gatling 8-inch cast-steel gun	....do	40,000.00
Loading apparatus for Emery elevating carriage	....do	10,000.00
For the construction of one breech sight for 8-inch converted rifle, as designed by Lieut. C. W. Hobbs	....do	90.00
Additional for experimental parapet at Sandy Hook	....do	1,300.00
For the construction of a visual target indicator designed by Lieut. Arthur Murray	....do	170.00
For procuring a type quadrant, as designed by Lieut. I. N. Lewis	Aug. 18	75.00
To reimburse Ordnance Department for expenses incurred in procuring one Rafferty multiplying scale	Sept. 15	15.00
To procure friction primers, cartridge bags, and pressure gauges for use in experimental firings at Sandy Hook Proving Ground	Oct. 19	1,500.00
For purchase of smokeless powders for cannon, to be used in the development and test of smokeless powders, with a view to their adoption for service	....do	20,000.00
Additional for the construction of a visual target indicator of the design submitted by Lieut. Arthur Murray	....do	30.00
For repair of wires of the Fiske position finder at Fort Hamilton	Oct. 20	20.00
For necessary expenses of the Board	.....	8,564.63
Total allotted	.....	249,251.12
Revocations of allotments under these acts.		
From allotment of $18,000 made Nov. 16, 1892, "for tests of 8-inch barbette and disappearing carriages, including minor alterations and repairs	Mar. 12	8,000.00
From allotment of $20,000 made Nov. 16, 1892, "for test of 10-inch disappearing carriages, including minor alterations and repairs and incidental expenses"	....do	9,000.00
From allotment of $12,000 made Nov. 16, 1892, "for tests of 12-inch barbette carriage, including minor alterations and repairs and incidental expenses"	....do	2,000.00
From allotment of $3,500 made Nov. 16, 1892, "for tests of 7-inch howitzer carriage, including minor alterations and repairs"	....do	3,000.00
From allotment of $4,500 made Nov. 16, 1892, "for tests of 7-inch mortar carriage, including minor alterations and repairs"	....do	4,000.00

TABLE SHOWING ALLOTMENTS MADE BY THE BOARD OF ORDNANCE AND FORTIFICATION FROM OCTOBER 31, 1895, TO OCTOBER 31, 1896, ETC.—Continued.

FORTIFICATIONS ACTS APPROVED JULY 23, 1892, ETC.—Continued.

	Date.	Amount.
Revocations of allotments under these acts—Continued.		
From allotment of $10,000 made Nov. 16, 1892, "for completion of test of Crozier 10-inch wire-wound gun to 300 rounds"	1896. Mar. 12	$10,000.00
From allotment of $12,000 made Nov. 16, 1892, "for completing test of Woodbridge wire-wound gun to 300 rounds"	....do ...	2,250.00
From allotment of $8,000 made Nov. 9, 1893, "for purchase of one 12-cm. quick-fire gun and mount of design of Schneider & Co."	....do ...	280.00
From allotment of $4,000 made Sept. 7, 1893, "for the purchase by the Chief of Ordnance of 100 rounds of ammunition, complete, with ordinary cast-iron shell, for test of the 12-cm. Schneider (Creusot) quick-fire gun"	....do ...	236.50
From allotment of $1,200 made Sept. 24, 1895, for completing test of the 8-inch and 10-inch Crozier-Buffington gun carriages	1895. Nov. 25	1,200.00
From the allotment of $20,000 made Oct. 24, 1894, "for the purchase by the Chief of Ordnance of brown powder for experimental firings with seacoast guns"	1896. Mar. 12	6,750.00
From allotment of $50 made Jan. 8, 1895, "for purchase of two lightning arresters and two small switch boards for use of Board on Regulation of Seacoast Artillery Fire"	....do ...	16.50
From allotment of $200 made Feb. 12, 1895, "for purchase of 40 rounds of ammunition from Driggs Ordnance Co. for experimental firings with Driggs 12-pounder R. F. field gun mounted on a minimum recoil carriage"	....do ...	12.80
From allotment of $100 made Apr. 18, 1895, "for purchase, for Board on Regulation of Seacoast Artillery Fire, of 20 chestnut telegraph poles," etc.	....do ...	28.50
From allotment of $105 made June 18, 1895, "for construction of certain parts of sights for the 8-inch converted and 8-inch service B. L. rifles for the development of the telescopic sights of Lieut. C. D. Parkhurst"	....do ...	30.00
From allotment of $85.11 made July 16, 1895, "to enable the Chief of Ordnance to purchase 353 pounds No. 12 B. & S. gauge copper wire"	....do ...	.11
From the allotment of $40 made Aug. 6, 1895, "to enable the Chief of Ordnance to procure a new metallic arm for the Rafferty relocator"	....do ...	10.00
From the allotment of $28 made Sept. 23, 1895, "for the procurement, for the Board on Regulation of Seacoast Artillery Fire, of four Swiss stop watches"	....do ...	2.00
From the allotment of $25 made Sept. 23, 1895, "to procure a detector galvanometer for the use of the committee on high explosives in subterra shell trials"	....do ...	5.00
From the allotment of $550 made Oct. 22, 1895, "for the necessary changes in the old Lewis range finder now at Fort Wadsworth"	....do ...	50.00
From the allotment of $1,500 made Nov. 25, 1895, "for the purchase of two base-end instruments"	Aug. 19	1.87
Total revocations under these acts	.....	46,873.28
Total allotted and expended to Oct. 31, 1895 (see last report)	.....	480,267.24
Total net allotments Oct. 31, 1895, to Oct. 31, 1896	.....	202,377.84
Total net allotments and expenditures to date	.....	682,645.08
Total appropriated under these acts	.....	835,000.00
Total allotted	.....	682,645.08
Balance available for allotment	.....	152,354.92

SUMMARY TO OCTOBER 31, 1896.

Act.	Total appropriations.	Total net allotments, expenditures, and reverting to Treasury.	Total balances on hand.	Total allotments and expenditures from Oct., 1895, to Oct., 1896.	Allotments revoked.
Fortification act of Sept. 22, 1888	$3,972,000.00	$3,966,607.40	$5,392.60	$18,448.05	$23,840.65
Army appropriation of Mar. 2, 1889	56,000.00	3,156.20 52,843.80	.....	.....	.....
Fortification act of—					
Mar. 2, 1889	1,233,594.00	1,204,819.00	14,775.00	10,000.00	.....
Aug. 18, 1890	3,832,935.00	3,831,579.31	15,355.69	1,300.00	1,541.02
Feb. 24, 1891	2,290,803.00	2,290,803.00	.....	9,285.11	9,285.11
July 23, 1892, Feb. 18, 1893, Aug. 1, 1894, Mar. 2, 1895, and June 6, 1896	835,000.00	682,645.08	152,354.92	249,251.12	46,873.28
Total	12,220,332.00	12,032,453.79	187,878.21	288,284.28	81,540.06

Total allotments	$11,935,051.61
Total expenditures for necessary expenses of Board	44,558.38
Total turned into Treasury	443.80
Total reverting to Treasury by lapse of appropriation	52,400.00
Grand total	12,032,453.79

APPENDIX B.

PROCEEDINGS OF BOARD TO TEST RANGE AND POSITION FINDERS, INSTITUTED BY SPECIAL ORDER NO. 249, ADJUTANT-GENERAL'S OFFICE, OCTOBER 24, 1890.

41 FULTON STREET, NEW YORK CITY,
January 23, 1896.

The board met pursuant to the call of the president.

Present: Lieut. Col. A. C. M. Pennington, Fourth Artillery; Lieut. Col. M. P. Miller, First Artillery; Maj. John G. D. Knight, Corps of Engineers; Capt. Frank E. Hobbs, Ordnance Department; First Lieut. Edward Davis, Third Artillery, recorder; First Lieut. Henry L. Harris, First Artillery, executive officer.

The board examined three types of the Lewis depression range and position finder at the place of business of Messrs. Stackpole & Brothers, 41 Fulton street, New York City, with bases as follows: 300 to 100 feet, 100 to 200 feet, and 200 to 400 feet, and find them all improved types of his former instruments and recommend their acceptance.

The board further recommend that the Lewis range and position finder be adopted for service.

The board then proceeded to Governors Island and continued its session in the office of the chief ordnance officer and inspector of artillery, Department of the East. The board then read all the communications on hand in reference to the latest type of the Fiske position finder adapted for use with a vertical base, each member of the board having had the opportunity, previous to this meeting of the board, of examining the drawings showing the adaptation of the present Fiske instrument as a vertical base range and position finder. The board carefully considered all the claims made for this instrument by its manufacturers, the Western Electric Company, and report as the opinion of the board that the system has not sufficient merit to justify its adoption, and it is therefore not desirable to have a set of instruments constructed.

With reference to the Unge and Aide-Tireur range finders, a committee of the board appointed at its previous meeting to test these instruments submitted a report showing distances determined by these instruments and the corresponding errors. The errors were as great as 10 or more per cent of measured distances under even 2 miles; the board therefore concluded that neither of these instruments has sufficient accuracy to justify its adoption in service.

The board then adjourned.

A. C. M. PENNINGTON,
Lieutenant-Colonel Fourth Artillery, President.

EDW. DAVIS,
First Lieutenant Third Artillery, Recorder.

Record of observations with the "Aide Tireur."

Distance by triangulation.	Distance given by "Aide Tireur."	Error.	Length of base.
Yards.	*Yards.*	*Yards.*	*Feet.*
2,473	2,825	+352	39
2,473	2,780	+307	37¾
2,473	2,710	+237	42
2,263.5	2,350	+ 86.5	42
3,807.3	4,400	+592.7	42
2,574.3	2,720	+145.7	29¾
2,374.2	2,950	+575.8	29¾
1,460	1,495	+ 35	30
1,256.7	1,354	+ 97.3	30½
2,473	2,750	+277	30
2,473	2,675	+202	41¾
2,473	2,875	+402	36
2,473	2,725	+252	36
2,473	2,800	+327	36
2,473	2,850	+377	30¾
2,473	2,600	+127	35⅛
2,473	2,635	+152	39¾
2,473	2,600	+127	44⅞
2,473	2,750	+277	28¾
2,473	2,730	+257	37
2,473	2,655	+182	37
2,473	2,650	+177	37
2,773	4,200	+393	37
3,807	4,430	+623	50
3,807	4,530	+723	50
3,807	4,250	+443	45
3,807	Rule would not give reading.		30
3,807	4,110	+303	34½
2,473	2,950	+477	34⅓
2,473	2,950	+477	34⅓
2,263.5	2,800	+536.5	35⅓
2,263.5	2,650	+296.5	31
2,263.5	2,650	+296.5	45
2,473	2,890	+417	43⅓

HENRY L. HARRIS,
First Lieutenant, First Artillery, Executive Officer of Board.

Record of observations with the "Unge."

"UNGE" NO. 48.

Distance by triangulation.	Distance given by "Unge."	Error.	Length of base.
Meters.	*Meters.*	*Meters.*	*Meters.*
2,268.8	2,480	+212.2	6.2
2,268.8	2,352	+ 83.2	8.4
2,268.8	2,384	+115.2	12.55
2,268.8	2,385	+116.2	5.3
2,268.8	2,484	+215.2	6.9
2,268.8	2,439.6	+170.8	10.7
2,268.8	2,386	+117.2	10.7
2,268.8	2,354	+ 85.2	10.7
2,268.8	2,401	+132.2	6.9
3,493	3,640	+147	5.2
3,493	3,486	+ 7	8.3
3,493	3,735	+242	8.3
3,493	3,620	+127	8.25
2,076.6	2,223	+146.4	7.8
2,076.6	2,247	+170.4	7.75
2,361	2,480	+119	6.2
2,179	2,429	+250	6.15
1,152	1,409.5	+257.5	5.9
2,268.8	2,360	+ 91.2	11.8
2,268.8	2,392	+123.2	11.67
2,268.8	2,457	+188.2	11.7
2,268.8	2,320	+ 51.2	13.3
2,268.8	2,370	+101.2	13.5

Record of observations with the "Unge"—Continued.

"UNGE" NO. 49.

Distance by triangulation.	Distance given by "Unge."	Error.	Length of base.
Meters.	*Meters.*	*Meters.*	*Meters.*
2,268.8	2,463.3	+194.5	11.9
2,268.8	2,520	+251.2	11.5
2,268.8	2,300	+ 31.2	11.5
2,268.8	2,458	+189.2	13.5
2,268.8	2,479	+210.2	13.55
2,268.8	2,505	+236.2	13.55
2,268.8	2,727	+458.2	10.1
2,268.8	2,605.5	+336.7	13.5
2,268.8	2,566.9	+298.1	13.3
2,076.6	2,257.2	+180.6	13.2

HENRY L. HARRIS,
First Lieutenant First Artillery, Executive Officer of Board.

PROCEEDINGS OF A BOARD OF OFFICERS TO TEST RANGE AND POSITION FINDERS, CONVENED BY SPECIAL ORDERS 249, ADJUTANT-GENERAL'S OFFICE, SERIES OF 1890.

FORT HAMILTON, NEW YORK HARBOR,
June 23, 1896.

The board met pursuant to the call of the president.

Present: Lieut. Col. A. C. M. Pennington, Fourth Artillery; Lieut. Col. Marcus P. Miller, First Artillery; Maj. J. G. D. Knight, Corps of Engineers; Capt. Frank E. Hobbs, Ordnance Department; First Lieut. Edward Davis, First Artillery, recorder; First Lieut. Henry L. Harris, First Artillery, executive officer.

The board proceeded to test the Fiske range finder for accuracy and speed in connection with the new standard base end instruments recently installed on the Hamilton-Wadsworth permanent base line. These base end instruments were designed for their purpose by First Lieut. I. N. Lewis, Second Artillery, and their successful completion and installation are largely due to his personal attention and individual work. These stations (Hamilton and Wadsworth) are connected by telephone, and also by an electric clock and bell system, whereby simultaneous observations at twenty seconds interval, or any other desired interval, may be made of record. The board also takes advantage of this meeting to make further tests of the Lewis range and position finder as a vertical range finder, and also as an azimuth instrument for base end uses. This latter test is to compare its work with the standard base end instruments.

The board also considered the Nolan instrument, which had been referred to Maj. J. G. D. Knight, Corps of Engineers, as a subcommittee of this board, for tests at Willets Point. Major Knight, after having caused it to be tested under varying atmospheric conditions, reports that it is not satisfactory for service use for the following reasons:

(1) The vibrations of the base rod, in even a slight wind, cause the image to dance so rapidly over the scale as to render accurate reading impossible.

(2) As at present arranged, there are no means of focusing the telescope on each object sighted at, which prevents securing distinctness of the image and scale simultaneously.

The board takes notice of the resolution of the Board of Ordnance and Fortification of June 1, 1896, that the house built for the Zalinski

range finder at Fort Wadsworth and the material purchased for the installation of that instrument be turned over to the Board on Range and Position Finders for such use as it may deem advisable, which resolution met the approval of the Secretary of War June 16, 1896.

The board then proceeded to Fort Wadsworth and witnessed the practical working of the Rafferty relocator in connection with the Lewis instruments at Hamilton and Wadsworth used as azimuth instruments.

The Range Finder Board is of the opinion that the combination of any base-end azimuth-reading instruments with the Rafferty relocator, and the necessary electrical connections whereby to telephone or otherwise communicate the base-end readings to the relocator, constitute practically the instrument described by the American Artillery Range Finder and Relocator Company.

The feature peculiar to its combination is the relocator. This may be used in combination with any form of azimuth-reading instrument, be it that used at Forts Hamilton and Wadsworth, the Fiske range finder, or the Lewis.

The relocator itself has been previously observed in operation by other boards, and is of record as having given satisfaction. From practice with it observed by this board, it is thought to be an efficient device for passing from the base-end measurements to gun ranges and azimuths, and even to gun elevations and azimuths.

There is no sufficient reason to justify the United States in entering into any agreement to obtain from this company at special prices any collection of azimuth instruments and telegraph or telephone apparatus. The component parts of such combinations are in the market. The value of the relocator as such, it is understood, has been a subject for the consideration and report of the Board on Regulation of Seacoast Artillery Fire.

The board then adjourned to meet at the call of the president.

A. C. M. PENNINGTON,
Lieutenant-Colonel, Fourth Artillery, President.
EDW. DAVIS,
First Lieutenant Third Artillery, Recorder.

Tests of instrumental accuracy of position finders at the Narrows, New York Harbor.

JUNE 23, 1896.

	Azimuths at P., Fort Hamilton.	Standard base S., Fort Wadsworth.	Azimuths at Lewis P. F.		Ranges at Lewis P. F.	
			Calculated.	Observed.	Calculated.	Observed.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	*Yards.*	*Yards.*
1	39 58 50	348 6 30	343 28 03.9	343 26 00	1,654.9	1,645
2*	29 55 40	348 31 40	345 10 49.4	345 23 30	2,352.4	2,500
3	20 16 05	349 09 50	346 46 03.6	346 45 00	3,394	3,345
4	13 19 20	349 06 40	347 19 53.5	347 18 30	4,556.95	4,525
5	10 55 55	350 23 50	348 47 50	348 46 30	5,395.2	5,370
6	7 56 15	350 58 45	349 38 10	349 36 30	6,600.8	6,590
7	7 24 15	352 20 20	351 03 55	351 02 45	7,391.25	7,375
8	6 54 00	353 30 00	352 18 25	352 17 00	8,276.65	8,275
9	4 22 50	351 35 30	350 33 39.5	350 33 00	8,845.2	8,850
10	1 19 05	347 36 40	346 43 45.7	346 43 00	8,499.22	8,445
11	356 55 50	341 34 50	340 57 05.8	340 56 30	7,882.8	7,865
12	349 49 00	332 19 40	332 11 12.8	332 11 20	7,233.6	7,200
13	342 14 30	321 26 20	322 01 15.3	322 02 25	6,294.74	6,310
14	340 16 35	314 37 30	315 52 22.5	315 51 50	5,241.42	5,220
15	340 14 30	309 12 40	311 10 37	311 10 00	4,457.25	4,500

*See note on page 37.

Tests of instrumental accuracy of position finders at the Narrows, New York Harbor—Continued.

JUNE 23, 1896—Continued.

	Azimuths at P., Fort Hamilton.	Standard base S., Fort Wadsworth.	Ranges at Fiske P. F.		Azimuths at Fiske P. F.	
			Calculated.	Observed.	Calculated.	Observed.
	° ′ ″	° ′ ″	*Yards.*	*Yards.*	° ′ ″	° ′ ″
1	39 58 50	348 6 30	2,667	2,660	36 49 34	36 49 50
2*	29 55 40	348 31 40	3,181.4	3,300	27 28 35.6	25 37 30
3	20 16 05	349 09 50	4,063.5	4,055	18 32 58	14 33 20
4	13 19 20	349 06 40	5,107.9	5,098	12 05 43	12 06 00
5	10 55 55	350 23 50	5,928.4	5,915	9 53 25	9 55 20
6	7 56 15	350 58 45	7,096.8	Lost.	7 08 44.8	7 08 15
7	7 24 15	352 20 20	7,904	7,900	6 41 49	6 42 30
8	6 54 00	353 30 00	8,803	8,770	6 16 18	6 16 30
9	4 22 50	351 35 30	9,294.8	9,285	3 49 08	3 48 50
10	1 19 05	347 36 40	8,820.5	8.800	0 46 15	0 47 00
11	356 55 50	341 34 50	8,015.5	8,015	356 34 24	356 23 50
12	349 49 00	332 19 40	7,068	7,065	349 21 28	249 21 55
13	342 14 30	321 26 20	5,798	5,795	341 52 21	341 52 10
14	340 16 35	314 37 30	4,589	4,585	340 02 54	339 53 00
15	340 14 30	309 12 40	3,712.6	3,720	339 44 45	339 45 20

NOTE.—The instruments tested were the Lewis P. F., at Fort Wadsworth, and the Fiske P. F., at Fort Hamilton. The height of the former above mean water is about 173 feet.

*In the second observation of this series it is evident that some mistake was made in one or the other of the standard base instruments, since a comparison of the results obtained by the Fiske and Lewis give good accord with each other.

In observation No. 3 there must have been a misreading of the azimuthing wheels at Fiske H.

The observations were made on the steamer *General Thayer*, and up to about the eighth observation about 12 yards should be added to the ranges from the Lewis P. F. for distance from water line to smokestack, on which latter the vertical hairs were ordered laid.

JUNE 24, 1896.

	Azimuths at P., Fort Hamilton.	Standard base S., Fort Wadsworth.	Azimuths at Lewis P. F.		Ranges at Lewis P. F.	
			Calculated.	Observed.	Calculated.	Observed.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″	*Yards.*	*Yards.*
1	35 18 15	348 48 30	35 41 41	35 42 30	2,815.1	2,810
2	25 27 05	349 41 10	25 42 47	25 44 45	3,483	3,505
3	17 56 20	349 11 40	18 08 13	18 08 20	4,243.1	4,170
4	11 06 00	348 10 20	11 13 23	11 14 10	5,257.9	5,310
5	9 02 10	350 15 30	9 08 35	9 08 25	6,320.6	6,400
6	7 52 30	351 51 50	7 57 50	7 58 00	7,330.65	7,422
7	7 18 30	353 18 30	7 23 07	7 22 45	8,305	*8,470
8	3 22 00	350 08 40	3 25 47	3 25 30	8,906	8,985
9	0 27 50	345 34 30	0 31 34	0 30 45	8,038.85	8,085
10	356 13 50	339 21 10	356 17 16	356 16 50	7,175.25	7,190
11	347 48 50	327 57 50	347 51 04	347 49 50	6,043.3	6,100
12	340 45 20	318 05 10	340 46 06	340 45 00	5,083.58	5,080
13	339 09 15	312 00 30	339 09 40	339 08 55	4,103.01	4,085
14	338 59 35	304 14 50	339 00 04	338 59 30	3,034.5	3,020
15	343 53 00	294 24 45	343 57 07.3	343 56 10	1,976.67	1,960
16	10 29 10	299 51 20	10 53 37	10 54 10	1,728.7	1,720
17	38 26 35	308 43 00	39 08 13	39 05 05	1,815.87	1,805

REMARKS AS TO JUNE 24 TRIALS.—The position finder under test was the Lewis P. F., at Fort Hamilton, at the height of 59 feet above mean water. It was raining, and the weather not suitable for tests of instrumental accuracy.

*In this observation, the range at the Lewis P. F. was undoubtedly wrongly read. The observed reading at this instrument should have been 8,370 yards instead of 8,470 yards.

Calculated and compiled from the official records.

HENRY L. HARRIS,
First Lieutenant First Artillery,
Executive Officer, Board to Test Range Finders.

GOVERNORS ISLAND, *August 10, 1896.*

SIR: In compliance with your instructions, I have the honor to submit the following report of progress since my report of July 27, 1895:

TESTS OF INSTRUMENTS.

The Fiske position finder, model of 1895; the Lewis position finder, model of 1895, and the improved Lewis position finder, latest model, have been tested for instrumental accuracy.

The results submitted are based on the official reports of the commissioned officers, Lieutenants Murray and Hawthorne, First Artillery, who operated the new standard base instruments on each date of tests. Lieut. I. N. Lewis, Second Artillery, designed the instrument, superintended its construction by Stackpole Bros., and suggested most of the changes made in the original design.

I do not agree with Lieutenant Lewis in certain points as to numbering the graduations, though I think the instruments are admirably suitable for "horizontal base-end instruments." In case of construction of similar instruments I would suggest that every degree be numbered in order that there may not be any excuse for misreading an angle. A difference of a minute amounts only to 0.296 of a yard at 1,000 yards, but a difference in reading of 2 degrees would generally make a serious error, and particularly in relocation.

The War Department has adopted the Lewis depression position finder for the service. The records of the instrumental accuracy of this instrument should make a new standard of acceptance in case of any other instrument proposed. We have heretofore taken the English standard of 1 per cent per 1,000 yards. I think we can now safely place our standard at 1 per cent of the range. This, of course, refers to instrumental accuracy. What can be obtained under conditions of actual action is yet to be ascertained.

The records show a less general error in the case of the Fiske horizontal base position finder. It should, of course, be borne in mind that a base of nearly 1,000 yards, even with two observers, ought to give more accurate results when time is not regarded than a base of 60 or 175 feet with one observer; but when it comes to a case of quick work, the errors due to the adopted depression position finder, even at a height of 60 feet, will be more than compensated for by having but one observer who can concentrate his attention on the target in view without any reference to an observer at a secondary station.

In connection with the trials of the Fiske position finder at Fort Hamilton, I desire to submit reports, with accompanying tables,* from Sergt. Neils P. Yurgenson, Signal Corps, U. S. A., who has given very conscientious and intelligent attention to the work confided to him.

During the time of the tests the temperature corrector was not moved once, in order that we might ascertain to what extent, permanent or otherwise, changes in temperature would affect the voltmeter readings at different points of the scale.

As will be seen from a comparison of the tables, very little change is necessary at any time to adjust for temperature correction, and when this adjustment is once made, it can be relied on for the length of time consumed in any one test.

The greatest difficulty encountered in our work has arisen from the fact that our wires are overhead wires and not put up in the most per-

*Omitted from report of Board of Ordnance and Fortification.

fect way. Wires are very frequently found entangled after heavy windstorms, and the whole system generally requires an overhauling before the fault can be located.

Underground or lead cable wiring, in iron pipes, when necessary, is in my opinion the only thing which will give us satisfactory results, and I trust that the Board will strongly recommend such a system for its work at Hamilton and Wadsworth. If these posts are ever to be properly wired, now is the time to begin.

As our board has to report on the merits of the different range finders submitted for its inspection, and as at one or more of the meetings of the board the several individual members thereof have seen the operation of a horizontal base connected with a "relocator" or "converter board," I would respectfully suggest that it be recommended that some of the principal artillery posts be supplied with the new azimuthing device (standard base instruments), and whatever converter board for relocation may be adopted, together with the latest improvements in telephonic communication, so that the merits of the combination can be fully tested and reported on.

This should be taken in hand first at some post provided with the modern artillery.

The Nolan instrument (field range finder) was sent to Willets Point for trial and report, and I understand that this report has been submitted to you.

The board has also again experimented with the "Aide Tireur" and the "Unge" and reported thereon.

The question of a supplemental position finder for emergency work is one that merits attention; but with the present knowledge of the board, I respectfully submit that it is not in a position to make any definite recommendation on the subject.

When our new batteries have been tried, and their excellencies or defects become known, we may be better able to suggest the necessary auxiliaries for working them. But one thing is certain, and that is that at the trial of these new batteries the best instrument should be available for determining all the data necessary to a generally perfect solution of the problem of seacoast artillery fire.

This problem can never be solved theoretically. Money can be well spent now in endeavoring to effect the practical solution.

Since at target practice time is not considered, nor need it be for certain results to be ascertained, I recommend that all artillery posts provided with modern high-power guns and mortars be supplied with two of the standard base instruments similar to the ones described in the accompanying* blue prints and photographs, but with a few minor modifications. These modifications will take definite shape when the results of the trials of the two instruments (base end) made for use at the proving ground at Sandy Hook, New Jersey, become known.

This is a question concerning the work of our board, since, to determine the conditions which a supplemental range or position finder must fulfill, it is very desirable to know with what degree of accuracy the gun it works can be laid. And—repetition here can do no harm—to know the accuracy of your guns as affected by atmospheric conditions, defects of carriage, platform, site, etc., we must have quick working and accurate instruments, accurately set up, to determine range, etc., of shot in every case.

The present base-end instruments, used in connection with converter or relocator for the gun, and provided a careful triangulation before-

* Omitted from report of Board of Ordnance and Fortification.

hand has determined the relative positions of the fixed points used, will, in my judgment, prove amply satisfactory.

The Zalinski position finder never having been submitted for test, the house provided for the same has been turned over to our board. It will probably be found a good place for the Watkins depression R. F., or any instrument under temporary test.

It is proposed to continue work during the coming season by endeavoring to ascertain more definite data with reference to atmospheric refraction. This work will be undertaken by me in connection with my duties on the Board on Regulation of Seacoast Artillery Fire.

Very respectfully, your obedient servant,

HENRY L. HARRIS,
First Lieutenant First Artillery,
Executive Officer of Board.

Col. A. C. M. PENNINGTON, Fourth Artillery,
President of Board to Test Range Finders,
Governors Island, New York.

APPENDIX C.

BOARD ON REGULATION OF SEACOAST ARTILLERY FIRE.

ARMY BUILDING,
New York City, April 13, 1896.

SIR: In accordance with instructions received from your Board, we have the honor to report that we have made a careful and thorough practical test of the "relocator" devised by First Lieut. William C. Rafferty, First Artillery, and the "converter board" devised by First Lieut. E. A. Millar, Third Artillery; the tests being competitive in character, and both made at Fort Hamilton, New York Harbor.

Our report has been delayed for more than a month awaiting the receipt from Lieutenant Millar of a complete description and the necessary drawings of his device. These have not as yet been received, and we are therefore compelled, in order to avoid further delay, to submit this report without them.

It is now generally recognized to be essential to a thorough and effective system of artillery-fire control to provide means for obtaining quickly and accurately the conversion of ranges and azimuths as given by the range and position finder into the proper ranges and azimuths from the gun itself. There are so many honest differences of opinion among artillerists as to the best methods of accomplishing this, and also as to the best place for making the conversion, whether at the gun or at the position finder or at some convenient central place distant from both, that we have not considered it within the scope of the present report to enter into the general subject of replotting devices, but have confined ourselves to the construction, operation, and relative merits of the two instruments mentioned, since they are the only ones of the kind which have been referred to us for official test.

THE FIRST DAY'S TEST.

The board met at Fort Hamilton, New York Harbor, Friday, February 28, 1896, at 11 o'clock a. m., with First Lieut. H. L. Harrist, First Artillery, and First Lieut. I. N. Lewis, Second Artillery, the two members composing the board, both present. A dense fog concealed all objects seaward, so that it was impossible to take observations from the range finders, and after waiting in vain until 1.30 p. m. for the weather to clear it was decided to limit the work for the day to an examination of the mechanical features of the two devices and to an explanation by Lieutenant Millar of the principles involved in the construction and use of his board—in the relocator of Lieutenant Rafferty's design these were already well known.

In the absence of full drawings and description, the accompanying photographs* will give a fairly correct idea of the appearance of the Millar converter. No. 1 shows the board in working position swung between vertical uprights. The framework is of iron, covered with

*Photographs, drawings, and tables omitted from Report of Board of Ordnance and Fortification.

thin sheets of hard rubber so as to make an even surface; the horizontal diameter is about 10 feet and the vertical diameter is about 8 feet. Two scale-bearing arms are so pivoted that the centers about which they turn will represent the relative positions of the range finder and the gun, one center being fixed, the other movable in the direction of the length of a short carrying bar which carries the arm and its dial mechanism, and which also turns about a common center with the other scale arm. This carrying bar has a clamping attachment at its outer end which enables the operator to swing it over any portion of the upper circumference and then clamp it securely in the desired position. This arm would only be changed in position when the position of the range finder with respect to the gun is changed.

The dial mechanism carried near the center of each scale-bearing arm is used instead of large graduated arcs around the lower circumference of the table which would be otherwise necessary. The dials are arranged in pairs, one reading minutes and the other degrees of arc. A novel sliding collar is used which permits both arms to slide freely through it, and by means of an aperture in the center enables the operator to quickly note the exact point of intersection of the two arms, and permit the scale reading of each to be seen. The photograph also shows a third arm to the left of the other two. This arm has no scale, and is used only when the converter board is employed in connection with a horizontal base range finder, in which case it is coupled to the second range finder arm by means of a short bar near the lower extremities of the two, so that to whatever angle the second is moved the third will remain parallel to it.

The two essentially novel features of this board are the sliding collar, by means of which the scale readings are quickly and accurately made, and the movable carrying bar which affords a ready means of adjustment for changes in the relative positions of range finder and gun.

The construction and operation of the Rafferty relocator are fully explained in the appended description and drawing prepared by the inventor. The most novel feature of this board is in the position selected to represent the target or other object whose range is to be determined. In every case this is taken to be at a point near the center of the table, about which both scale-bearing arms are pivoted. Its most valuable feature from a service point of view is its extreme simplicity, there being really but four essential parts, viz, the table with a single graduated arc, two scale-bearing arms, and a spacing piece.

THE SECOND DAY'S TEST.

The board reassembled at Fort Hamilton, New York Harbor, on Monday, March 2, 1896, at 10 o'clock, a.m., with both members present.

The following programme had been prepared in advance and was carefully followed out:

First. A preliminary test of the relocator, Lieutenant Rafferty working alone. A set of three angles and ranges given, to be replotted. Time kept by Lieutenant Bailey.

As Lieutenant Millar could not operate his board alone, a similar test was not made of the converter.

Second. Time test. Lieutenants Rafferty and Millar, each with one assistant (a corporal), operating their respective instruments at the same time. Range finder station Lh. Set of three angles and ranges to be replotted. Timekeepers, Lieutenants Bailey and Marsh.

As some confusion resulted during this test, due to the fact that one operator was accustomed to set first for range and the other for azimuth

first, it was decided to change the order of the readings alternately thereafter. It was also found to confuse the timekeepers to have both instruments used at the same time, and this was also changed.

Third. Time and accuracy test.

1. Position of range finder changed to Fa, and same set of angles and ranges replotted. Lieutenant Millar, operator. Time kept by Lieutenant Marsh.

2. Same, with Lieutenant Rafferty operator, and Lieutenant Bailey keeping time.

Fourth. Time and accuracy test.

1. Set of three angles and azimuths, replotted by Lieutenant Millar, covering the case where the field of fire of the gun extends through more than 180° of arc. Lieutenant Marsh timekeeper.

2. Same, by Lieutenant Rafferty, with Lieutenant Bailey timekeeper.

Fifth. Predicted positions. Three observations and predictions by each, the range-finder station remaining at Fa. Timekeepers same as before.

Sixth. Predicted positions.

A second set of three observations and predictions under the same conditions as before.

Lieutenants Rafferty and Millar each explained to the board certain special advantages of their respective instruments, and the board then adjourned.

Appended hereto will be found the tabulated results of the above tests arranged and noted in such a way that the comparative work of the two instruments is clearly brought out.

From the foregoing tests, and from our knowledge of the construction, operation, and governing principles of these two instruments, we believe:

(1) That both are far within the service requirements as to accuracy of results and ease and quickness of manipulation.

(2) That as regards the time actually employed by each in replotting, they are both equal; but the Rafferty board has a slight advantage in that one man alone can operate it.

(3) That they are equally accurate in results.

(4) That the Rafferty board has a decided advantage in simplicity of construction, has fewer and more substantial parts, is much less liable to get out of order, is less bulky when made to same scale, is more easily housed and transported, and will work equally well in any position, while the Millar board in its present form must be placed in vertical position.

While fully aware of the fact that Lieutenant Millar had but little time to familiarize himself before the test with the manipulation of his own device, and was for that reason at a considerable disadvantage during the tests, and while believing that his converter can be, and undoubtedly will be, much simplified and improved in the future, we are convinced that in its present form it is inferior to the Rafferty relocator, and that of the two the latter is much better adapted to meet the requirements of the artillery service.

Very respectfully, your obedient servant,

HENRY L. HARRIS,
First Lieutenant First Artillery, President.

I. N. LEWIS,
First Lieutenant Second Artillery, Member and Recorder.

The RECORDER,
Board of Ordnance and Fortification, Washington, D. C.

ARMY BUILDING,
New York City, April 20, 1896.

SIR: We have the honor to submit herewith our report on the "system of plotting shots and directing the fire of batteries at moving targets," devised by First Lieut. E. M. Weaver, Second Artillery, which was referred to us by your Board a year ago.

Since it was referred to us, this system has been the subject of frequent study and discussion, but we have deferred taking definite official action thereon until by full investigation of the general subject of fire control, as understood here and abroad, and by thorough practical firing tests we have convinced ourselves of the relative merits of the two underlying general principles, one of which must necessarily govern in whatever method of fire control is to be finally adopted for our service, viz: First, the system of "squares," where the water area to be defended is mapped and plotted into squares or other small areas, each lettered and numbered and the whole tabulated; and second, the more general principle of polar coordinates where no such mapping and tabulation is necessary.

After carefully studying the subject as a whole and in detail, and as the result of practical work of our board for the past year (with the greater part of which you are already familiar) we feel in a position to pass an intelligent and unbiased opinion in the matter referred to us.

The actual firing tests under the system proposed by Lieutenant Weaver, which took place at the Artillery School at Fort Monroe (see accompanying record with report), may be accepted as illustrating the best that can be done with it under the present service conditions, since both officers and men engaged in it were experts, and we did not consider it necessary to make a practical trial of the system ourselves.

Lieutenant Weaver's system consists of a certain method of replotting for the gun, based upon the "square system." His relocator board consists of a harbor chart laid off into squares as now required; an arc centered at the position of the gun on the chart, which arc extends over the field of fire of the gun and is divided into smaller arcs corresponding to 100 yards at the extreme range and numbered consecutively; and arm graduated for range and lettered for each consecutive danger space between 1,000 yards and the extreme range of the gun. The traverse circle is not divided into degrees and minutes, but into arcs corresponding to the arcs before mentioned, and suitably numbered in inverse order.

A range dial is used, graduated or lettered to correspond to the ranges indicated on the replotter arm.

The method simply narrows down the several water areas to separate danger spaces for the target and obviates the necessity for consulting a voluminous table of squares.

The characteristic features, therefore, which distinguish this system and differentiate it from the well-known "square" system are:

First. The use, in conjunction with a map of the harbor laid off into squares, of a transparent chart representing the water area defended by the gun laid off into sectors, the form and area of which are determined by the length of a ship, extreme range of the gun, and the angle of fall of the projectile.

Second. A range dial for indicating elevation of gun, lettered or numbered to correspond to definite ranges.

Third. A traverse circle lettered or numbered to correspond to the danger spaces or sectors on the transparent relocating chart.

In paragraph 41 of his report, Lieutenant Weaver claims the following advantages for his system over the "square" system:

(1) That the size of the block is adjusted to the danger space at all ranges, and the blocks are much deeper in range than those of the "square" system at the shorter ranges.

(2) That for the same water area to be covered, fewer blocks are required.

(3) That no converting tables are necessary to lay the gun.

(4) Simplicity and quickness as compared with other systems.

(5) That the range dial is an improvement over the means heretofore used to give elevation.

(6) That direction in azimuth can best be given by traverse circle graduations.

(7) The system may be put into operation at once in connection with the apparatus and methods now employed in target practice at our coast forts and with no expense except for making the range dials.

As to the merits of these claims we believe as follows:

First. The first claim is correct when the blocks are adjusted for any particular initial velocity. This is assumed to be constant, but in practice it is found that changes amounting to as much as 30 feet per second frequently occur.

Second. We think it doubtful if fewer blocks are required for a given area under this system, particularly when extreme ranges are considered, and in any event the difference would be of small importance.

Third. It is true that no converting tables are required to lay the gun, and this is an advantage over the "square" system.

Fourth. If by "other systems" Lieutenant Weaver means the "square" system alone, we agree with him that his is simpler and quicker.

Fifth. The range dial or its equivalent is an old device, and it is already used generally with all modern ordnance. The particular form suggested by Lieutenant Weaver, with its peculiar notation, is not believed to be the best, although better than the quadrant alone.

Sixth. We agree with Lieutenant Weaver that direction in azimuth can best be given by traverse circle graduation, and this is now done with all modern ordnance, but we do not consider the notation employed by him to be as general or as convenient as the usual azimuth graduation.

Seventh. The seventh claim is admitted, except that a certain additional amount of delay and expense would be necessary in preparing gun charts.

As the result of our investigation, and with our present knowledge of what has already been accomplished in the English service as well as our own, we are of the opinion that Lieutenant Weaver's system as here outlined and proposed is too slow and too complex to meet the present or prospective needs of our seacoast artillery service.

HENRY L. HARRIS,
First Lieutenant First Artillery, President.
W. C. RAFFERTY,
First Lieutenant First Artillery, Member.
I. N. LEWIS,
First Lieutenant Second Artillery, Recorder.

The RECORDER,
Board of Ordnance and Fortification, Washington, D. C.

ARMY BUILDING,
New York City, May 22, 1896.

SIR: The Board on the Regulation of Seacoast Artillery Fire desire to submit for the consideration of your Board the inclosed outline description of a system of "Fire control and direction" for the use of the seacoast artillery of the United States service.

We have given much time and careful consideration to the subject, and have had enough practice in the preliminary stages of the work to feel satisfied that our conclusions are correct.

Your Board has witnessed the experimental work in progress from time to time, and can therefore judge whether or not the theoretical ideas advanced with reference to the more progressive steps in the system, yet untried, are worthy of adoption, or at least of more continued practice, to determine the suitability for our service of the methods proposed.

In a previous report (on Lieutenant Weaver's system), dated April 20, 1896, we made this statement: "(There are) two underlying general principles, one of which must necessarily govern in whatever method of fire control is to be adopted for our service, viz: First, the system of 'squares,' where the water area to be defended is mapped and plotted into squares or other small areas, each lettered and numbered and the whole tabulated, and second, the more general principle of 'polar coordinates,' where no such mapping and tabulation are necessary."

We believe that the second or more general principle of "polar coordinates" should be adopted as the fundamental basis of our system.

The use of this principle obviates the necessity of plotting the several necessary harbor charts in squares or other small areas and the construction of voluminous tables of "squares;" it gives more accurate results with a saving of time—a most essential feature—and much simplifies the transmission and conversion of the indications from the position finder to the gun or from one position finder to another, and possesses many other desirable features, which will be evident from a consideration of the proposed system. This is true whether a depression or horizontal base position finder is used; whether the position finder is in immediate proximity to the gun or at a distance from it.

We have assumed, therefore, that our system is based on the general principle of "polar coordinates," and that polar coordinates at any one point (as at gun, position finder, etc.) are direction and range.

"Direction," as used here, is practically "azimuth."

We feel a certain degree of embarrassment in submitting such a skeleton report on such an important subject. We therefore beg you to consider the fact that no single device for conversion or for correction has as yet been adopted for the service, and we consequently have some hesitation in attempting to fill in the details necessary to a perfected scheme.

We propose to continue our work by making a thorough investigation as to the "best possible system of communication between the range finders and the relocators or batteries," in accordance with the directions of your Board under date of May 7. Also to have practice in the progressive steps of our proposed system, as far as the means available will permit.

HENRY L. HARRIS,
First Lieutenant First Artillery, President.

W. C. RAFFERTY,
First Lieutenant First Artillery, Member.

I. N. LEWIS,
First Lieutenant Second Artillery, Recorder.

The RECORDER,
Board of Ordnance and Fortification, Washington, D. C.

PROPOSED SYSTEM OF "FIRE CONTROL AND DIRECTION" FOR THE UNITED STATES SEACOAST ARTILLERY SERVICE, PREPARED IN OUTLINE BY THE BOARD ON REGULATION OF SEACOAST ARTILLERY FIRE, MAY, 1896.

The fundamental basis of the system is the practical application of the general principle of "polar coordinates."

It will be necessary to preface the description in outline of the proposed system by some brief definitions of the terms employed.

The unit of the artillery command consists of an area of land and sea, provided at certain points with works of defense and with an artillery armament. In our service this unit corresponds to what is termed a "fort," and its commander would be called a "fort commander."

A "fort" would be organized, for artillery purposes, into one or more "fort commands," of which the size should be governed by the character of the area to be defended and by the number of guns of one kind which it may be possible for one officer to "direct" in action, or by local conditions. The officer commanding a "fire command" would be called a "fire commander."

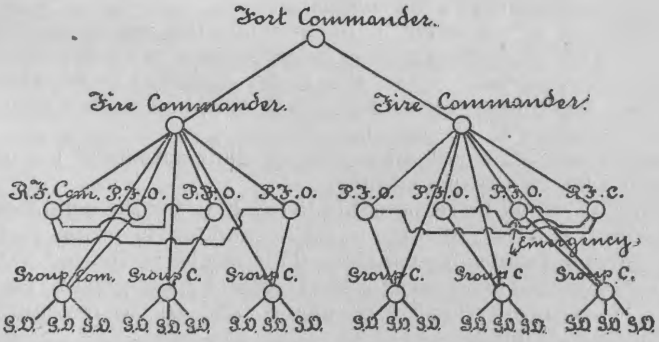
A "fire command" would be subdivided into a number of "groups," each group consisting of such a number of guns as could be efficiently "supervised" in action by one officer and regulated as to firing by one position finder, either for independent or parallel fire. The commander of such a "group" would be called a "group commander."

For the proper supervision of the group of position finders corresponding to any "fire command," a "range-finder commander" would be necessary, who would be subordinate to the "fire commander."

The officer in command of a position-finding station would be called a "position-finding officer."

Under the "group commander" would come the "gun director," who would be in immediate command of one of the guns of the group.

The following diagram will illustrate the "chain of command" for one "fort," comprising two "fire commands" of three "groups" each, each group consisting of three guns:



Titles.	Abbreviations.
Fort commander	Ft. C.
Fire commander	F. C.
Group commander	G. C.
Gun director	G. D.
Range-finder commander	R. F. C.
Position-finding officer	P. F. O.

The G. C., R. F. C., and P. F. O. are under the direct orders of the F. C.

The general nature of the duties, etc., of these officers would be as follows:

The Ft. C. would have more responsibility resting upon him than would any other officer of the chain. He would be responsible for the proper condition of the armament, ammunition, etc., of his fort, and for the proper training and discipline of the personnel under his command. He must be thoroughly conversant with all the capabilities of his command for artillery offense and defense, and must have studied out the several possibilities of naval attack and the way in which each should be met.

In case of action he would assign targets to the several F. Cs. under him, making such changes in the same as the successive stages of an action might render necessary.

His station should be a P. F. station, which would give him an unobstructed view of the whole scene of action, if possible, and he should be in direct communication with his F. Cs.

In most cases the Ft. C. would also be the F. C.

The F. C. would be responsible to the Ft. C. for the proper condition of all the artillery material and for the proper instruction and discipline of all the personnel under his own command.

His duties in action would be to carry out the orders of the Ft. C., and in case of breakdown of communications between himself and the Ft. C. to act on his own responsibility. He should be made acquainted with the general plan of defense adopted for any particular course of action, in order that he can thus act intelligently in the absence of specific orders.

He should be in direct communication with the Ft. C. and with each gun group and P. F. of his command.

His station should be a P. F. station commanding an unobstructed view of the water area covered by the guns of his command.

In certain cases the "fire command" might consist of a single group.

The G. C. would be responsible to the F. C. for the condition of the armament and ammunition, and for the training and discipline of the personnel appertaining to his command.

His duties in action would be to carry out the orders received from the F. C., to lay and fire his guns in accordance with the information received from the range or position finder assigned to his group, and to see that the proper ammunition was supplied to his group. His station would be with his group.

In case of breakdown of all communication outside of his group he must act on his own responsibility.

The R. F. C. would be responsible to the F. C. for the condition of the R. F. material and lines of communication and for the proper instruction of the personnel under his control. This would be limited to the personnel and material necessary for the R. or P. Fs. assigned to the groups of guns constituting the fire command, and to the communications between his F. C. and the Ft. C.

His duties in action would be to have a general supervision of the range-finding group and the lines of communication.

His station would be wherever most convenient for his duties and for communication with the F. C. and the range-finding group, and he should be prepared to repair any damages to the lines of communication under his control in the shortest possible time.

The P. F. O. will be responsible to the F. C. for the proper working of his station.

The G. D. would have immediate command, under the G. C., of the gun, the smallest unit of seacoast defense.

He would be responsible to the G. C. for the care of the gun, etc., for the proper training of his detachment, and for their discipline when at the gun.

His duties in action would be to see that his gun was properly loaded, laid, and fired, in accordance with directions received from the G. C. His station would be at his gun.

Having thus given in outline the chain of command down to the smallest unit, and a very general description of the duties and stations of the officers composing it, it is in order to consider briefly the means of communication and other material required to carry out the system. And there is no present necessity for going any higher than the fort commander.

To indicate in a general way the extent of the lines of communication considered necessary, the diagram illustrating the chain of command will serve all purposes. Thus:

The Ft. C. is in direct communication with his F. Cs.

Each F. C. is in direct communication with his R. F. C., with each group, and each P. F. of his command, and each group is in communication with the P. F. working it. The R. F. C. is also in communication with each P. F. of his group.

In case of any breakdown of communication between a group and its P. F. it should be possible to place this group in communication with another P. F. of the same fire command.

It will be seen from the above that it is the belief of our board that each Ft. C. should have a P. F. station from which he can "control" the fire of his several fire commands by "indicating" targets to the F. Cs., ordering the kind of fire to be used on the different targets, reserving the fire of one or more groups or of one or more guns of a group, concentrating the fire of two or more groups or fire commands on any particular target, etc.; that each F. C. would be provided with a P. F. station from which he can "direct" the fire of his groups through the P. F. of the group and specific orders as to kind of fire, etc., he sends direct to the G. C., in accordance with the orders of the Ft. C.; that each group should be connected with a P. F. by which its fire can be directed, and with the F. C.

As, in general, the G. C. could not personally direct the fire of each gun in his group, he should be provided with the means of conveying to each G. D., without undue loss of time, the information necessary to enable him to lay his gun properly and to fire it at the proper time.

If each G. D. is provided with a means of conversion of the coordinates given by the P. F., it is evident that he can receive at first hand from the P. F. the data necessary to enable him to lay his gun correctly, etc.

In order to correctly lay his gun the G. D. must know two things, viz: First, the direction of the target, and second, the distance or range to the target from his gun. These two variable elements, referred to the position of the gun itself as a center, form our system of "polar coordinates," and are obtained from the corresponding elements at the position-finder, by some method of conversion. The gun is laid in direction by means of a properly graduated traverse circle and quick-reading vernier (or, in case of "direct laying," by means of a sight with or without reference to the traverse circle graduations), and is given the elevation corresponding to the given range by whatever means may be provided for the purpose. The necessary corrections to be applied

to these two elements to compensate for drift, wind, and other atmospheric conditions, etc., being determined and applied before the gun is laid. This determination should be made, so far as practicable, by means of mechanical devices, in order to avoid unnecessary numerical computations.

The methods of conversion available are:

(1) By a relocator or converter board at the gun.

(2) By a replotter arm at the position-finding station.

(3) By tabular conversion.

(4) By a combination of the first or second with the third.

No matter which of these is adopted it will be necessary, for firing at fixed targets, or for predicted firing, to supply certain corrections for atmospheric conditions, drift, etc. The place at which these corrections should be made is still an open question and our board has not had the necessary practice nor does it possess the requisite information to enable it to make any specific recommendation with reference to this point. Certain mechanical devices for quickly obtaining these corrections have been tried and found to give satisfactory results, and others, it is understood, are yet to come before us for trial and report.

It is our conviction, therefore, that the material required for the complete equipment of a modern battery will be, in addition to the guns, carriages, ammunition, etc., a range or position finding establishment; the necessary lines of communication connecting all the different officers of the chain of command; means for converting the coordinates determined at one position into the corresponding ones for another; and means for quickly obtaining the necessary corrections to be applied to these elements for use at the gun.

For the range or position finding establishment, the board, as previously stated, believe it necessary to have:

For each fort commander a depression position finder; for each fire commander a depression position finder; and to have each group commander or his guns connected with a position finder for the group.

The last-mentioned position finder may be a depression position finder, depending on site or other local conditions. It will also be necessary to provide for each group one or more supplemental range or position finders, in case the main system breaks down. Reference, at this point, to the two methods of laying a gun—the "direct" and the "indirect"—seems logical and proper.

The board believes that, whenever possible, the method of indirect laying should be used; since it is convinced that, for seacoast artillery, guns can be more accurately laid to a mark (on traverse circle for direction and on elevation indicator for elevation) than by means of a telescopic or other sight. And this is true for either a fixed or moving target.

This method must be followed in the case of the 12-inch mortars and is, as said, deemed preferable for all guns except "rapid-fire" guns or, in case the group commander is thrown on his own resources, from the breakdown of communication or from the fact that the action becomes so close and heavy that direct laying must be resorted to.

These are possible eventualities, and must be foreseen and provided for in any scheme of artillery instruction.

The subject of "means and lines of communication" is deemed such an important one that one of the members of the board has been appointed a subcommittee for the purpose of preparing a special report thereon and entering more into detail than has been deemed advisable for other portions of this report. This paper will be found appended

marked A, and is adopted as the report of the board. A dissenting opinion on certain points of the report, by one member of the board, is also appended, marked B.

The different methods of conversion available have already been set forth. The only mechanical means of conversion submitted to us for practical trial and test are: The Rafferty relocator and the Millar converter board. These were given a competitive test, in accordance with instructions from your Board, and a report thereon has been made to you.

As to the means of making mechanically the corrections for drift, atmospheric conditions, etc., to be applied to the elements for the gun, no device has come officially before our board.

In order that the initial steps of the system, using the method of indirect laying, may be practiced, if thought desirable, at the various military posts provided with the means of doing so, a "pointing drill," prepared as the result of our practice, is submitted herewith.

POINTING DRILL BY INDIRECT LAYING.

[For one or more guns which are electrically connected with a position finder (P. F.), and which are provided with relocators or converter boards.]

In general terms the pointing drill consists of the following operations:

(1) Taking observations (direction and range) on a point of a ship at regular intervals of time, or in case of a fixed target, at any desired time.

(2) Transmitting these to the gun or guns.

(3) Converting these data to the position of the ship or target with respect to the gun.

(4) Predicting a point which the ship will reach in a definite known time.

(5) Laying the gun upon this point and commanding "Fire!" in advance of this time so as to allow for time of flight.

The intervals of time must be constantly known or marked both at the P. F. station and at the gun. This interval is here assumed to be twenty seconds; but for beginners the interval may be made thirty seconds.

CASE I.—DEPRESSION POSITION FINDER (D. P. F.).

The P. F. detachment consists of an officer and one number.

The position-finder officer (P. F. O.) commands the station, operates the P. F., and reads and calls out the direction and range.

No. 1 operates the telephone, fills out identification card when used, and calls the intervals. He should be supplied with record blanks, pencil, stop watch, and identification cards. He puts on the telephone head receiver when the "Attention!" ring sounds and keeps it on until "Good-bye!" He records all messages received at his station and repeats them at once to the P. F. O.

The method of working the P. F. O. station is as follows:

The P. F. O. selects the vessel to be tracked or receives information of the same. He assures himself that everything is in readiness at the relocator station, picks up the vessel with the telescope and commands "Time!" At this command No. 1 calls "Ready! 1, 2, 3," and starts his stop watch at "3"; the direction and range at "3" are called by the P. F. O. and telephoned by No. 1 to the relocator station. No. 1 calls "Ready! 1, 2, 3," every twenty seconds, regulating the calls so that "3"

will fall at the end of the twenty seconds exactly. After calling out the direction and range, he records them and, at the close of the exercise, signs his record and gives it to the P. F. O., who authenticates it and hands it in with his record.

Relocator station.—The detachment consists of the gun director (G. D.), who may be preferably an officer or a reliable, well-informed noncommissioned officer (N. C. O.), and three members.

The equipment necessary for the G. D. is a stop watch and a straightedge proportional scale divided into equal parts on both sides of the zero; but the parts on one side are double those on the other.

No. 2 is equipped with colored pencil.

No. 3 is a telephone man, who records and repeats all telephone messages intended for the station, including "Ready! 1, 2, 3." He should be provided with pad and pencil, and, at the close of the exercise, dates and signs his record and hands them to the G. D. On taking station he puts on head receiver as soon as "Attention!" is sounded and keeps it on until "Good-bye!" is transmitted to or from his station.

For the Rafferty relocator the duties are as follows:

The G. D. keeps time, predicts, and gives command for firing; No. 1 sets the range arm at the indicated direction; No. 2 sets the spacing pieces at the indicated distance on the range arm, marks each relocator position with colored pencil, also each predicted position, distinguishing the latter by a tail to the circle (Q), and calls out the direction and elevation of the predicted position.

With the Millar converter board the collar is set at the given range on the P. F. arm first, and then this arm is moved to give the proper reading direction.

The method of working is as follows:

The G. D., seeing that everything at his station is in readiness, notifies the P. F. O. of the fact and then stands ready with his stop watch at zero. When No. 3 hears and repeats the first "Ready! 1, 2, 3," sent from the P. F. station, the G. D. at "3" starts his watch. The direction and range are called out by No. 3 and are relocated. This gives the first relocation position.

If the target is stationary, the elevation and direction of the guns for this position are called out to the chief of detachment and gunner; the gun is laid accordingly, and the G. D. commands "Fire! Hit!" If the target is moving, three consecutive positions are relocated as above and, by means of the proportional straightedge, the predicted position is marked as follows:

The G. D sets the proportional straightedge so that the "zero" is at the third relocated position, the smaller divisions running toward the first position; the reading at this point is noted and the corresponding reading on the opposite side of the zero marks the predicted position.

No. 2 moves the gun arm to this point and calls the direction and elevation of this position aloud to the chief of detachment and gunner.

The vessel should be at the predicted position exactly two minutes from the time of the first observation when the stop watch was started.

The G. D. notes the fifth relocated position to assure himself that the course and speed have not materially altered and commands "Fire!" sufficiently before the end of the two minutes to allow for time of flight. At the end of the two minutes he calls "Hit!" and the man at the telescopic sight notes and records the point of the vessel cut by the vertical hair of the sight.

Nos. 1 and 2 continue relocating while the G. D. is at the gun firing.

The G. D., immediately after the command "Hit!" turns back his stop watch to zero, returns quickly to relocator, and starts watch again at the next "3." To find the next predicted position he lays off the same double distance as before this "3" was sounded. This position ought to be the position of the vessel at the expiration of one minute by his watch; he therefore commands "Fire!," "Hit!", so that "Hit!" will be given at the expiration of one minute.

Should the course alter so as to cause an error in the pointing, a new predicted position will be determined and the time of the new predicted position will be as indicated above, i. e., one minute from the time of setting the watch at zero; provided the point for the zero of the scale is at the point located just previous to the "3" at which the watch was set at zero.

If only the speed alters, the G. D. must judge how many seconds must be allowed for the change and command "Fire!" and "Hit!" the necessary number of seconds before the regular time.

The gun.—The chief of detachment supervises the giving of direction and the gunner the elevation. Both go to the relocator station, which should be as near the gun as practicable, after the gun is loaded (the gun is not loaded in pointing drill) and receive data which they will note. Returning to the gun, the G. D. has the gun rapidly traversed to the indicated direction, while the gunner gives the necessary elevation with such assistance as the particular gun may require. Not over fifteen seconds should be occupied in laying the gun.

The elevation to be given is quadrant elevation, and may be indicated by quadrant or other elevation-indicating device.

Telescopic sight at the gun.—One well-instructed man will be required. His duty will be to set the sight at the approximate sight angle for the predicted position (determined by distance and height of gun above water) and with zero deviation, to place the sight in its seat, and be ready at the command "Hit!" to determine what point of the ship, if any, the vertical hair covered at that command; to make a note of this at each fire, and hand his record, duly signed and dated, to the G. D. at the close of the exercise.

His equipment should be telescopic sight, pad, and pencil.

If no telescopic sight is available he uses the sight provided for the gun.

CASE II.—HORIZONTAL BASE POSITION FINDER (H. B. P. F.).

Two azimuth circles at the ends of a horizontal base line and the relocator and converter board at the gun may constitute this case. The stations at the end of the base line and the relocator station are electrically connected.

The detachment at each observing station consists of an observer in charge and No. 1. The observer will command station, operate azimuth instrument, and call out direction. No. 1 will operate the telephone as previously explained.

The detachment at the relocator station is the same as before.

The two observers receive from the G. D. at target practice, or from the fire commander in action, notification of the target or of the ship to be followed by the same means employed with the D. P. F. This means is given on the identification cards and is as follows: To obtain the direction of the ship from the two base stations, the G. D., using the graduated traverse circle as a guide, notes the direction of the ship from the gun and estimates the range; plots this point, and, by the relocator or other device for conversion, finds the approximate direction

of the line joining that point and each base station. A description of the vessel is included in the identification. The observers are thus enabled to pick up the ship with their telescopes.

When everything is in readiness at the relocator station, and the base stations are ready, the G. D. commands "Time!" at which command No. 3 calls (so as to be heard in the station and also through the telephone) "Ready! 1, 2, 3." At "3," the G. D. and No. 3 start their stop watches (in this case No. 3 at the relocator station regulates the time interval instead of No. 1 at the P. F. station). No. 3 calls "Ready! 1, 2, 3," every twenty seconds as before

No. 1 in each base station repeats "Ready! 1, 2, 3;" at "3" the direction is read and called to No. 1, who telephones it to the relocator station.

The station is then worked as before.

FOR PRACTICE AT FIXED TARGETS.

The target fired at will be the last position of the target sent to the relocator station, and to this position the point of fall of the shot will be referred. In direct laying, the point of fall of the shot is naturally referred to the position of the target ascertained immediately after the position of the shot is determined.

The following additional details will be necessary:

One well-instructed man to observe, record, and transmit to the relocator station the atmospheric data, consisting of direction and velocity of wind and the value of $\frac{\delta}{\delta'}$. At the relocator station, one well-instructed man to receive and transform this data for the gun.

The corrected direction and elevation of the gun will be called out by the G. D. and not by No. 2.

And similarly for fire at predicted positions.

All records should be carefully kept and handed in.

Slight modifications of this drill can be made when other appliances are at hand, such as electric clock and bells for marking time intervals, printing telegraph or other device for sending direction and range, etc. And these will doubtless suggest themselves in any particular case.

HENRY L. HARRIS,
First Lieutenant First Artillery, President.
W. C. RAFFERTY,
First Lieutenant First Artillery, Member.
I. N. LEWIS,
First Lieutenant Second Artillery, Recorder.

A.

REPORT OF SUBCOMMITTEE ON MEANS AND LINES OF COMMUNICATION.

The various units of the chain of artillery fire command are necessarily so situated that direct communication by messenger between them is out of the question except as a last resort, and the distances are, as a rule, so great that speaking tubes or other mechanical means for the transmission of sound can not be used. It will therefore be necessary to depend upon some system of signalling, either visual or electrical in character.

Visual signals are practicable for comparatively short distances only, and their use involves a most serious loss of time, but they have the advantage of being extremely simple and reliable, and it is believed that they should find a place in the general plan. They will be used in the main to check information sent electrically between the different stations. I have not, however, thought it necessary at present to describe any particular form of visual signal apparatus.

This report will be confined exclusively to electrical lines of communication, using the telephone and the telegraph, since the practical efficiency of our whole system of fire direction and control depends, in large measure, upon their perfection.

Both the telephone and the telegraph are too well known as electrical instruments to need description, but it should be understood that by the term telegraph is here meant any form of writing or printing, or other telegraph, which severe service tests may hereafter determine to be the best. I give both, because I believe that both should be used in all cases; each as a check upon the other, and either to be used in case of damage to the other. Whenever practicable the wires for the two instruments should be laid along different routes between stations, so as to minimize the danger of a complete break down, and it would be well to avoid the use of a "central station" for the same reason. In all the newer fortifications provision will probably be made, and certainly should be made, for laying wires in conduits underground, and the cheapest and best conduit for all military purposes is ordinary iron gas pipe of proper size to contain the requisite number of wires. This pipe should be laid at a depth of at least 3 feet from the surface, and should be provided at intervals of about 500 feet with cast-iron junction boxes to permit of ready access to the different wires for examination and test. Similar junction boxes should also be provided at all points where branch lines connect with the main cable. In every case a complete metallic circuit should be provided for each telephone, but the telegraph may be operatrd on an "earth circuit," using the iron conduit pipe as a common "earth" or return. In most of our older fortifications, and with the facilities already at hand for conducting drill and target practice, it will probably be necessary to depend upon overhead wires, in which case the poles should be of wood, at least 30 feet in length, with a single cross arm at least 10 feet in length, and the number of wires carried by a single line of poles should not exceed six. The wires should be stretched as tightly as possible, and the distance between wires measured along the cross arm should be at least 18 inches. Experience at Forts Wadsworth and Hamilton during the past year has shown all these precautions to be necessary in order to protect the lines against serious injury from the storms of wind, sleet, and snow which so frequently visit our seacoast forts.

While the first cost of installation is considerably less where overhead wires are used, I believe the underground system better and cheaper in the end, and would therefore earnestly recommend that wherever it is possible to do so all electrical wires used in the artillery defense be placed in suitable underground conduits, and that the question of providing these conduits in all the new fortifications be brought to the attention of the proper department as soon as it is expedient to do so. The cost of providing the necessary conduits while the fortifications are in course of construction will be less than one-quarter the cost of providing them afterwards, and the total saving, even for a single work, will be a very considerable sum. In laying these conduits one other question should be considered, viz, the almost certain use in

future of search lights to light up the water approaches to forts at night, and also the electric lighting of all magazines, loading rooms, and passageways within the limits of each gun group or battery. The wires for these purposes should, wherever possible, be laid in conduits at the time the forts themselves are built, and the same conduits may be used to carry the telephone and telegraph wires.

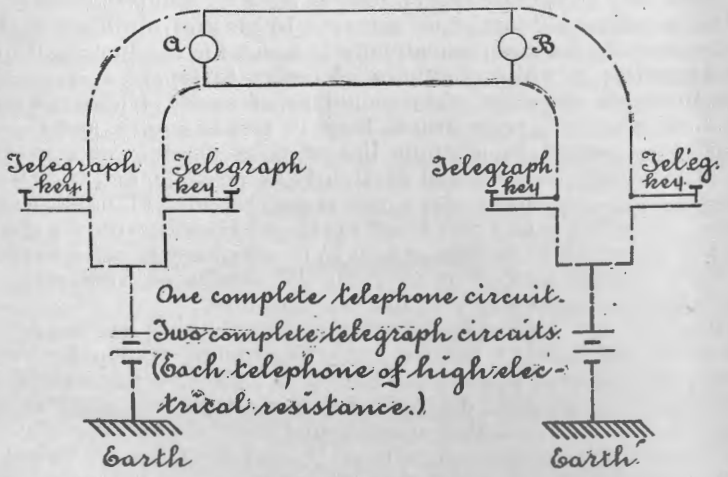
I believe the success or failure of our proposed system of control to be absolutely dependent upon two things: First, the lines of communications, and second, the time necessarily employed in determining the range and direction of a moving object from the gun.

To insure success the first should be as short, simple, and well protected as possible, and the different parts should be so arranged that not only can accidental damage be easily and quickly repaired, but an accident to one should not affect the other parts of the system.

The second should be as short as possible consistent with service, accuracy, and reliability, and to secure this the number of repetitions, operators, and instruments must be as few as possible, and the instruments used the best obtainable.

The commercial development of the telephone has been so rapid during the past five years that it is now an exceedingly satisfactory and reliable instrument for the transmission of intelligence in the business world. That it will prove equally satisfactory under the exacting conditions of military service use may reasonably be doubted, and for this reason the telegraph should be used in conjunction with it in every instance, since the latter is believed to be more reliable, although not so satisfactory in other respects. In any event the use of both diminishes the danger of complete breakdown in the lines one-half, and the same wiring may answer for both, so that the only additional cost is that of the telegraph instruments.

To illustrate this latter point, suppose A and B, as shown in the figure, to be connected by telephone using complete metallic circuit.



By making the connections as shown it is possible to have two complete telegraph circuits and one telephone circuit over the same two wires. Each of the three can be used independently of the others, and all three can be used at the same time without inductive effect. This arrangement is particularly desirable on long military lines, where the first cost of wire is a considerable item.

It is essential that our fire commander be in direct communication at all times with each and every unit of his command, and at the same time he must be able to issue the same orders simultaneously to several or even all of these units. To satisfactorily meet this requirement, the usual commercial practice in arranging the electrical lines can not be followed, since such a condition seldom, if ever, exists commercially.

To place all the stations in series upon one line of cable would be most unwise, since a single mishap to any part of line or any instrument on the line would disable the whole system, and in order to locate the trouble it might be necessary to examine and test all the wiring connections throughout.

The only alternative method is what is known as the arrangement "in parallel," by placing each station on a separate branch of the circuit with all these branches united at some common point. This common point is not a "central station," but simply consists of two metallic posts buried far underground, to each of which one wire from each branch circuit is led and permanently attached. This point may be called the "electrical center" of our wiring system, and its location should be such that the electrical resistances of the different branches measured from it are approximately equal, and in no case should the point be at or near one of the operating stations.

The following diagrams will explain more fully the distinction between telephoning "in series" and telephoning "in parallel," and will show also the advantages of the latter arrangement over the former for all military purposes:

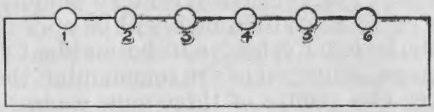


FIG. 1.—"In series." Six telephones connected in series with metallic return.

It is evident that a single break in any part of this line or at any one of the six instruments completely disables the line. It will also be noted that each telephone added to such an arrangement adds its resistance to that of those already in circuit, and for this reason the electrical resistance of each bell and receiver is made as low as possible, usually about 90 ohms each.

If the six telephones are so distributed as to form (roughly) a circle the arrangement in series would then be as follows:

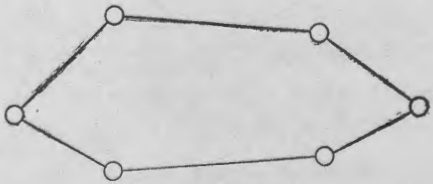


FIG. 2.—"In series."

The same objections apply, but in this case there is one advantage, viz: The length of the wire required is a minimum.

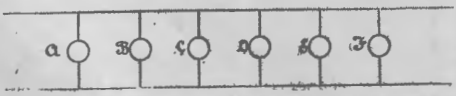


FIG. 3.—"In multiple." Six telephones connected in multiple, complete metallic circuit.

The chief advantage of this arrangement over that shown in Fig. 1 is that an injury to one telephone does not affect the operation of the other. Five of them may be broken and the sixth worked as well as ever. It is also evident that each telephone added to such a line diminishes the resistance of the whole. The arrangement is still faulty in that a single break in either one of the lead wires would disable the whole line.

Now, if the six telephones are distributed as shown in Fig. 2, the proper wiring in multiple will be as follows:

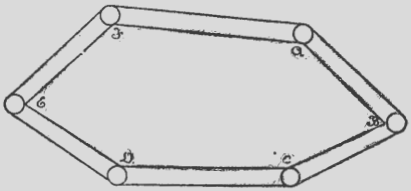
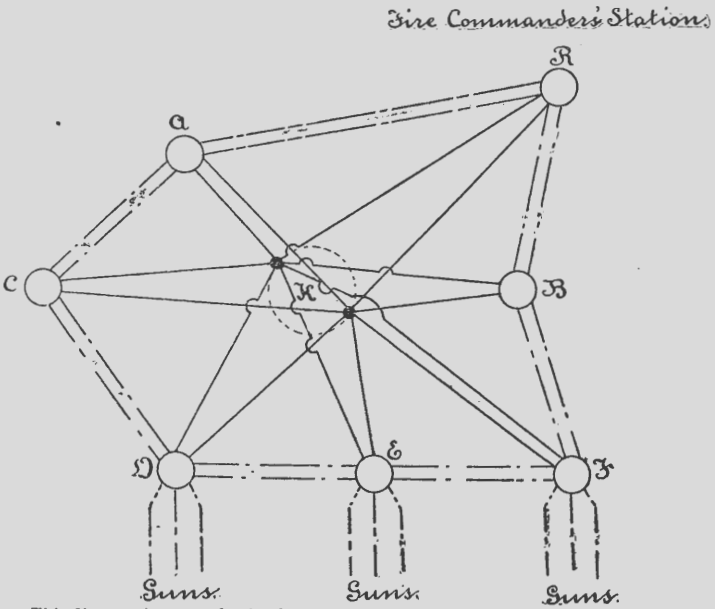


FIG. 4.—"In multiple."

This illustrates what I believe to be the typical arrangement for all military purposes. There are as many branches as there are separate telephone stations. An injury to one branch or to one telephone does not affect the others; but the following precautions should be observed: First, the receiver and the call bell in each telephone should have the the same resistance, and this resistance should be high—say at least 1,000 ohms. Second, the "electrical center" should be so placed that the resistance of each separate branch will be approximately the same.

I will now submit what I conceive to be an ideal wiring diagram for asingle fire command composed of fire commander, three position-finder stations, and three gun groups of three guns each.



NOTE.—This diagram is general; simply made to illustrate the method. No details are given, such as switch boards, number of telephones, call bells, etc., as these will be arranged to suit each individual case.

The three groups are located at D, E, F. Each group consists of three guns but since the group commander is supposed to be stationed at or near the guns and in direct communication with them either by speaking tube, visually, or by voice, I have not shown the electric lines as extending to each individual gun. Such wiring naturally comes under the head of interior wiring of the battery itself, and however much there may be of it it does not affect the exterior or main lines of communication in the slightest degree.

The three position finders for the three groups named should be placed at C, A, and B, or at the vertices of a triangle, the sides of which are chosen with especial regard to the lines of approach which must necessarily be followed by an attacking fleet. I will call this triangle a range-finding triangle.

The depression position finder for group D will be at C; for group E will be at A; and for group F will be at B.

If at any time it is desired to use any two of these instruments as a horizontal base position finder the fire commander designates through his telephone which two are to act in this capacity, thus: For group D, A and B would form the base, for group E, C and B would form the base, and for group F, A and C would form the base. And the use of these instruments as horizontal base position finders would not interfere in the slightest degree with their legitimate service.

The fire commander's station is at R. The "electrical center" of the system is at K. All wires are supposed to be under ground. A single pair of wires is laid from R, A, B, C, D, E, and F, direct to K, where the wires are united to two common metallic contact posts. In addition to this, two wires are also laid from R to A, thence to C, D, E, F, B, and back again to R. With suitable switchboards in the different stations, a comprehensive and very flexible system of communication is provided with a comparatively small number of wires and instruments and at a moderate cost.

An inspection of the diagram will show:

First. That all the telephones are connected in multiple;

Second. That damage to one instrument or one pair of wires does not affect the remainder;

Third. That any two stations are connected by three distinct lines of communication, and therefore all three have to be broken before a station is isolated, for instance—

A and D are connected thus..... { A C D / A K D / A B F E D }

Fourth. Each position finder is directly connected with its corresponding gun group, while the fire commander is in constant touch with every part of his command.

Fifth. In case of injury to one position finder, its gun group can be operated directly from one of the remaining P. Fs. without change in the lines of communication.

The general system of wiring here outlined may readily be applied to any particular case, and with such modifications as future experience will no doubt suggest, I believe it will meet all the practical needs of the service.

I. N. LEWIS,
First Lieutenant Second Artillery, Subcommittee.

B.

ARMY BUILDING,
New York City, May 29, 1896.

The President of the Board on Regulation of Seacoast Artillery Fire.

SIR: I am constrained to differ with Lieutenant Lewis, and therefore respectfully submit the following views for consideration:

As between the arrangement in multiple and the arrangement in series, there is no question; telephones will be arranged in multiple; printing telegraph or its equivalent will probably be arranged in series.

The fundamental conditions existing demand that provision be made to meet the following requirements: Any P. F. of fire command may be required to be in communication with any group by telephone and telegraph; one P. F. must be in communication by telephone and telegraph with one group; the F. C. must be able to communicate in both ways with any set (meaning P. F. and group). These should be practically applied in such manner as to secure the greatest simplicity and the least loss of time.

The basis of Lieutenant Lewis's system is a condition much more limited (as to use in practice, that of placing the F. C. primarily in communication with all stations and all stations in communication with each other; that is, a closed circuit all around).

Its practical application I illustrate by Figs. 1 and 2, referring to telephone only. (1) When F. C. speaks, all hear him; when he is giving orders to A B, the others, C D, G H, should be cut off so as to prevent confusion. (2) The work of A B is different from that of C D, G H; so when A sends an angle or range to B, neither F. C. nor the others should hear it; therefore, A must be cut off from F. C. and also from O; and B should be cut off from D and also from O, and so for C D, G H. Yet (3) the F. C. may desire to give further orders or to change his orders and he must be able to open up communication again.

In each station three sets of wire run and they must be cared for on a switch board; such switch board is shown in Fig. 1. To detach or cut out A from F. C. and O, and still permit F. C. to call up A, a call bell may be placed on each line from F. C. and O; then, changing the wires from their present posts to their respective bells will accomplish this purpose. In every station, therefore, there must be a switch board and an expert to operate it.

I believe that a "central" will be required for the satisfactory operation of all lines from a F. C. down. The switch board in the central is shown in Fig. 3. Whether for telephone or telegraph, the method of using would be the same.

A comparison of the two systems may be made as follows:

With central.	Without central.
All switch boards in one place.	Switch boards in all stations.
One expert.	Six experts.
No code of bells.	Requires code of bells.
One kind of work in each station.	Different kinds of work in each station.
Provides for printing telegraph.	Does not provide for printing telegraph.
The central is the station of the R. F. commander, thus facilitating his work in locating breaks.	

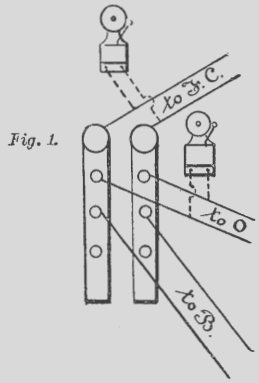


Fig. 1.

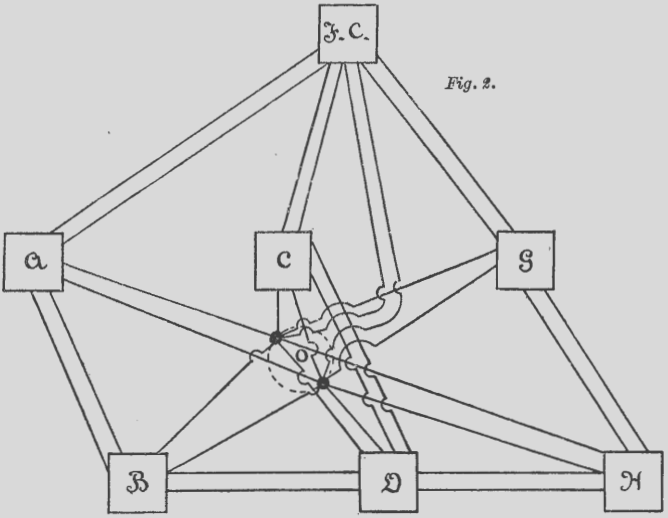


Fig. 2.

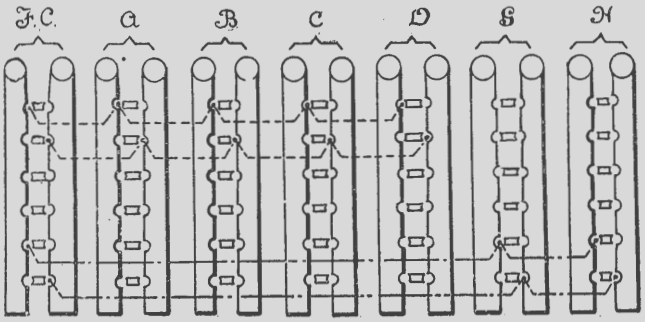


Fig. 3.

---------- shows loops or cords connecting F.C; A, B, C and D in one circuit, in parallel or multiple.

———-——- shows cords connecting F.C, S and H.

As to safety, a central can be made as secure as a powder magazine. Some of the best authorities in New York City have been consulted on the subject of communications.

It should be observed that when two depression range finders are used to send angles only, they make only one working range finder and all the guns directed by it must fire at one objective.

W. C. RAFFERTY,
First Lieutenant First Artillery.

ARMY BUILDING,
New York City, August 14, 1896.

SIR: In accordance with instructions received from your Board, we have the honor to submit herewith our report on the Millar slide-rule correction table and the Rafferty deviation index, which were referred to us for practical trial, examination, and competitive test.

THE MILLAR SLIDE-RULE CORRECTION TABLE.

This apparatus was designed and constructed by First Lieut. E. A. Millar, Third Artillery, U. S. A., as a practical application of the principle of the slide rule to the solution of the various problems which arise in the use of tables of fire.

As the device itself, as well as the general principles of its construction, are already familiar to your Board, we have not deemed it necessary to submit more than a brief outline description, but have appended hereto a full description of the methods employed in finding and applying the different corrections, together with practical examples illustrating the use of the different rules. (See end of this report.)

In its present form, the table consists of two thicknesses of pine board, rectangular, 14 inches wide by 30 inches in length, with the top surface covered by heavy drawing paper, upon which the various scales and tables are drawn in ink. Thirteen scale-bearing rulers, sliding in undercut grooves, are arranged side by side on the surface of the table; also two celluloid disks with graduated edges are pivoted on this surface. Each ruler and disk has its own individual scale and is employed for finding a specific correction.

The scope of the table as a whole is most comprehensive, including as it does absolute correction for all the various small errors which may arise in laying a gun, due to the elevation above target, drift, force and direction of wind, changes in temperature and barometric pressure, variations in initial velocity, density of loading, weight and kind of projectile, etc.

The principle of construction is undoubtedly correct, and the corrections as found by this table may safely be assumed correct, although no means are available by which the actual values in each instance can be determined as a check. The mechanical construction is rough, and the arrangement of so many slides on the same board is most confusing, but in case other tables of this kind are made we believe the construction and form can and will be improved.

From our examination and study of the device we believe that it will accomplish all that Lieutenant Millar claims for it. As he states, it is a general method rather than a particular embodiment of the method that we are called to pass upon. We believe the method to be a good

one and its practical application feasible in each particular case, but we do not feel prepared to say that the method should either be or not be adopted in service, nor do we feel competent at the present time to institute a fair comparative test between it and other well-known methods of finding and applying these corrections. In our opinion, enough practical data is not at hand to do so. Only results obtained during actual firing should be used in such a test. Most of these corrections are small, and until our modern guns are tried under conditions that approximate those of service we can not know to what extent they will effect the accuracy of the fire. It will probably be found that the time saved by not making the corrections in some cases will more than compensate for the errors involved.

THE RAFFERTY DEVIATION INDEX.

A full description of this device, together with practical examples illustrating its use, will be found appended hereto. The fundamental difference between this and the preceding device is, that while Lieutenant Millar offers a general solution to the problem, Lieutenant Rafferty has confined himself to a quick mechanical solution of three particular examples under it, viz: Correction for wind, correction for drift, and correction for changes in value of $\frac{\delta_l}{\delta}$, the correction in each case being given directly in minutes of elevation or minutes of azimuth. This he has accomplished, both quickly and accurately.

In reaching a conclusion as to the absolute value of the device, or as to its comparative value with respect to others of its kind, the remarks we have made above apply equally well here.

COMPARISON.

A comparison of the two, so far as they cover the same ground, shows: First, that they will both accomplish the same results in about equal periods of time; second, both are simple in construction and use; third, the operation of each is so simple that enlisted men quickly learn to make the correction.

HENRY L. HARRIS,
First Lieutenant First Artillery, President of Board.
I. N. LEWIS,
First Lieutenant Second Artillery, Member and Recorder.
The RECORDER,
Board of Ordnance and Fortification, Washington, D. C.

DESCRIPTION OF A SLIDE-RULE BOARD FOR CORRECTIONS USED WITH TABLES FOR 8-INCH M. L. RIFLE.

The board is submitted as an example of the principle of the slide rule as applied to the solution of many problems which may be necessary in the use of tables of fire.

The particular board submitted could be very much improved upon in mechanical construction and accuracy of graduation, but it is considered that in its present shape it will show the speed, accuracy, and the great range to which its principal may be applied.

The coefficients for $\Delta\varphi$ for ΔX, ΔV and ΔC are from tables computed by Lieut. Col. J. I. Rodgers, Second Artillery. The drift, time of flight, and jump from Whistler's Graphic Tables.

The wind coefficient from Lieutenant Ruckman's tables. The other coefficients were computed for this board.

Column 1 gives the range by 100 yards.

Column 2 the corresponding angles of elevation (drift from Lieutenant Whistler's tables).

Column 3 gives the corresponding angles of projection for standard conditions as given in Lieutenant-Colonel Rodgers's tables.

To find $\Delta\varphi$ for ΔX between the ranges given in column 1, Slide A.

Required the angle of elevation under standard conditions for a range of 3,660 yards.

Bring 60 on A opposite 3,600 the index is opposite 9.6 $\therefore$ $\varepsilon = 6^\circ\ 44'$ (columns 1 and 2) $+9'.6 = 6^\circ\ 53'.6$.

When the shot is fired it goes 27 yards over the target; how much must the elevation be reduced for this?

Bring 27 on A opposite 3,700 (the nearest range), the index shows $4'.4$ $\therefore$ $\Delta\varphi = 9'.6 - 4'.4 = 5'.2$, or $3{,}660 - 27 = 3{,}633$. Bring 33 opposite 3,600, the index shows $\Delta\varphi$ to be $5'.3$.

For 3,680 yards?

Bring 80 opposite 3,600, the index which is on the scale is marked 10x $\therefore$ $10\text{x}\ 1.3 = 13'$ $\varepsilon\ 6^\circ\ 44' + 13 = 6^\circ\ 57'$.

For 3,608 yards?

Bring 80 opposite 3,600, but as 8 is $\frac{1}{10}$ of 80 take $\frac{1}{10}$ of reading opposite index $\Delta\varphi = \frac{1}{10}$ of $10\text{x}\ 1.3 = 1'.3$ $\varepsilon = 6^\circ\ 44' + 1'.3 = 6^\circ\ 45'.3$.

To find $\Delta\varphi$ for ΔV slide B.

On the left of B there are four columns. The first gives the distances in inches from base of shot to bottom of bore; the second gives these distances in feet from muzzle to base of shot; the third gives the corresponding I. V. to these loadings as determined by experiment at Fort Monroe, Va., with 35 pounds Dupont hex. E. V. I. 1876. This would probably differ slightly with different powders. The fourth gives velocities greater than 1,414. Column 3 is headed $\Delta\phi +$ and column 4 — $\Delta\phi$.

When the piece is loaded it is found that the scale on the rammer staff indicates that the base of shot is $20''.51$ from botton of bore (= 8.062 feet muzzle to base of shot). For a range of 3,600 yards what is the $\Delta\phi$ for this loading?

Column 3 shows that I. V. is 1,398 fs. $+\Delta\varphi$ is $+$.

Bring 3,600 on B opposite 1,395 line; the index is opposite 9.8 $\therefore$ $\Delta\varphi = 9'.8$.

For an I. V. of 1,425 fs., what is the $\Delta\varphi$ for a range of 3,600 yards?

Bring 3,600 opposite 1,425; the index is opposite 5.7. As 1,425 is in column 4 $\Delta\varphi = -5'.7$.

To find $\Delta\varphi$ for ΔC slides C and D.

Range 3,600 yards, ther. 80°, bar. $30''$, shot 178 pounds, what is $\Delta\phi$ for ΔC from normal conditions?

Bring $30''$ on C opposite $80''$; opposite 178 is found 1.025, where $\Delta\phi$ is shown to be —.

Bring 3,600 on D opposite 1.025; the index is opposite 3.4 $\therefore$ $\Delta\varphi$—$3.4'$.

Range 3,600, bar. $29''$; ther. 40°, shot 177 pounds.

Bring $29''$ on C opposite 40°; opposite 177 is found $0.975 = 10 - 0.025$, where $\Delta\varphi$ is shown to be $+$.

Bring 3,600 on D opposite 1.025; the index is opposite 3.4 $\therefore$ $\Delta\varphi$ $3.4'$.

To find the "reduced velocity" Slides A, B, C, and D.

The bar. is $30''.1$, ther. 88°, shot 182 pounds; the piece is loaded to give an I. V. of 1,405 fs. Range 3,600 yards.

For these conditions $\Delta\varphi$ for $\Delta\text{C} = -8'.1$, $\Delta\varphi$ for $\Delta\text{V} = +4'.6$. Bring

the index on B opposite 3.5. In the column headed $\Delta\varphi$—3,600 is nearest 1,421; reduced velocity =1,421 fs.

Range 3,652 yards, conditions as above. For $\Delta\varphi = -3'.5$ (using reduced velocity) $\Delta\varphi$ for $\Delta X = +8'.4$ ∴ total $\Delta\varphi = 8.4 - 3.5 = +4'.9$.

Suppose the shot is fired and plots 20 yards short:

Bring 20 on A opposite 3,600; the index is opposite 3.2. This would indicate that the reduced velocity may be taken as the standard 1,414 fs., as the $\Delta\varphi$ −3.5 and +3.2 would about cancel each other, and the only corrections are those in range.

Corrections for wind, Disk I, Slides E and K.

Wind XI o'clock, 18 miles per hour, range 3,600 yards, or direction of wind may be given in azimuth, one set of conditions corresponding to XI o'clock is azimuth of target 60°, azimuth of wind 30°.

Move Disk I until the arrow is in the relative position of wind vane to the line of fire as indicated on the board, or set the azimuth of the target on I opposite the direction of wind on azimuth; this will bring the arrow in the proper direction. There are three openings in I, which, when set for the above conditions, show that $\Delta\varphi$ is +, the allowance L, and that the component letter is C.

Bring 18 on E opposite 3,600; the component letter C is opposite 7.5 ∴ $\Delta\varphi$ is $+7'.4$.

Bring 18 on K opposite 3,600; the black C is opposite 2.7 ∴ allowance for wind is 2.7 points L, but drift for this range is shown to be 2.2 ∴ allowance =4.9 points L.

Opposite the blue letter C is 9.2; allowance is $-9'.2$ in azimuth; allowance for drift = $-7'.5$ ∴ laying in azimuth is azimuth of target $-16'.7$. Slides E and K may be connected so that in one movement both $\Delta\varphi$ and allowance may be read.

For use of direct fire at a moving target the allowances for movement of target during time of flight, or time of flight + 1, 2, 3, 4, or 5 seconds, are given on Disk H, and slides F and L.

In two minutes the target will be at 3,600 yards; it is moving 9 yards a second and in a direction relative to the line of fire as shown on the disk (when the point to be aimed at is 250° in azimuth and the target is moving toward 30°). The openings in H show the component letter to be D, the allowance R and $\Delta\varphi$—.

Bring 9 on F opposite 3,600 on D. $\Delta\varphi = -11'$.

Bring 9 on L opposite 3,600 on D allowance = 15 points R.

The piece is to be fired at the end of the interval when sight with above allowance is pointing at the target. If it is desired to give an interval for the gunner to dismount bring the speed on F and L opposite range on the lines numbered with the desired interval.

To find the distance a target will move in different intervals and its speed when one distance and its interval is given, slide M. For the intervals on the left of M (10s. to 1m. 40s.) the indices give speed as indicated: For intervals on right of M the readings in speed are one-tenth, and in distance ten times those indicated.

If the distances are one-tenth of distance on left scale, speed will be one-tenth of indicated speed.

The index for miles per hour reads to same unit as upper index for yards per second and ten times the unit of lower.

A vessel moves 320 yards in 40 seconds. Bring 40 on M opposite 320. The yards per second is 8, miles per hour, 16; in 1 minute 30 seconds it will move 720 yards, in 2 minutes 30 seconds, 1,200 yards, etc. + c.

To find the components of distance and speed moved in directions parallel and normal to range, slide N.

A target is moving in a direction indicated by H by the component letter F, the speed = 9 yards per second.

Move X on N opposite 9, opposite F on side giving component parallel to X is found 4.6; opposite F on side giving component normal to X is 7.6 ∴ speed in direction of range is 4.6 yards per second and across range 7.6 yards per second.

A target is moving in direction indicated on H by the component letter C at 19 miles an hour and at 4,280 yards; what will be the range in 2 minutes (speed and direction considered uniform)? On M bring "miles per hour" opposite 19 and index on N opposite C M in on N. On distance scale 970 is found opposite C parallel to range ∴ new range = 4,280 — 970 = 3,310 yards. This gives an approximation only, as the cosine instead of the radius is given.

For giving the correction for height of gun above target when using quadrant angle and for finding yards deviation for deviation in minutes and the allowance in points for this deviation, slide O is used.

The angle of elevation for a target at 3,600 yards under existing conditions is 6° 49′; what is the quadrant angle when the gun is 40 feet above the target? Move 40 on 0 opposite 3,600, M is opposite 12 ∴ Quadrant angle = 6° 49′ — 12′ = 6° 37′.

The differeuce between the azimuth of target and azimuth of shot is 7′; what is the deviation in yards and what allowance in points, range 3,600 yards?

Move Y on O opposite 7, opposite 3,600 is 7— and opposite Y in the last column is 2.

∴ Deviation is 7 yards and allowance = 2 points.

Slide G is used for finding the algebraic sum of corrections in elevation.

Slide J is used for finding the algebraic sum of corrections in deviation.

THE RAFFERTY DEVIATION INDEX.

The deviation index has for its object the mechanical determination of the correction in minutes to be applied to the elevation of the gun and to the azimuth in order to allow for the deviating effect of the atmosphere, the wind, and the drift. The correction in elevation for the state of the tide may also be obtained.

Omitting, for the present, the last factor, it will be seen that the atmosphere and one wind component act along the range, the drift and the other wind component act across the range. Remembering this, it will be found that the operation consists of two parts:

First. Separating the wind into its components to each of which the appropriate factor is then automatically added (that is, to the component along the range the atmospheric effect is algebraically added and to the component across the range the drift is algebraically added).

Second. Mechanically changing the numbers so obtained to minutes of the appropriate scale (that is, minutes of elevation in one case, of azimuth in the other).

The instrument consists of a circular base having an azimuthal graduation, intervals 5°. Pivoted in this is a disk having two diameters, at right angles to each other, marked thereon. An arrow at one end of one diameter indicates the direction of the wind; the disk is "set" by turning it until the arrow reads the direction from which the wind

comes. One-half of the other diameter has an arbitrary scale of miles of wind marked on it.

Part of one semicircumference of this disk is graduated into divisions representing degrees of elevation and parts of degrees. These divisions and the scale representing miles of wind depend on each other. Curved lines on the disk are lines of uniform lateral deviation in minutes of azimuth.

A short arm rotates about the center of the disk and independently of it. It has a scale of miles of wind corresponding to that previously referred to.

Mounted on this arm by means of a sliding block and a hollow screw with a shoulder, serving as a pivot, is a cross-arm.

Both the long and short branch of this cross-arm has a scale of miles of wind the same as those previously referred to. On the short branch this scale is marked on the metal; on the long branch it is marked on one side of a boxwood ruler of triangular cross section; the other side of this ruler has a scale for values of $\frac{\delta_1}{\delta}$; the ruler slides along the long branch of the cross-arm.

The long branch has on its surface another graduation, which is one of minutes of elevation.

The minutes of azimuth correction are therefore read on the curved lines of the disk; the minutes of elevation correction are read on the long arm.

OPERATIONS.

To divide the wind into its components:

(1) Set arrow at azimuth of wind.

(2) Set sliding block on radial arm at the velocity of wind.

(3) Set radial arm at the azimuth of target; bring the cross-arm so that its long branch will be parallel to the arrow diameter.

Then read on the left side of boxwood scale the longitudinal component where the scale is cut by the lateral diameter and read on the short branch the lateral component where that branch is cut by the arrow diameter. The sign + is indicated by the semicircle in which the 0 of the scale lies.

The principle upon which this resolution is based is practically the graphical method of obtaining rectangular components. The angle between the direction of the wind and the direction of the target is graphically represented, and the force of the wind is so represented on the radial arm.

AUTOMATIC ADDITION.

The boxwood scale is set so that the $\frac{\delta_1}{\delta}$ reading shall be on the edge passing through the center of the cross-arm pivot. By this means the atmospheric effect is added without further action.

The 0 of the lateral scale is set to the left of the pivot enough to allow for drift.

CONVERSION TO MINUTES.

(1) Of azimuth. Set radial arm at the gun elevation. Under the direction component number on this arm read the disk number, which is minutes of azimuth.

(2) At the elevation component number set the sliding block and rotate on its pivot the cross-arm until the long branch reads the same number on the diameter graduation. Here read on the long branch the minutes of elevation correction.

ORDER OF OPERATION.

(1) Set for $\frac{\delta_1}{\delta}$.

(2) Set for wind direction and velocity.

These are done in advance.

(3) Set radial arm at azimuth of target and read components.

(4) Set radial arm at gun elevation and read direction correction.

(5) Set sliding block at elevation component and read elevation correction.

ARMY BUILDING,
New York City, August 14, 1896.

SIR: The Board on the Regulation of Seacoast Artillery Fire, constituted by Special Orders, No. 273, Headquarters of the Army, Adjutant-General's Office, Washington, D. C., November 20, 1894, respectfully submits herewith its progress report for 1895–96.

As most of the work done by the board during this period has been made the subject of special reports to your Board, it is deemed only necessary to mention the reports by name.

The most important of these reports is the one of May 27, giving a proposed system of "fire control and direction" for the United States seacoast artillery service. This we understand was approved by your Board and has been directed to be tried at three artillery posts. Also that a board has been constituted to formulate regulations and tactics based on this proposed system.

The other reports, in order of date, are:

October 18, 1895.—"Printing telegraph" system of the Consolidated Telegraph and News Company of New York City.

April 13, 1896.—Report of "competitive test" of the relocator, devised by First Lieut. William C. Rafferty, First Artillery; and the converter board, devised by First Lieut. E. A. Millar, Third Artillery.

April 20, 1896.—"System of plotting shots and directing the fire of batteries at moving targets," by First Lieut. E. M. Weaver, Second Artillery.

April 25, 1896 (Wrapper indorsement).—Returning papers relating to electrical device for automatic plotting, by First Lieut. D. D. Johnson, Fifth Artillery.

April 25, 1896.—Partial report on "system of range and position finding and converter board," devised by First Lieut. C. L. Best, jr., First Artillery.

May 15, 1896.—"Target indicator," devised by First Lieut. Arthur Murray, First Artillery.

May 19, 1896.—"Improvement in breech sights for aiming at moving targets," by First Lieut. Charles W. Hobbs, Third Artillery.

May 27, 1896.—Table of "directions and distances," with plot of triangulation at the Narrows, New York Harbor.

July 13, 1896.—"Plan for signaling azimuths and ranges," devised by Lieut. Bradley A. Fiske, United States Navy.

August 14, 1896.—Report on competitive trial of the slide rule devised by First Lieut. E. A. Millar, Third Artillery; and the deviation index, devised by First Lieut. W. C. Rafferty, First Artillery.

The board has had no experience with modern artillery and, until the results of this year's target practice by artillery troops are known, prefers to make no suggestions or recommendations as to guns, carriages, platforms, or accessories which might properly come under the head of "fire control and direction."

The two systems of telephones—the Bell long-distance and the Colvin—are undergoing a thorough and exhaustive test.

The Colvin system is being tested through the courtesy of the Interior Telephone Company, of New York City, at no expense to the Government other than the necessary battery power (not to exceed $35).

The Bell long-distance telephones, made as nearly as at present possible to conform with service requirements, were placed at our disposal through the courtesy of Messrs. J. J. Carty and U. N. Bethel, Metropolitan Telephone Company, New York City, at no expense to the Government.

As we have already stated in previous reports, we consider the subject of "communications" to be of vital importance. No matter what system may be adopted, the wiring will be practically the same, and as this can be put in at the outset at so much less cost than when the batteries are completed, we strongly urge the immediate consideration of this question for works in course of construction or to be constructed. The test of the telephones and telegraph typewriter should be continued.

The board still has under consideration the various elevation-indicating devices submitted, but it is not prepared to make a definite report on any one.

HENRY L. HARRIS,
First Lieutenant First Artillery, President.
W. C. RAFFERTY,
First Lieutenant First Artillery, Member.
I. N. LEWIS,
First Lieutenant Second Artillery, Recorder.

The RECORDER,
Board of Ordnance and Fortification, Washington, D. C.

REPORT OF INSPECTION OF THE NATIONAL HOME FOR DISABLED VOLUNTEER SOLDIERS.

REPORT

OF

INSPECTION OF NATIONAL HOME FOR DISABLED VOLUNTEER SOLDIERS.

WAR DEPARTMENT,
INSPECTOR-GENERAL'S OFFICE,
Washington, D. C., February 4, 1897.

SIR: I have the honor to submit the following report of the annual inspection of the several Branches of the National Home for Disabled Volunteer Soldiers under the provisions of the act of Congress approved August 18, 1894; during which personal visits were made from July 21 to November 1, 1896, and the preliminary and subsequent work lasted from early summer until now. The duty imposed entailed an inspection of the entire plant valued at not less than $7,500,000; its financial departments, with their intricate methods, and accounts and vouchers representing nearly $5,000,000; its supply departments with their great amount and endless variety of property and stores, valued at hundreds of thousands of dollars; its medical departments, with their several thousand sick; its complex and bulky system of records and papers; its numerous buildings from cellar to garret; its large and constantly increasing population of over 17,000 men; and involved a travel of several thousand miles from the Atlantic to the Pacific shore in a midsummer, when men and animals were daily reported in the neighboring cities as overcome by the heat, and at times it was thought best not to inspect the men in line nor subject them to exposure. It is hardly best to give an account here of the minutiæ of this inspection, so reference is made to the appendixes, as has been customary in former reports. The work is not an insignificant undertaking.

Special attention is invited to the report of Col. Dallas Bache, Assistant Surgeon-General United States Army, who assisted in the inspection of the Southern Branch with a view to a more thorough knowledge of its medical and hygienic features. As to the wisdom of such assistance occasionally in the inspection, if not in the permanent control, of such a Home for disabled men, a perusal of Colonel Bache's excellent report will afford the best demonstration. It is understood the desirability of such services has received some attention, and they have been offered to the Home authorities, though not yet adopted for the Home. The accountant of the department assisted throughout this inspection, especially with papers and accounts. The law requires this inspection to be thorough. The assistance of a medical and a financial expert and of an analyst for food seemed specially important and readily accessible; and the benefit to be derived from such special knowledge and experience, where utilized, is evident. If such assistance for the inspection

is deemed objectionable by Congress, it is hoped its pleasure will be indicated in the premises.

In collecting and summarizing data at the Branch Homes occasional difficulties have been met; but the effort to obtain it invites attention sometimes to where it may be needed; and when the information and statistics are habitually received accurately and promptly, the inspection is greatly facilitated and its complete thoroughness insured. In such a simple matter, for instance, as the number of barracks or storehouses, or the number of persons present, confusing statements have been given.

The Branches are generally in good condition and the grounds admirably kept, and some of the buildings are models of neatness and order and design. How to improve or replace those that are not deserves constant attention. The question of cleanliness will be recognized at once as deserving attention, whether in grounds, buildings, bedding, person, or clothes; and the more public the place the more probable the success. Food and proper ventilation are the first essentials of health; and the former seems rather more satisfactorily met than the latter, though both are successfully supplied at some Branches, except as vitiated by overcrowding. In no particular is deterioration noted. Wherever any change is being effected it seems an improvement; and the earnestness and zeal with which the task and duty assigned these Homes are being met deserve warm commendation.

DISBURSEMENTS.

Amount appropriated for the support of the National Home for Disabled Volunteer Soldiers for the fiscal year ending June 30, 1896		$2,514,846.00
Including for special construction		173,500.00
Leaving for maintenance		2,341,346.00
To this was added—		
From posthumous sources		43,674.74
From sales and other sources		61,859.33
From disallowances		982.62
Making a total of		2,447,862.69
From this amount there was expended to September 30, 1896:		
For maintenance—		
By disbursing officers	$2,198,002.16	
By Treasury settlements	134.89	
By allowances	2,160.41	
	2,200,297.46	
For posthumous repayments	22,841.63	
		2,223,139.09
Balance		224,723.60
Of this balance there was undrawn from the Treasury		104,865.11
Surplus funds turned in by general treasurer		99,764.31
Remaining in hands of treasurers		20,094.18
		224,723.60
Of the amount appropriated for special construction		173,500.00
There was expended		173,257.46
Leaving unexpended		242.54
Distributed as follows:		
Turned into Treasury	$21.37	
In treasurer's hands	221.17	
		242.54

While the amount of unexpended balances held by the general treasurer is much smaller than the amount held at the corresponding date last year, there does not seem to be any reason why any funds not needed for current monthly expenditures should be held, if these funds are regarded as public funds; for not only has the Secretary of the Treasury, under authority vested in him by law, directed that such funds should be redeposited in the Treasury promptly after the close of the fiscal year, but Congress as late as May 28, 1896, amended section 3621, Revised Statutes, to include "disbursing officers having moneys in their possession not required for current expenditure" in the enactment that "they shall pay the same to the Treasurer, an assistant treasurer, or some public depositary of the United States, without delay, and in all cases within thirty days of their receipt."

The general treasurer also carries a balance of cash on hand, and does not make all his payments by check, as required by the general laws governing the disbursement of public money; nor are some of his disbursements of funds relating to the several Branches approved, as apparently required by Treasury regulations; nor is the law requiring that funds shall be drawn from the Treasury only in favor of the person entitled to the payment always observed.

Estimates and appropriations.

The following statement presents a summary of the estimates and appropriations for the support of the Home and the amount unexpended of such appropriations during the past three years, as shown by the records to December 31, 1896:

Fiscal year.	Estimates of Board of Managers.	Appropriated by Congress.	Unexpended balances.
1894	$2,620,348.41	$2,379,872.99	$183,741.03
1895	2,530,131.70	[1]2,447,531.74	247,691.30
1896	2,711,326.06	2,514,846.00	224,966.14
Total	7,861,806.17	7,342,150.73	656,398.47

[1] This amount includes $123,058.74 appropriated from posthumous funds that were lying idle in the hands of Branch treasurers.

Per capita expense.

The reports of previous years show the cost per capita based on the amount expended for maintenance for the fiscal year 1894 as $141.41 and for 1895 as $128.78. The amount expended for maintenance for the fiscal year 1896, as shown by the accounts to September 30, 1896, appears to be $2,200,297.47, and the average present 17,451, making the cost per capita for that year $126.08. This does not include the amounts expended from the post fund, such as the pay of the band, pension clerks, and other items, which at other than the National Homes go to increase their cost. A comparison between the cost per capita under the several heads show a slight increase over 1895 in the cost of clothing, subsistence, and current expenses, and a decrease in repairs, hospital, farm and household, and the general appropriation for salaries and incidental expenses.

The care and economy exercised in the disbursements of these funds were everywhere in evidence; and if the expenditures of the post fund, which last year aggregated nearly $458,000, were as efficiently supervised, possibly similar results might follow.

Deposit of funds.

The various laws and regulations relating to the deposit of public funds looking to their safe-keeping, give preference to the placing of such funds in a United States subtreasury. The wisdom of such a rule is apparent from the

frequent announcements of the closing of other depositories. While under the laws requiring bonds to be given to secure the balances, no loss may ultimately occur, much inconvenience is possible by even the temporary locking up of such funds until the depositories' affairs can be adjusted. In two instances the funds of the Home are kept in national banks in the same city in which a subtreasury is located. While it may be necessary to keep the balances of the post fund, owing to its daily cash receipts, in a local depository, possibly the balances of the general and pension funds might be placed with the assistant treasurers. These balances frequently exceed $500,000, and the idle pension balance of one of the Branches alone is apparently over $80,000.

It is again noted that the general treasurer does not always test by collection the checks remitted to him by the Branch treasurers, but merely indorses and returns them to the drawer. Experience has shown the necessity of the regulations which require that all checks transferring funds should not only be deposited, but should be remitted direct to the depositary to be placed to the credit of the receiving officer. In many instances, idle balances were found in the hands of the Branch treasurers, possibly due to the transfer to those officers of funds not needed nor requested for present disbursement, as for special construction; and in some cases, where such excess under one head was noted, a deficiency under another head existed.

Special funds.

The accounts relating to the various funds held by the president of the Board of Managers, outside of and additional to those held by the general treasurer, were inspected, and show but little change since last report. To the balance reported at last inspection ($67,046.13) interest on the Ward-fund bonds, amounting to $1,848.27, was added; and from these amounts the principal disbursements were $274 from the Stinson legacy for a clock at the Marion Branch dining hall, and $4,014.87 from the Ward fund, covering $3,019 for cold storage at the Pacific Branch, $300 for lease of gas land at the Marion Branch, and $350 for services in closing General Franklin's accounts as acting treasurer and preparing bills for Congress.

The balance on October 20, 1896, was as follows:

Ward fund		$60,208.07
Stinson legacy		442.58
Butler settlement		2,354.88
Improvement fund, Western Branch		1,600.00
Total		64,605.53
Distributed as follows:		
North Carolina bonds	$10,000	
Tennessee bonds	33,300	
Virginia bonds	15,000	
		58,300.00
Phœnix Bank, Hartford, Conn		3,950.65
Cash in hand		2,354.88
Total		64,605.53

Post fund.

It was noted at some of the Homes that a great deal of the work on the post accounts arose from the furnishing of transportation to members going on furlough, and at others, where arrangements had been made with the railroad companies to issue the usual half-fare ticket to the member on presenting evidence of his membership, the Home treasurer's office was saved much labor. Is it not practicable to extend the latter methods to all

the Branches? At one Branch they were forced to it, because the supply of coupons was exhausted, and no inconvenience to the members was reported. It should not be difficult to show the railroad officials the advantages of a cash system over one involving bills, vouchers, and accounts.

The provisions of law authorizing the Home to procure from the Ordnance Department ammunition for the morning and evening gun, and for firing squads, did not seem to be known at some of the Branches, and they were purchasing powder and cartridges for such purposes from their post fund. A preference for buying stores for themselves can, of course, hardly dominate such questions.

SUPPLY DEPARTMENTS.

Barracks.

The barracks are very satisfactory at some places, though not at others; but recent constructions are generally excellent and their appointments meet the most modern views. The overcrowding noted in previous reports did not seem to have decreased during the past year. Indeed, why should it? A resolute endeavor would be necessary to stop it. Enough dormitories have perhaps been built during this Administration to empty the so-called "gopher holes" and dark and questionable sleeping places; but the pressure for any sort of a place within the Homes has not ceased, and some sort of provision seems essential. At one Home the upright lockers standing between beds were being replaced by the old-time boxes that fit under the beds and admit of greater crowding, though already the proper allowance of air and space seemed trenched upon; and the sleeping in basements has not lessened. Where electric lighting has been introduced, the air possibly should be less vitiated than in dormitories lit by gas and without ventilating chimneys or louvers. Perhaps enough has been said in reports from year to year as to either the successes attained or the failures marked. Plumbing and cleanliness are generally good, and the bedding is improving and carefully watched, though decidedly superior at some Branches than at others; and there should be fewer bedbugs: but ventilation and bathing facilities leave much room for criticism. Something more than water and soap seems required at several Branches: and what a bather should be given as toweling may seem insignificant: but when it is utterly inadequate to dry the person, or is a roller towel already used a score of times for the hands and face, evidently bathing can not be tempting. And a towel for one or more dozen men, and apparently not always changed daily, is hardly a liberal allowance.

Complete information as to cost of barracks per cubic foot, or some other adopted unit of measure, has not been obtained; and comparison between Branches of the economical methods and work, or with outside work, can not be made, however suggestive or desirable.

Bedsteads.

The endurance and cheapness of an iron bunk and its importance in the life of a member in an institution established for disabled men, who certainly will grow feebler with increasing years, would seem to fairly warrant the purchase of nothing less than a 3-foot bunk hereafter. The reasons for a cleanly, comfortable, creditable bed and bedding are too patent to need argument. Some may think the old way and supplies are good enough, though the Government can do better without undue expense or effort, for such men as are collected in these Homes; but it is submitted that where improvement is practicable it should be made. A narrow cot, a

flimsy mattress, bugs, counterpanes with holes, a pair of sheets per month, the makeshifts for warmth and comfort, the absence of foot rugs or slippers, and the storage of wearing apparel and other articles under the bedding may be less or no more usual now than ten years ago; but if the opposite condition were made universal, no matter how gradually, evidently there is something about it that does not seem undesirable. The labor, care, and expense are not excessive; and some of the Branches have proved how success can be attained in most of these particulars. The 3-foot bunk seems needed, not only for comfort, but as some protection against the vitiated air in such dormitories as are habitually overcrowded. It is believed that much that is unhealthful or objectionable in this could be remedied inexpensively if a reliable and experienced medical director were assigned to duty with these old soldiers under ordinary military supervision and esprit de corps.

Food.

Some of the dining halls and kitchens seem the perfection of cleanliness and are excellently managed, and the worst are not discreditable, and it is believed they never were. The food is generally of good quality, well cooked, and ample; and these Homes present a striking example of what can be accomplished by economical and skillful methods, which deserve the attention of all interested in messing large bodies of men. With such neatness and attractiveness even the plainest food appeals to the palate. If more is possible under the circumstances, it can be left to the zealous and intelligent efforts of the officers in charge to discover it and the best means to meet it.

The immense quantities in which subsistence supplies are purchased by these Branches, amounting to many thousand pounds per month, should secure the most favorable terms. The extremes in contract prices prevailing during the last quarter of the year are indicated in the following articles:

Articles.	Branch.	Price per 100 pounds.	
		Minimum.	Maximum.
Flour	Western	$1.40	
	Southern		$2.25
Coffee	Eastern	16.75	
	Pacific		21.65
Tea	do	14.45	
	Northwestern		32.00
Bacon	Central	6.37	
	Western		8.53

It seems fair that grade and quality should be alike for all, but such differences may be due to transportation, quality, brand, or other causes. In one instance, two of the Branches purchased tea in the same market at a difference of $5 per 100 pounds, which seemed to more than offset difference in cost of transportation; and in another, three Branches bought their oleomargarine in the same city, the one nearest by over 500 miles paying over $1 more per 100 pounds than the one most remote from that market. Praise is due the officials for what they have already accomplished, and their continued efforts and watchful care are a guaranty that the interests of the Government may not suffer. The average cost per capita for subsistence was about $56 for the past year.

The bowls in use appeared to be a cheap and brittle crockery, costing about one-third as much and the breakage being about five times as great as in the Army.

Property.

As the expenditure of money became more regular in conforming to the rules regulating the deposit and disbursement of public funds, it seemed desirable to devote more attention than had previously been possible to the business methods relating to property. A call was made for the necessary statement, somewhat similar to that used for funds or to that used for property in the Army, in advance of the visit, but they generally had not been prepared prior to my arrival; and possibly some disinclination may exist to furnishing these statements, as there was to submitting certain funds when these inspections began. Unless such inspections meet with cheerful alacrity and ready assistance and a receptive spirit from all, the difficulties are unnecessarily increased and the fullest success restricted. A telegraphic call was also made for certain samples of food, to be simultaneously submitted for expert chemical analysis: but these matters are held in abeyance, as it has seemed best to take up seriatim in this inspection what pressed for attention and make it as thorough and complete as the opportunities and the limited means at hand permitted, but stop short where the opposition would clearly compel an imperfect inspection. With a patient and decided effort, it is not doubted that this public duty will ultimately be correctly adjusted, and apparently while progressing toward this end it is accomplishing all that was expected by those who established it. The readiness of this Department to comply with the behests of Congress concerning this duty seems sufficiently evident, whether to discontinue or proceed with it. The question presented seems to be simply what the best methods and the public interests require; whether lax or exact methods are desired and satisfactory; whether those usual with Government accountability or for a private corporation are desired. In short, whether money appropriated by Congress shall be expended for the purposes for which it was appropriated; and Government money shall be expended in the Government way. Whatever the law indicates is decided upon, it is the duty of this Department to try to help execute.

A simple, clear, uniform, and rigid system of accountability and responsibility for both money and property, and in the distribution and performance of duty, is of course essential in so large and expensive an institution; and in some points it seems hardly to have been attained. For instance, the amount of property in actual existence in store or use, but not on the quartermaster's bulky volumes, has already invited remarks, and seems excessive for surplus stores, which indeed should never be allowed.

The value of the property classed as imperishable (which does not include articles consumed in the using, such as subsistence, medicines, etc.), may be estimated from the statement that nearly $200,000 worth of such property had been condemned during the year. Are not values in property as much a responsibility as values in money, and should not the same accountability extend over each, as they are convertible each for the other? And should there not be a property return submitted at stated periods accounting for all property received and expended, just as it is now done for funds, and as is done in the Army for both funds and property? Such a return seems to be required to reconcile the apparent differences between the reports of the issuing and receiving officers.

Property and stores seem to have received good care and supervision considering their scattered and inadequate storage places and these business methods.

Clothing.

The price of clothing is changed from year to year, dependent upon the cost of manufacture; yet in charging to the members the value of clothing not accounted for by them, the value of the clothing at the date it was received was not charged, but they are expected to pay the price fixed by regulations in 1883. Should not the members receive the benefit of the reduced price, as in the sale of subsistence to officers and others?

Shop accounts.

The shop accounts have been receiving some attention, with a view to improvement. Under the new methods the shop appears to be charged with the value of the material issued and the cost of service, and credited with the value of the work done, based upon the probable rate of pay for such services outside the Home. Thus a member who was paid 35 cents per day would have his services rated at from $1 to $1.50 per day, and other rates accordingly, and so the profit to the shop is apparently a matter of estimate. This possibly accounts for some of the varying per cent of profits on the stated value of articles fabricated in the shops of the several Branches, as follows:

	Average profit.
Eastern Branch	0.033
Pacific Branch	.052
Central Branch	.081
Northwestern Branch	.128
Marion Branch	.200
Southern Branch	.208
Western Branch	.427

The bakery at the Pacific Branch shows a small loss, while that at the Western shows a gain of 38 per cent. All the shops at the Eastern Branch closed out without gain or loss, except the soap shop, at which a gain of 47 per cent is reported, while the soap shop at Marion reports only 9 per cent, and at the Western nearly 75 per cent. While these shop accounts may be interesting to keep, they do not seem to have much practical value, as the profits stated are not actual gains, but theoretical estimates, and no loss in the value or quantity of the material used need appear.

MEDICAL DEPARTMENTS.

Hospitals.

These institutions come high in importance, and possibly next to the dining halls and kitchens in perfection of construction at some of the old Branches, where the admirable dormitories predominating at the newest seldom appear; but here, too, the limit of space has been reached, and the buildings and rooms added from time to time to the medical departments indicate their growing need. With an average daily sick of over 2,400, resources are taxed to the utmost in giving well-deserved care to all sufferers. Where women nurses have been employed, improvement has been effected in the service. The suggestion of divorcing the Army and Navy Hospital at Hot Springs, Ark., from the active force and devoting it to the care of these disabled veterans is submitted for consideration. The sick and the helpless and the feeble need our first attention; and the lack of a central medical authority is much felt, and uniformity of administration and methods has suffered in consequence.

Medicines.

It is important that all drugs and preparations procured for these old veterans should be the best obtainable, purchased from reliable dealers by experts, if possible, with facilities to test their purity and potency, and no old stock or

deteriorated drugs should be accepted. The combined list of medicines used at the different Branches seems large enough to embrace every variety in the market. The Home officials have not as yet availed themselves of the privilege of purchasing army medical supplies under the act of June 11, 1896, but the law may be too recent for immediate results. They are not limited to the 223 articles on the army list, nor even to the 600 or more medicines they are now using if more are needed to cure the sick, and if there are any articles it is desirable the Home should obtain through this means under reasonable regulations the law now seems to authorize it. From the contracts on file in this office it appears that nearly 1,500 gallons of alcohol were contracted for at the various Branches at an average of $2.40 per gallon, and nearly 5,000 gallons of whisky at an average of $2.14 per gallon. As the Government does not pay the internal-revenue tax of $1.10 per gallon, the Medical Department of the Army is possibly enabled to purchase articles subject to that tax at lower rates.

The dead.

There were 1,171 deaths during the year, of which 206 occurred outside of the Home, giving a slightly greater rate of mortality than reported for the preceding year. Nearly 80 per cent of these men were buried at the Home cemeteries, which, with the present rate of interment, are rivaling our national cemeteries, and may deserve to be placed on an equal footing, like that at the Southern Branch or at the Soldiers' Home for regulars; thus leaving it to the officials of the Home to care for the living in their charge and permitting another branch of the public service already established, and performing its duty equally well, to take care of the last resting place of our dead. It is unnecessary to say at which Branches this change would be the greatest boon; but would it not be acceptable and decorous at most of them?

ADMINISTRATION.

Officers.

The officials have shown commendable zeal and efficiency in conducting affairs at the Branch Homes, and their efforts are praiseworthy; though occasionally there is lack of uniformity in methods or responsibility. Who should have direct charge of work and property and tools and where the personal touch of the governor, doctor, treasurer, or quartermaster, or some subordinate of either, excludes the others, are matters which have received attention at more than one Home, and deserve still more. Uncertainty in such matters is undesirable. Perhaps the varying quality and harmony among the officers at the several Branches make uniformity throughout the whole Home difficult; but the greatest practical efficiency at each seems eminently desirable. It would be beneficial if the division of duties among the officers at the Branches assimilated as nearly as possible to that of an army post, which long experience has demonstrated is best for an aggregation of old soldiers. This natural division gives the commandant an assistant to take charge of the sick, of the well, and of the material (whether money or property). The original law authorized such a quartet in a governor, deputy governor, treasurer, and doctor. One of the troubles at the Branches seems founded on the failure to follow the wise provision of the organic law and the natural distribution of the essential duties under whatever titles may be chosen. The Dayton and Milwaukee branches have officers performing adjutant or inspection duties with marked success and benefit. The newer Branches already need another officer, and if

one could be assigned to this class of duties it would be in the direction possibly most needed.

Members. The average number of officers and members reported present during the year was 17,451, which is an increase of 974 over the number reported for the previous year, and an average of 4,233, or 19.5 per cent, was constantly absent, making the total number of members present and absent during the year 21,684. The per cent of constant absentees for the two preceding years was 18.46 for the fiscal year 1895 and 19.10 for 1894; so it seems about 19 per cent of the men carried on the rolls are not living at the Home.

Among some State Homes there is an active movement for removing names of unaided absentees which cumber the rolls and files indefinitely, and give privileges which may appear sometimes to militate against those who have never received any benefit from the Home before; and it seems no hardship to drop men who apparently are not in need of its benefits.

Pensioners. By far the greater number of the members are pensioners. At the close of the year over 82 per cent of the members on the rolls, or 18,531, were pensioners, who received pensions through all intermediate grades from $6 to $72 per month. The amount paid them during the year was nearly $2,500,000; and there was a balance held to their credit by the treasurers amounting to over $200,000 and representing the savings of 3,149 men, of whom 171 had been transferred to insane asylums and 108 were not within reach, as their addresses or residences were not known. These funds are now lying idle in depositories. Active soldiers are given the right to deposit funds with the United States, and it seems reasonable and fair to give these disabled ones a similar privilege.

Discipline. The discipline is generally acceptable, though if the number of trials may be taken as a measure of judgment, there has been a deterioration as compared with the previous year. During the past year about 27 per cent of the average number of members present were tried for breaches of discipline, which is 4 per cent more than for the preceding year. Liquor seems to be the cause of most offenses. A good many worries come to the innocent and unoffending three-fourths of an institution when the other fourth persist in overindulgence; and the struggle of the Branch Homes against intemperance is liable to be in evidence. The efforts at one Branch in suppressing the haunts of vice in the vicinity of the Home and removing temptation from the feeble-minded and disabled seem to have met with exceptional success and borne good fruit and are worthy of emulation. At one Branch no intoxicating liquors are sold on the grounds.

Amusements. Something more than mere food, shelter, and clothing seems due these men, and until adequately supplied perhaps the Homes are not all they should be. Even the active Army devotes set times to manly and military sports. The proper occupation, and even the innocent amusement, of so large an aggregation of men without the refining presence of equal numbers of women and children has received considerable, and deserves more, attention and effort. To keep their interest enlisted and attention engaged in all worthy matters may be so natural as not to require any special effort, but the need must be recognized in this as in every home in the land. Some places seem to lack little conveniences that render them comfortable, and Congressional appropriations seem to have given

no church to any Branches. The need of a proper place for divine worship is most felt at the younger Branches, particularly the Pacific, where an unsightly frame that would make a poor barn at most is used for the purpose. Even the beer halls lack something or appear grosser than is essential to such profitable institutions.

Outdoor relief.

Years ago attention was invited to the unseemly sleeping places and overcrowding of hundreds of these veterans at some of the Branches. Since then enough buildings have been erected either by State or national expenditure to provide for this surplus population, but little or no relief is shown in this objectionable feature. Surely all the members should be housed like men, and the congested condition of the Home and the constantly increasing throng of needy and worthy men pressing to its doors for shelter, food, and care calls for some prompt measure of relief. If the temporary character of an institution limited to a single generation were persistently recognized throughout its entire system, possibly the amounts expended would go much further in affording relief to the disabled.

Under the present pressure for relief, three methods suggest themselves: First, to increase the present plant; second, to build new Branches; and, third, to provide for the members at their private homes. It is respectfully submitted that all three are pressingly needed. The mere building of barracks is not all that is necessary. Other incidental expenses follow as a matter of course. The barracks furnish only the shelter; and the kitchens, the hospitals, the storehouses, and other necessary adjuncts are now crowded beyond their capacity and may need to be correspondingly increased. In the $500,000 expended from post and general funds in permanent improvements during the last four fiscal years, including 1897, apparently some three-fifths have not been for dormitories. A new Branch on a comprehensive plan capable of development would doubtless in time relieve some of the pressure. But either adding to old or building new Branches will consume time; and as stated in a previous report we can not build as fast as grim want grows upon the thousands who are already appealing for relief, nor even fast enough to meet the present wants of men that should appeal to our sense of honor and patriotism. Their wants are for to-day, not a year hence, when some of the buildings may be completed.

We need not ask who is to be benefited, and when. If unworthy, nothing should be bestowed; if worthy, the paraphernalia of an expensive Home the sufferer is too late to enter is useless to him. It does not come like relief to the disabled if they ask for bread and are offered a stone. The simple question is, What is the best and most prompt and economical method of extending needed and deserved relief to all these actually disabled old soldiers, and render it unnecessary to unduly overcrowd them, or confine relief to a favored few? Thousands of dollars put into brick and wood for future and growing needs may be very good. But the unexpended balances for the past three years amounted to over $600,000, and might bring comfort now in their day of need and in such wintry weather to be enjoyed while still alive. Some say that the maximum membership of the Home will probably be reached in from eight to ten years, and the buildings are larger now than may be needed after a score of years. Would it therefore be wise to let these men continue to suffer while we attempt to build barracks or new Branches for all, even during the most crowded winter? The men seeking the shelter of the Home to-day do so generally not from choice, but are driven to it by

distress. There are many members now in the Home who have expressed in letters to this office the hope that such relief would be given them so they could return to their families and leave a place for some poor comrade now without shelter or home. Perhaps it may be due or permissible to present their petition with some special earnestness.

It has been practically demonstrated in some of the States and at the regular Home that it is possible to provide the aged and disabled soldiers with relief at their own homes. There are effective agencies employed for the distribution of this relief through the town, the county, the State, or through Homes; showing that a widespread desire exists to ameliorate the condition of these worthy veterans in this manner. By this direct distribution of the fund there is no expense for costly barracks, ornamentation of grounds, maintenance of bands, theatrical companies, and a small army of officials; but the old soldier gets it all in the midst of his home associations, his wife, his children, and his friends. To those who are without these associations the National Home offers its sheltering care; but why should those who can have them be denied them, and at an additional cost to the Government? Doubtless a plan can be found, if desired, by which extravagance can be avoided; and Congress can at all times limit the appropriation. The overcrowding at the Homes may not be creditable, and the exclusion of so many deserving men entirely from these benefits seems severe. Is there any other method to fully meet this duty, except away from these Branches? The generosity of Congress to the old veterans in this and all matters is a characteristic of our times. Nothing greater can be asked. But is there not a pressing need to have the old law establishing outdoor relief duly recognized during this severe season and these hard times? It has been practically demonstrated how such relief can be economically and efficiently managed whenever its benefits are extended again properly to the National Home.

If it is deemed best to build a new Branch, would it not be best to locate one in the South, where less expensive and more speedily constructed buildings may be erected and the household expenses be kept down without loss of comfort to the men?

Changes noted.

It may not be inappropriate to refer at this time to some of the changes which have occurred and their trend. The net cost per capita, based upon the amounts appropriated for maintenance, not including receipts from sales and other sources, has been reduced during the past four years over 22½ per cent; while the average present has been increased during the same period about 19 per cent. The active interest taken by Congress in the affairs of the Home is shown by the enactment of laws requiring the Secretary of War to exercise the same supervision over all receipts and disbursements of the Home as for the Army, and providing for a general treasurer, who should not be a member of the Board of Managers, and who should be bonded to the United States, and the bonding of the Branch treasurers to him; the fixing of the salaries of the officers and employees of the Board; the more prompt rendition of accounts; the classification of all employees; the consolidation of appropriations for clothing under one head; the right to use funds received from sales; the use of penalty envelopes; the shipment of certain stores direct to the place where used; the transfer of the posthumous fund, $152,232.63, then lying idle, and the surplus subsequently accruing, to the general fund; the limiting of the disbursements to the amounts appropriated therefor; the prohibition of expenditures

from the general fund for new buildings without Congressional authority; the payment of mileage to officers instead of actual expenses; the annual inspection under the Secretary of War of the disbursements, management, discipline, records, and condition of the Home; the issue by the Ordnance Department of the Army of ammunition, etc., for the morning and evening gun and for firing squads; and the right to purchase medical and hospital supplies from the Medical Department of the Army; and in addition to these, a series of rules and regulations for the audit of the accounts with forms for accounts current and vouchers were prescribed by the Secretary of the Treasury under authority of law of long standing.

As a result of this legislation and executive action it certainly seems that a more strict and prompt accounting has been obtained, and a greater economy in the use of public funds, without detriment, but with positive benefit to the service for which they have been so generously appropriated. This ought to be satisfactory to all concerned.

In conclusion, I beg to invite attention to the need of clerical assistance in handling the vast amount of work connected with this institution. At times it seems that all the clerks in this office are engaged on Soldiers' Home matters to the exclusion of their former duties, and for months during inspection Sundays and nights are occupied, though their additional duties scarcely receive any outside recognition. The work so done may have borne the fruit intended by those who established it, but it should be fairly provided for.

Respectfully submitted.

J. C. BRECKINRIDGE,
Inspector-General.

The SECRETARY OF WAR.

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APPENDIX A.

No. 1.—Report of an Inspection of the Eastern Branch, made July 21, 1896.

There has been no change in the officers of this Branch during the year. They seemed to be impressed with the responsibility of their duties and to endeavor to perform them to the best of their ability. In a former report it appeared that the commissary officer expended and controlled cash which was carried on the treasurer's books. As to property, some overlapping of direct control and methods of business seems to have existed.

DISBURSEMENTS.

The accounts and disbursements of the treasurer were examined from October 21, 1895, the date of last inspection, to July 21, 1896, inclusive, involving $493,210.62, pertaining to the general, pension, and post funds. The expenditures, as shown by vouchers and transfers, amounted to $421,345.23, leaving a balance on hand of $71,865.39, which consisted of $996.43 cash in the hands of the treasurer, and $70,868.96 on deposit in bank.

General fund.

During the past fiscal year the treasurer received on account of the general fund $249,577.35, which includes $3,308.78 received from posthumous sources, and $7,468.57 from sales. The expenditures for the same period were $231,538.51, of which nearly one-fourth was disbursed in currency. At the date of inspection there were $20,266.40 on deposit and $374.51 cash on hand pertaining to this fund. The excess of 10 cents was due to an error in drawing a check for payment of a voucher.

Improvements and repairs.

The only new building reported made during the year was the new frame barrack, at a cost of $6,983. It can accommodate 125 men and is occupied by Company H, and therefore costs $55.86 per capita, which can be compared with prices at other Branches. The boggy nature of the ground usually requires piling for foundation. Possibly the present hospital would answer much better for barracks, in which men do not remain so constantly; and a modern hospital with the best scientific construction might wisely be erected. No new constructions have been authorized for the present fiscal year, except the building of a new barn, for which $2,800 was appropriated. A new coal shed at the wharf at Randolph, Me., for the use of the Home is much needed to replace the one destroyed by the freshet last spring. The amount expended on repairs during the year is reported at $16,318.92. The most considerable repairs upon one structure were made on the old bakery building, which was converted into quarters for convalescents.

Pension fund.

From this fund $246,913.72 was disbursed during the year, leaving a balance of $26,351.87 due the pensioners at the close of the year. The United States bonds bought many years ago with the idle balance of this fund were sold and the proceeds, $8,620, deposited with the Granite National Bank of Augusta, Me., to the credit of the treasurer on account of the pension fund. It would seem the pensioners or the Home should receive some benefit from it. The treasurer reports that the Shawmut National Bank of Boston, Mass., in which is kept the account with the general fund, charges the Home for the collection of checks, and so to avoid this expense the checks are sent through the Granite National Bank of Augusta. Why should not the accounts of the general and pension funds, at least, be kept with the United States sub-treasurers? At the close of the year there were 2,044 pensioners on the rolls at this Branch, against 1,868 the year previous. An average of $32.27 was paid each pensioner for the last quarter of the fiscal year. The funds of which the treasurer is the custodian belonging to insane and other pensioners are not inconsiderable. At date of inspection the treasurer's balance to the credit of this fund was $11.53 over the amount shown by his records as due the account from him.

Post fund.

The receipts from sales during the year at the Home store, restaurant, and beer hall were $49,516.75, and the revenues from the theater $1,385.41; and the expenditures were $21,524.78 for stock, and $24,116.20 for clerk and help hire and other items. At the close of the year the treasurer held $15,349.42 to the credit of this fund. At date of inspection he had $14,332.07, or $4.02 more than the amount necessary to close his account.

The insurance on the opera house, chapel, store stock, and Keeley clubhouse was paid from this fund; also the salary of the Keeley doctor at $80 per month, and postage stamps for the use of non-pensioners.

Purchases.

Purchases in open market are made upon requisition of the quartermaster, approved by the governor, for such supplies as are required and authorized in the schedule furnished by the president of the Board of Managers for the treasurer's guidance. Those made by contract are usually made monthly as far as practicable in case of imperishable articles, and weekly or oftener in case of perishable articles. The principal supplies of food for the last quarter of the fiscal year were bought in Maine, Massachusetts, and New York. Flour was obtained from Auburn, Me.; fresh beef, ham, salt pork, and potatoes from Gardiner, Me.; corn beef, bacon, and sugar from Augusta, Me.; coffee, tea, fresh fish, butter, and lima beans from Boston, Mass.; codfish from Gloucester, Mass.; navy beans from Rochester, N. Y., and sirup from New York City. This Branch pays more for fresh beef and less for coffee than any of the others.

Employees.

The number of employees reported authorized during the year under the general fund were 3 officers, 20 non-commissioned officers, 341 members, and 49 civilians, or a total of 413, which is to the average present for the year as 1 to 4.5. No members worked without pay during the year, except as a penalty.

ADMINISTRATION.

Population.

The average number of officers and members present during the year was 1,855, which is an increase of 78 over the average of the previous year; and an average of 539, or 22.5 per cent, was constantly absent. At date of inspection,

the total population living on the reservation consisted of 1,914 souls, including civilian employees, women, and children; and 653 members were absent. There were 103 vacant beds in barracks and 15 in hospital, which does not seem large, considering the number of absentees. The overcrowding in some of the old dormitories has been mentioned in former reports. The vertical lockers which replaced the boxes gave more floor space by separating the beds, but are now being taken out of the sleeping rooms. The appearance of the men at review was commendable.

Discipline.

Discipline seems fairly well maintained, though a slight increase is reported in the number of trials as compared with the previous year. Nearly one-half of all offenses committed consist of inebriety, and over one-fourth of absence without leave. The punishments comprise labor without pay, generally police duty, and restrictions in liberties.

Men who ask for discharge before the expiration of six months after admission are reported as absent without leave for sixty days and are then dropped from the rolls. If an old soldier's temporary necessities force him to seek the shelter of the Home, and before the expiration of six months circumstances should favor him so that he could support himself or no longer become a charge upon the Home, and thus give place to one more needy than he, should not such an one be commended and encouraged rather than have his record discredited by the charge of "absent without leave?"

The authorized "furlough register" does not seem well adapted for its purpose. It is suggested that the system of keeping each man's record on a separate card to be filed alphabetically, after the manner adopted by the War Department for all its records with such satisfactory results, would be more simple and expeditious. When a man returns from furlough, his card with his record on it is withdrawn to another file box to be returned to the active file when he again goes on furlough, which file alone engages the clerk's attention and shows at any time the number and names of those then on furlough. The advantages of this system could be extended to other records in the offices of the adjutant and the surgeon.

The State register contained at date of inspection only the names of members admitted since about four years ago, and was about a month in arrears.

Amusements.

Facilities for amusement and recreation consist of reading room and library, smoking and card room, billiard and pool room, deer park, concerts, and theater. Of these the concerts seem best liked.

The library and reading room were in good condition. Books may be taken from the library on presentation of a card and retained fourteen days. Books of fiction are in greatest demand, and it seems that an average of nearly 16 books was read by each member during the year.

The band is maintained during the entire year, with an average membership of 17, all of whom are civilians. The annual cost of maintaining the band, including subsistence and other allowances of the musicians, averaged $390.09 per man. The concerts are reported well attended, and there are no charges for admission. The musicians are quartered in the restaurant building, which was built from the post fund, and they are subsisted in the general dining room and receive the same allowance of clothing as the members of the Branch, but no fuel.

The opera house was in excellent condition. All the leading theatrical

companies that come east of Portland usually give performances here. The expenses are met from the post fund. Members are taxed a nominal charge for admission, but the receipts from this source cover nearly one-fifth of the expense.

The basement of the library building is used as billiard, pool, and card room, and was in good condition. It is frequented at all times from morning till evening, except on Sundays. There are no charges for the use of the tables.

The Grand Army post at this Branch holds its meetings in the opera house.

Religious services.

Catholic and Protestant services are held every Sunday in the Home chapel, which was built within the past few years, and special services are held when required. The ministers receive each $65 per month, and do not live at the Home. They also visit the sick when necessary and officiate at funerals, and on some occasions the governor officiates. Divine services are reported to be attended by a larger proportion than is found in outside communities.

Farm.

The farm is under the direct charge of the governor. About 500 acres are reported under cultivation, and the following buildings are used for farm purposes: 7 barns, of which 2 are used for horses, 3 for cows, 1 for vehicles, and 1 for hay; 2 sheds for carts and tools; and 4 buildings for horseshoeing, harness maker, wheelwright, and quarters for teamsters. They were all in good condition. Ten carriages and sleighs, or pungs, and 28 wagons and sleds are kept for use by the Home. The stock on hand June 30, 1896, was valued at $5,680, and consisted of 16 horses, 58 cows, 2 oxen, 1 bull, 49 calves or heifers, and 40 deer and bears. The principal products are milk, hay, and ensilage, the former valued at $7,889.25, and the hay and ensilage at $5,705. Milk seems to be credited to the farm at the rate of 24 cents per gallon, though it is reported that the price of milk by the quantity in the nearest town is only from 18 to 20 cents per gallon—a difference of 20 or 30 per cent. A comparison of prices of some articles at the several Branches is suggestive of the differences in their surroundings; and the care and improvement of a herd is not always so successful as here.

SUPPLY DEPARTMENTS.

Buildings.

The barracks were generally clean and in good repair; that occupied by Company G was undergoing repairs. There were some signs of leaks, and perhaps more modern barracks might improve in design and construction upon the older or altered ones. The dormitories are crowded, and some of the companies are scattered in parts of several buildings.

No record is kept of the amount expended on each building. Where the estimate or expense on a building does not give its size, any comparison of the economical work and methods is difficult between the Branches or for work outside; and information as to cost per cubic foot or some other adopted unit of measure or comparison has not yet been fully received.

The general washroom in the basement seemed less inviting than the water-closet and bathroom, though the appearance of the bath tubs could be improved by a coating of enamel paint. The bath towels were noticeably small and thin. Toilet paper is found in general use throughout the other Homes, and all might be treated fairly alike.

Bedsteads and bedding.

The beds in use are of various patterns—iron cots with woven-wire bottom, about 2½ feet wide and 6¼ feet long. The average supply of bedding per man consists of a cotton mattress weighing 14 pounds, three woolen blankets, two linen sheets, one cotton pillow and slip, and one bedspread or counterpane. Sheets and pillow slips are said to be washed each week, and blankets and counterpanes aired frequently out of doors when necessary. Some of the latter seemed to be in need of washing.

Supplies.

The supplies seemed of good quality (though there was some criticism about the coffee and C sugar) and of sufficient quantity; but the storage places are undesirable and too scattered, and in some cases supplies pertaining to different departments are stored in the same places. Some of the quartermaster property, for instance, is stored in a room in rear of the quartermaster's office, in cellar of Company D, in engineer's and carpenter's shops, hospital, paint shop, etc., and subsistence supplies are stored in basement and cellar under the main dining room, in cellar of Company D, and in meat shop. No damage to the supplies, however, is reported on account of storage; and with such scattered stores it may be unnecessary to question whether better police and order in some rooms would be possible. The furniture and other property of the Home is not all marked, but all is reported as taken up as public property on the books under the various heads and kind of stores. Property and stores are usually issued upon properly approved requisitions, though some stores, like coal, are issued without requisition. The closest supervision of such matters is apt to be beneficial to the public interest.

The engineer makes monthly report to the quartermaster of the coal used by the boilers. The number of tons used in January was reported as 420, February 362, March 387, April 190, and June 271, leaving a balance on hand, acording to the records, of 100 tons. No report for May was shown the inspector.

Shop accounts.

If these accounts are deemed necessary and are to be regarded of value, they should be assigned to one responsible officer, and he should be furnished with all the data affecting them. Last year's accounts were apparently entered from memoranda. Repairs made on verbal orders do not appear, and apparently the internal vouchers do not show all the internal transactions. The double set of time books required seem to entail a good deal of clerical work.

Clothing.

A clothing account is kept with each member of the Home, the various articles being issued according to regulations and charged to each man, who is held accountable for each and every article until worn out. When on furlough his clothing is held for him until his return, but if he be absent twelve months it is returned to the quartermaster's department and, if suitable, reissued or put in condition for reissue. No account seems to be kept of second-hand clothing or clothing awaiting condemnation. Cast-off clothing, unfit for further use, is condemned and sold as rags, except old shoes, which are destroyed, and buttons, which are cut off and returned to the Central Branch depot.

The sales of rags during the past year comprised 31,780 pounds woolen, 1,925 pounds cotton, and 1,370 pounds bedding. The prices obtained per pound were 5 cents for 14,460 pounds, 4½ cents for 19,245 pounds, and 1¾ cents for 1,370 pounds, the total receipts amounting to $1,613.02.

Laundry. The members of each company are required to send their clothing to the laundry on Sunday mornings, and each member is permitted to send one shirt, one pair of drawers, and a pair of socks, and other clothing if necessary. The average number of pieces laundered per month is reported to be slightly over 29,000. Members wash their handkerchiefs themselves, and a number wash their own socks, shirts, or drawers in a room with the necessary appliances for that purpose. The wash list seems to indicate that counterpanes are in use about a year and the small hand towel a week without laundering. The dryer does not seem to work well at times.

Fire department. The apparatus for the protection against fire seemed in good condition. The fire organization consists of fifteen men, who are required to respond to the fire alarm sounded by a whistle on the machine shop, and are said to be able to respond in from two to five minutes. During the past year a fire occurred from the range in the main kitchen, which caused a damage amounting to $50 before extinguished. No other fires are reported for the past twenty years.

Engineer department. The chief engineer at this Home has charge of the machine shop, all boilers, plumbing, repairs of all kinds, except carpenter's work, hydrants, and hose, and has been on duty here for four and one-half years. Thirty-six men, or less, varying with the season, are employed under him as plumbers, steam fitters, stone masons, laborers, tinsmith, coal passers, and firemen.

The system of water supply and of drainage and sewerage is reported satisfactory.

Dining hall and kitchen. These were in fair condition and police; but the range and steam-kettle facilities seem insufficient, and tables have to be set twice for each meal as at the other Branches. The food is generally acceptable in quantity and quality. The daily consumption of food and cost for the months of December, 1895, and June, 1896, are exhibited in Tables 27 and 28. Dining room and kitchen work is performed by 53 men, who constitute the permanent force for this duty, and there are no additional temporary details, as at other Branches.

There are 6,589 pieces of crockery reported in daily use in the main kitchen. The percentage of breakage of each kind during the past year ranged from one-third for vinegar bottles to 63 for bowls. The breakage is said to be due principally to handling in setting tables twice for each meal and to poor quality of the ware.

Swill and garbage are sold to the highest bidder by annual contract. The price obtained last year was $50 per month.

Thirty-three members are reported living in the vicinity of the Home, to whom a month's supply of rations is issued in advance at an average cost of the ration for the previous month, or about $5.40 per man. Clothing is also issued to these members under the same rules as apply to those within the Home.

MEDICAL DEPARTMENT.

The hospital consists of a brick building and two frame pavilions connected by covered passages, and a small building adjacent thereto serves as quarters for convalescents. Cleanliness was observed on every side.

The hospital basements are occupied by morgue, crematories, steam

boilers for heating, and fan for ventilation, laboratory, and storage, and the attics are used as storage rooms and attendants' quarters. Each ward is supplied with set bath tubs with hot and cold water, and patients are required to bathe once each week, unless otherwise ordered by the surgeon. Some are bathed daily. Ventilation is effected by a steam fan which exhausts the foul air, and fresh air is admitted through stacks after being heated by passing over steam radiators. The large metal cylinders standing at different heights in the wards are a marked feature here.

The average daily sick during the year has been 278 in hospital, 30 in convalescent quarters, and 69 at sick call. There were 607 patients admitted to the hospital and 52 to the convalescent quarters, and 236 cases were discharged from the former as cured and 3 from the latter. The total number of cases treated during the year was 2,505, and each case was treated an average of 43 days and about 44.7 per cent resulted in a cure. Acute pulmonary affections and inflammatory rheumatism are reported the principal diseases of local origin, due frequently to climatic conditions. There were no infectious or contagious diseases during the year beyond 5 sporadic cases of erysipelas and 1 of influenza.

The death rate is reported greater than for the previous year, and was 50.91 per 1,000 of the average present and absent, and 40.22 per 1,000 of the whole number cared for. Of the 122 deaths, 91 occurred in hospital, 4 in other parts of the reservation, and 27 on furlough. The causes assigned are 119 natural, 1 suicide, and 2 accidents. The average age at death was over one year less than reported for the previous year.

Eighty of the deceased members were buried at the Home cemetery, which is kept in excellent order. Funerals at the Home cost $10.49 each, not including care of cemetery and graves, which are made almost in solid rock. Coffins are made by contract at Augusta, Me., at a cost of $3.50 each. The deceased are buried in uniform clothing. No allowance is made for the funeral expenses of members dying outside of the Home, as is done at the Home for regulars.

There are 82 hospital employees, of whom 70 are members and 12 civilians. The former serve as hospital stewards, ward masters, barbers, bread cutters, cooks, dishwashers, drivers of hearse, elevator attendants, funeral escort, gravediggers, hall cleaners, nurses, orderlies, porters, readers to blind, waiters, and wound dressers; and the latter as assistant surgeons, matrons, internes, druggists, and nurses. The ratio of these employees to the total number of patients treated is as 1 to about 30, and to the average daily sick as 1 to nearly 5.

Medicines are obtained from the quartermaster's department upon the surgeon's requisition approved by the governor. They are then issued to patients at surgeon's call upon verbal orders of the surgeon, and to patients in hospital upon his written orders, which are preserved. After issue by the quartermaster's department no further record is kept of medicines. The hospital records were in good order and kept as required; but the sick-call record could be improved for historical or statistical purposes.

Facilities to care for the insane consist of one grated ward with three cells for close confinement. It is cheerful and sunny, and its windows afford a view of the busiest part of the camp. Occasionally the ward is crowded, and there is no inclosed court for outdoor exercise of these unfortunates. The average annual number of insane at this Home is 41, and about 18 are sent yearly to the asylum.

Sixteen members are reported totally blind, and 26 with an impaired eyesight so as to be unable to read.

No. 2.—Report of Inspection of the Northwestern Branch, made August 4, 1896.

The officers are efficient and zealous in the discharge of their duties, and there has been no change in their personnel since last inspection.

DISBURSEMENTS.

The accounts and disbursements of the treasurer were inspected from November 11, 1895, the date of last inspection, to July 31, 1896, and involved $525,947.50, pertaining to the general, pension, and post funds. The expenditures, as shown by vouchers and transfers, amounted to $483,800.99, leaving a balance on hand of $42,146.51, which consisted of $348.44 cash on hand pertaining to the post fund and $41,798.07 on deposit in the First National Bank of Milwaukee.

General fund. During the past fiscal year the treasurer received on account of the general fund $281,900.03, consisting of $270,625.01 from Congressional appropriations and $11,275.02 from sales and other sources. The expenditures for the same period were $258,674.03, which was all disbursed by check. At some of the other Homes it is noted that considerable sums of this fund are still disbursed in currency. At date of inspection there was a balance of $3,520.58 on deposit to the credit of this fund. The accounts and records of this office are very neatly and intelligently kept.

Improvements and repairs. This Branch erected during the year a new headquarters building and a quartermaster and commissary storehouse at an expenditure of $13,803.10. These buildings meet a long-felt want. No improvements are contemplated or have been authorized for the present fiscal year, but the following are reported needed for the year ending June 30, 1898, viz: Additional electric-light plant, $9,500; two water-tube boilers, $12,000; and improving old hospital building, now used for shops and storage purposes, $6,000. The amount expended on repairs during the year is reported as $19,856.56. The most considerable repairs upon one structure were made upon the convalescent barracks at an expense of about $1,000, which is a specially tidy and comfortable building, with plenty of light and air, and the occupants seem to be specially cheerful and well cared for.

Pension fund. The treasurer paid out during the year on account of pensions $280,716.66, and had a balance of $19,343.08 due the pensioners at the close of the year. The average paid each pensioner during the last quarter was $31.66. On June 30, 1896, there were 2,238 pensioners on the rolls at this Branch against 2,078 a year previous, of whom 1,917 were present and 321 absent. Twenty-four had been absent over one year. At the close of the year there were 224 pensioners who had balances to their credit. Of these 1 had over $1,000, 8 between $500 and $1,000 each, 44 between $100 and $500 each, and 171 less than $100 each. The addresses of 19 pensioners, who had balances to their credit amounting to $658.17, were not known; and 8 pensioners, with a total credit of $381.50, had been transferred to an insane asylum. At date of inspection, July 31, 1896, the balance to the credit of this fund was $26,290.18, including the proceeds of a United States bond for $800 sold during the year.

Post fund. The receipts from sales during the year at the Home store, restaurant, and beer hall were $51,060.41, and the expenditures for stock $26,646.69. The assets reported at the close of the year were $9,684.09 cash and $1,442.62

merchandise. At date of inspection, July 31, 1896, the treasurer had in his charge $12,335.75 to the credit of this account.

The cash book of this fund was ruled in columns to show the receipts and disbursements from each source each day, thus making a very full and satisfactory record and involving much less labor than the method in use at some other Branches, where the record was spread over three and four times the space.

It was noted that funds received from sales of transportation to members are held by the transportation clerk until from $200 to $300 are in his hands before it is turned over to the treasurer, who does not take the amount up on his cash book until the end of the month. Evidently a more frequent regular settlement and smaller accumulation of undeposited cash is a better business method.

The checks on sales at the beer hall seem to be satisfactory and the business carefully conducted. The cash register at the store and the returns do not always agree, but the balance is largely in favor of the returns. Both places were found in commendable order and police. It might be well if the best business methods found at one Branch were uniformly extended to all.

Purchases. Purchases are practically all made under contract, and only a few of small value are made in open market, when it is impracticable to enter into contract. The principal articles of food for the last quarter of the fiscal year were all purchased in Milwaukee, which is but a few miles from the Home.

Employees. The number of employees reported authorized during the year under the general fund were 6 officers, 29 non-commissioned officers, 926 members, and 40 civilians, or a total of 1,001, which is to the average present as 1 to 2.3, though the average reported employed is as 1 to nearly 5.

An average of 66 men daily worked during the year on various details without pay, but not as a penalty.

ADMINISTRATION.

Population. The 2,313 average present is a gain of 83 over last year; the average constantly absent was 382, or 14.2 per cent. The highest number present during the year was 2,436 on January 8 and 9, 1896, and the lowest 2,116, on July 21 and 22, 1895, so that the greatest overcrowding is habitually when natural ventilation is poorest. At date of inspection 2,344 officers and members, including 58 temporary members were present at the Home, which, with the civilian employees living on the reservation, and women and children, made the total population present 2,446 persons; and 487 members were absent. The number of vacant beds was 58 in barracks and 28 in hospital, which is about 18 per 100 of the members then absent.

It is believed best to see the members in a body as the quickest, if not the only, way to judge of the general condition of the clothing and other elements essential to their comfort and contentment. Snow prevented their turning out on two previous occasions, and owing to the intense heat it was now omitted, and an inspection was made indoors.

Discipline. Discipline is maintained by the non-commissioned officers and the Home police. Judging from the number of trials, discipline seems to have improved. The decrease in the number of trials was about 5 per cent, as compared with the preceding year. One-half of all offenses committed are due to drink, and one-sixth absence without leave.

The punishments attached comprise labor from ten to sixty days and forfeiture of pass privileges; and for incorrigibles, dishonorable discharge. Sentences of labor may be commuted in the discretion of the governor at the rate of 20 cents per day. From this source $503 was received, which was paid by 106 members. These funds are held by the chief clerk, under receipt to the sergeant of the guard, who reports the amount at the end of the month to the treasurer, who then receipts to the chief clerk for the amount collected and credits it to the post fund.

Amusements.

Facilities for amusement include theater, billiard room, card room, band, library, beer hall, boating, skating, and entertainments by members. Theater, billiards, and cards seem best liked. Bowling was tried several years ago, but the alley was abandoned from want of use. The library and reading room were not only in good condition and police, but seemed a creditable and economical structure in full use throughout, both in basement and above. At the close of the year there were 7,809 volumes on hand, which shows nice improvement. Books may be taken from the library, one at a time, but must be returned within two weeks in good condition. Books of fiction, history, travels, explorations, and adventures are reported in greatest demand, and the books read average about 14 per member for the past year. The Home also subscribes for 103 papers and 22 periodicals, at apparently full rates, and received 25 papers and 4 periodicals gratuitously.

The band is maintained during the entire year with an average membership of 18, all of whom are civilians. The cost of maintenance during the year, including subsistence and other allowances, averaged $339.86 per musician. The concerts are reported well attended and there are no charges for admission. The musicians are quartered in a small building set apart for the purpose and receive one suit of uniform a year, and rations the same as members of the Home.

The second floor of memorial hall serves the purpose of a theater. It was in good condition, but is reported to be dangerous in case of fire, on account of insufficient exits. The performances given are chiefly comedies and there is no charge for admission, and generally two performances of each play are given to accommodate all the members. Fifteen performances were given during the year at an expense of $4,250. Nothing like all the members attend the theater, play billiards, etc., and the question whether any payment should be made and how adjusted has received various decisions at different times and places. The theater is occasionally used by public speakers addressing members of the Home.

The basement of the social hall building is used for billiards and pool and was in good condition. There are no charges for the use of the tables, and they are in nearly constant use when the room is open, from 8 a. m. to 8 p. m.

The card room is in the basement of the library building and contains sixteen tables and one long table for checkers.

The seven boats on the lake are at the disposal of members free of charge, but civilians pay 5 cents each per hour for their use. The receipts from this source were $64.70 for the year, and the expenditures $24.87, so the plant seems maintained upon a very small charge.

Keeley League.

This society numbers 252 and holds weekly meetings in its club room. Its gain in membership during the year was 61, who took the cure for the first time, and 34 took the cure a second and 11 a third time. The loss during the same time was 88, of whom 23 relapsed. The cost of taking the cure

for the first time is reported as $23.75, for medicine, lodge, club dues, and initiation fee. It is reported that care is exercised in having members take the cure voluntarily, and no inducements are given nor encouragement beyond the necessary information. The total receipts for the year were $2,580.32, the expenditures $1,916.75, of which $1,521.60 was for medicine, and the balance on hand was $1,085.21. The accounts are kept by the post-fund clerk and the funds by the treasurer of the Branch, who pays the bills on the approval of the governor. To Dr. Comfort, the assistant surgeon of the Home, $25 per month was paid for services, and the amount of dues collected was paid to the treasurer of the league.

In addition to this league there are two other societies among the members—Veteran Post No. 8, G. A. R., with a membership of 207, and Cushing Naval Veteran Association, with a membership of 42—both holding their meetings in the social-hall building. These organizations are said to have a good effect upon discipline.

The Methodist Church and Women's Christian Temperance Union are mentioned as showing a special interest in the members.

Religious services.

These are held five and six times each week in the Home chapel, which has a capacity of 400 and is reported suitable for the purpose. There are two chaplains, a Roman Catholic and a Protestant Episcopal, who receive each a compensation of $41.66 per month. The Protestant chaplain lives at the Home. In addition to divine services, the chaplains officiate at funerals and give spiritual comfort to the sick and dying. Religious services are reported well attended.

Farm.

It is reported the farm contains 150 acres under cultivation, and comprises the following buildings: One farmer's quarters and wood shed, 3 horse stables, 1 large hay barn with tool and implement house in one end and grain bins in the other, 1 carriage and vehicle house, 1 blacksmith shop with teamsters' quarters overhead, 2 hog barns, 1 two-compartment house, 1 wagon shed with straw loft overhead, 1 implement shed, 1 dwelling used as drivers' quarters, 1 corncrib, 1 very dilapidated dwelling near cemetery, 1 two-compartment icehouse, and two small icehouses and tool shed. A number of these buildings require reshingling, otherwise they are in serviceable condition. The transportation facilities of the Home consist of 15 vehicles, such as a carriage, ambulances, wagons, carts, etc., and 22 horses. Six of the latter are used for duty on the farm and about the grounds. Besides these the farm keeps 62 cows, 18 calves and yearlings, 22 sheep and 19 lambs, and furnishes stabling for 7 private vehicles and 10 private horses. The stock on hand June 30, 1896, was valued at $4,197.

The products for the year are reported as valued at $8,434.17, of which $3,808.62 was for 30,469 gallons of milk, which is credited to the farm at the rate of 12½ cents per gallon. A nominal account seems to be kept of this milk and that purchased. At one of the other Homes where cows are kept on the farm, the rate is 24 cents per gallon. The farm land here is not suitable for raising potatoes, but cabbage, hay, and other articles raised are reported as good as can be bought.

Four hundred pounds of live chickens were purchased and expended each month during the last year. They were reported as turned over to farm and thence to hospital on requisition. There did not appear to be any report of farm chickens since September 30, 1895, when the report showed 130 on hand.

SUPPLY DEPARTMENT.

Buildings.

The baracks were well policed and in good repair, and their condition as to comfort and sanitation is reported good, though the ventilation, which is regulated by windows and doors, does not seem to be satisfactory in every respect. They are heated by steam and lit by gas and electricity. The concentration of the steam plant, for which $27,300 was appropriated in a prior year, has progressed far enough for some of the old space to be now used for other purposes. Six of the 12 barracks at this Branch have basements, of which 3 are used as storerooms, etc., and 3 as dormitories; and 3 barracks have an attic used as dormitory, baggage room, and for bath tubs, respectively. There were 342 men sleeping in basements, and 69 in attics, and 129 in scattered places not originally built for sleeping in. The attics are reported as good as the barracks with respect to ventilation, etc., but the basements have more or less dampness, and less light and ventilation than the barracks, and are generally objectionable. The construction of these veterans' Homes should contradict the idea that any old thing is good enough for us soldiers.

No record is kept of the amount expended on each building, though such data seems essential to the best and most economical administration of construction and repair.

Bedsteads and bedding.

The bedsteads are 6¼ feet long by 2½ feet wide, and the mattress in use is cotton and reported to weigh 13 pounds. The average supply of bedding per man consists of 1 counterpane, 4 blankets, 3 sheets, 1 pillow, and 2 pillow slips. This supply seems to be more liberal than reported at the Eastern Branch, which is in a higher latitude. Dormitory windows are thrown open at 6 a. m., and kept open until the rooms and bedding are aired. The locker in use here is 3 feet high, 2 feet wide, and 1 foot deep. Bedsteads, bedding, and lockers were reported in good condition.

Supplies.

The erection of a new storehouse during the year has relieved the pressure for room to a great extent, though the necessity of recourse to basements does not seem to have been obviated, but basements, however dark, dank, and inaccessible are rather better for property than men, though there is a fair-sized battalion in them here.

The supplies seem of good quality, and sufficient in quantity. The current supplies of quartermaster stores on hand June 30, 1896, were valued at $7,671.81, and of commissary stores $4,447.82. Coal is weighed when received, but not when issued, and a requisition is issued at the end of each month for the amount of coal purchased during the month. The record of amount on hand deserves some other and closer test. What statement and verification and supervision of the property received, issued, and remaining on hand throughout the Branch Home is wise or needed has attracted some attention. It is understood that no returns whatever are desired or demanded of such public property for this general purpose and use, under the instructions of the officers of the Board of Managers. The supervision of higher authority of property expended and hygienic questions are matters now of first moment, and deserve conclusive settlement. Furniture and other public property are not all marked, but taken up on the property books. The value of property condemned during the year is exhibited in the tables appended.

Clothing.

The value of clothing on hand July 1, 1895, is reported as $10,178.74, and that received during the year from depot as $25,308.30, and from other places as $6,573.05, giving a total accountability of $42,060.09. The value of the clothing issued during the year is reported as $29,753.77, leaving clothing to the value of $12,306.32 on hand at the close of the year. The issue of clothing is regulated according to the table of allowances, and clothing worn the required length of time is exchanged for new, garment for garment, if worn out; but if still serviceable, it is worn until unfit for further use. This appears a most economical arrangement for supplying the individual wants.

Condemned clothing is sold as rags. From this source $1,063.53 was realized during the past year. The prices obtained per pound were: For all wool, $0.0825 to $0.10; all cotton, $0.01; all wool seams, $0.0175 to $0.0225; mixed cotton, $0.0025 to $0.0075; socks, $0.0725 to $0.08; blouse linings, $0.003 to $0.0075; canton flannel drawers, $0.0175 to $0.0225; linen towels, $0.0225; shirts, K. W., $0.015; hats, $0.0225 to $0.03; all wool linings, $0.0375; and cotton and wool seams, $0.025.

The company commanders report at the end of the fiscal year the clothing in the possession of the men, and also all Home property in the barracks. This is a practical, disinterested, and much-needed count of stock, which deserves universal adoption. An attempted verification of something in the clothing accounts displayed lack of agreement, and the reasons given hardly seemed to reach the root of the matter satisfactorily. Whether or no account was kept of clothing taken away by men going on furlough, or there was no time to review the company commanders' reports, or caps and great coats were condemned years ago and dropped from the records, and subsequently issued but not taken up on the books, the stores should agree with the returns, and the several persons in actual charge of property should have correct lists and knowledge of its destruction. The keeping of the average price list involves much labor, but does not appear to be of much practical value. An earnest effort seems to have been made to improve the system of shop accounts, and some results, theoretical or otherwise, may be obtained to compensate for the labor involved. At this Branch a shop for cleaning the clothes of the members is maintained which apparently adds not only to the appearance of the men, but also to economy in clothing, and a similar one might well be established at the other Branches.

Laundry.

Clothing is sent to the laundry at specified times, in charge of duly authorized men with duplicate wash lists, which are verified by count, the laundry clerk giving receipt as the laundry comes in and taking receipt as it goes out. Each member is permitted to send to the laundry, weekly, one shirt, one pair drawers, and one pair socks, and as occasion may require, a blouse, trousers, vest, or overalls. The average pieces of wearing apparel reported laundried per month during the past year were 7,165 shirts, 7,668 drawers, and 6,828 socks, 132 trousers, 14 blouses, and 6 vests. This is less than a change of clothes per week. The expense of the laundry during the year was $1,440 for the services of 20 employees, and $1,000 for soap chips, an average of a little over $1.05 per man; but doubtless many of the men have their laundry done outside the Home.

Fire department.

The fire department is reported adequate and in good condition, and examined monthly. One engineer and five hosemen are quartered at the engine house, ready to respond to an alarm. There is also an auxiliary force, consisting of

all civilian firemen employed at the Home, who are regularly practiced in fire drill. The Home is also connected with the fire department of Milwaukee. There was no fire during the year. The last considerable fire reported occurred in 1876 and caused about $5,000 damage. A smaller fire in 1872 resulted in a loss of about $100.

Engineer department.

The chief engineer at this Home has general supervision of construction, sewerage, electric, gas, and water supplies, plumbing, steam fitting and heating, machinery and boiler plant, and has been on duty here for twenty-six years. Seventy-two men are employed under him as steam fitters, firemen, plumbers, masons, builders, hosemen, coal passers, lamplighters, etc. His department seems in good condition, and the system of water supply and sewerage satisfactory.

There are eleven shops at this Home—known as the bakery, carpenter, engineer, harness, linen, paint, printing, shoe, soap, tailor, and tin—the accounts of which are under the quartermaster.

Dining hall and kitchen.

These presented a neat appearance, and the facilities for cooking and serving meals are reported ample, though tables have to be set twice for each meal. The food seemed well cooked and ample in quantity. From the reports furnished it appears that during the month of December, 1895, the daily issues to the dining hall averaged 3.11 pounds per man, at a cost of $0.122; and during June, 1896, 2.86 pounds, at a cost of $0.118. To the hospital the issues during the month of December averaged 4.41 pounds per man, at a cost of $0.16; and during June 4.12 pounds, at a cost of $0.147.

Swill and garbage are sold under contract at the rate of $20 per month. The amount is estimated at 18,000 pounds per month.

There are 4,650 pieces of crockery reported in daily use, and 15,216 were received during the year and 7,552 broken, the breakage of bowls and dinner plates amounting to over 3,000 each. The percentage of breakage ranged from 2 for pepper and mustard pots to 84 for vegetable dishes.

None of the members of the Home receive outdoor relief in subsistence or other allowances.

MEDICAL DEPARTMENT.

The hospital consists of 1 central building for offices, dining room, and kitchen, and 3 two-story wings connected by corridors and used as wards, all of veneered Milwaukee brick. The north half of the west wing is used for the convalescents, in addition to those in the separate barrack. The insane ward and a company are under this roof. The room where the boilers were removed from is being nicely fitted up for other use.

The capacity of the hospital for patients is 169, and of the quarters for convalescents 103. Everything in and about the hospital was in good police. The hospital basements are used for storage and baggage and by extra-duty men and a few patients, and the attics for storage and aviary. There are 10 bath tubs in the hospital, and patients are required to bathe once a week, or oftener when necessary. Ventilation is effected by roof ventilators, fireplaces, and windows.

The average daily sick during the year was 172 in hospital, 91 in convalescent quarters, and 75 at sick call. There were 693 patients admitted to the hospital during the year and 70 to the convalescent quarters, and 546 were discharged from the former and 114 from the latter as cured. The total number of patients treated during the year was 3,072, and each case was treated an average of forty-two days.

There were no cases of contagious or infectious diseases during the year except erysipelas, and no diseases of local origin are reported.

The death rate for the year was 50.46 per 1,000 of the average present and absent, and 39.78 per 1,000 of the whole number cared for, and is about the same as reported for the previous year. Of the 136 deaths, 111 occurred in hospital, 6 in other parts of the reservation, and 19 away from the Home. The causes assigned are 128 natural and 8 the result of accidents. The average age at death was 66.1 years; for the previous year it was 64.8 years.

One hundred and seventeen of the deceased members were buried at the Home cemetery. They are buried in the Home uniform, and a coffin made in Milwaukee at a cost of $7.50. No allowance is made for funeral expenses of members dying outside of the Home, unless they are buried at the Home. The cost of a funeral is reported at $16.65.

There are 138 hospital employees, of whom 121 are members and 17 civilians. The former serve in the capacity of hospital stewards, ward masters, barber, bread cutters, cooks, dishwashers, drivers, funeral escort, gravediggers, hall cleaners, nurses, orderlies, reader to blind, waiters, and wound dressers, and the latter as assistant surgeon, internes, nurses, matron, druggist, and cleaner. The ratio of these employees to the total number of patients treated is as 1 to nearly 22.5, and to the average daily sick as 1 to about 2.5.

Medicines are obtained from the quartermaster's department upon requisition, and issued to the patients upon the doctor's prescriptions and at sick call. No account, except of whisky and wines, is kept at the hospital of medicines received from quartermaster.

Facilities to care for the insane consist of a restraint ward of 12 beds, closet and bath, and what is called the untidy ward of 31 beds, with two small rooms and one padded room. There is one strait-jacket, but no cells for close confinement. The average annual number of insane for the past three years has been 45, while the number sent to an insane asylum has averaged 9 per annum for the same period.

Nine members of this Branch are reported totally blind and 58 with an impaired eyesight, so as to be unable to read, and all require more or less attendance.

Many of the records are duplicates of those kept by other officers, and it would seem as if the system could be simplified and made uniform throughout all its branches.

Money and valuables found on unconscious members brought to the hospital are taken by the assistant surgeon, hospital steward, or ward masters to the surgeon in charge, by whom they are kept in a safe. No record is kept of what is turned over. The surgeon holds the pension money of the men in the hospital, and pays the same to them in small sums, as needed by them.

The medical storeroom is in the cellar of the hospital building, and it seems dry and clean. Whisky is issued in 5-gallon lots, about 15 gallons per week; wine by the gallon, 2 to 4 per week; beer by the case, 3 dozen. No account is kept at the hospital of second-hand clothing on hand.

No. 3.—Report of an Inspection of the Pacific Branch, made August 16, 1896.

There has been no change in the officers since last inspection. The general condition of the Home and the administration of the various departments speak well for their efficiency and ability.

DISBURSEMENTS.

The accounts and disbursements of the treasurer were inspected from November 30, 1895, the date of last inspection, to August 15, 1896, and involved $340,167.52, pertaining to the general, pension, and post funds. The expenditures, as shown by vouchers and transfers, amounted to $317,278.64, leaving a balance on hand of $22,888.88, which was all on deposit in the Los Angeles National Bank, except $43 of the post fund cash on hand.

General fund.

During the fiscal year ending June 30, 1896, the treasurer received on account of the general fund $262,150.53, of which $254,905.34 was from Congressional appropriations. The expenditures for the same period were $233,734.31, of which over one-fifth was disbursed in currency. At date of inspection there was a balance of $7,436.40 on deposit to the credit of this fund.

Improvements and repairs.

The principal improvements made at this Branch during the past year were an additional barrack, a main kitchen, and electric-light plant.

The contracts for the main kitchen amount to	$18,939
And sundry bills to	80
Total cost	19,019

The appropriation for the building was only $16,000; so the balance was paid by General Franklin from the Ward fund, $3,019.

The appropriation for the electric plant was $10,000, of which $9,969 was paid the contractor and $30.60 for sundry bills, leaving 40 cents unexpended.

The appropriation for the barrack was $22,500. The original contract was for $20,153, but supplemental contracts were made adding $2,161.10 to this amount, and sundry bills were charged amounting to $184.90, leaving $1 of the appropriation unexpended.

The plant is reported to give good service, but not of sufficient capacity for the work needed. The electric lights seem to be too high.

A trolley for carrying the beef and mutton to and from the cold-storage rooms is suggested, as the present method is very laborious; the receiving point and scales are so distant from the storage rooms.

The improvements authorized for the present year are a boiler house and stack, $9,200, and an additional barrack, $22,500, for which a contract for $20,376 has been made. This includes all plumbing, heating apparatus, electric work, etc., complete. The building is to be two stories of 13 feet, and an attic of average height of 8 feet. The central building will be 45 by 45 feet, with two wings 26 by 72 feet each, with no basement. Its normal capacity will be about 100, and the abnormal from 185 to 200.

The improvements reported needed for the year ending June 30, 1898, are estimated at over $100,000, and include two additional barracks, quarters for treasurer, chief clerk, and female nurses, large shop building, permanent bakery, permanent pumping plant, chapel, and assembly hall. The amount expended on repairs during the year is reported as $19,195.42. The most considerable repairs upon one structure were made upon the pumping plant, at an expense of $1,790. The water problem is hardly satisfactorily solved yet at this Branch, and other matters may naturally be held meanwhile in abeyance.

Pension fund.

The treasurer paid out during the year on account of pensions $168,037.30, and had a balance of $10,242.53 due the pensioners at the close of the year. The average paid each pensioner during the last quarter was $34.11. On June 30, 1896, there were 1,372 pensioners on the rolls at this Branch, against 1,113 a year previous, of whom 1,165 were present and 207 absent, 90 being absent over one year. At the close of the year there were 151 pensioners who had balances to their credit. Of these, 2 had between $500 and $1,000 each; 28 between $100 and $500 each; and 121 had less than $100 each. The address of one pensioner who had $100 to his credit was not known; and 3 pensioners, with a total amount of $78 to their credit, had been transferred to an insane asylum. At date of inspection the balance to the credit of this fund was $9,355.30.

Post fund.

The receipts from sales during the year at the beer hall and Home store and restaurant were $17,535.52, and the expenditures for stock $9,717.41. The assets reported at the close of the year were $5,095.40 cash, and $2,052.56 merchandise. At date of inspection, August 15, 1896, the treasurer had in his charge $6,097.18.

The post-fund buildings are not convenient nor suitable for their purpose. The unsightly beer hall was originally constructed for a store, and the store and restaurant for a waiting station, post-office, and lunch counter. There are few or none of the usual checks on the receipts from sales, and reliance is placed on the men in charge and the supervision of the treasurer, who makes monthly inventories of stock and property. The receipts at the beer hall are not turned over to the treasurer as so much received each day, but so much received for each barrel, varying from $25.25 to $25.75 per barrel in August. During three days in that month one barrel was sold each day, and yielded exactly the same amount. The system adopted at some other Branches appears more businesslike and commendable.

Purchases.

Purchases are made by the treasurer, as regulated by the supply schedule of the Board of Managers. Contracts are made for everything practicable which can be foreseen.

The principal articles of food, as flour, beef, potatoes, coffee, tea, sugar, bacon, etc., for the last quarter of the fiscal year were purchased in Los Angeles; fresh fish were procured from San Diego, and sirup from Santa Monica.

Employees.

The average number of men reported employed during the year under the general fund were 3 officers, 14 non-commissioned officers, 241 members, and 31 civilians, or a total of 289, which is about one-fifth of the average present. An average of 77 men per day were on fatigue duty, cleaning grounds and dining room and kitchen duty without pay, but not as a penalty.

Dining-room service is performed by detail for a week at a time and recurs about every four and a half months. Substitutes may be hired for $1.50, which is paid to the dining-room sergeant, by whom the substitute is hired. About 75 men are detailed each week, and from 30 to 35 of these hire substitutes.

Some system of detail and substitutes for dining-room duty seems to prevail at several Branches, and uniformity, supervision, and regular record seems needed, so the best practice will prevail everywhere. Perhaps one officer or the post council could take cognizance of all hiring of duty and see that all expenditures are duly recorded and conform to services properly rendered. Experienced and proficient workers.

room orderlies, nurses, etc., can usually render better service than can be expected from too frequent changes and grumbling workers, and to give the man in charge some opportunity for selection of a capable man of proper temper and habits may sometimes prove more beneficial than blindly following the roster. Good management, watchful care, and a kindly, contented spirit sometimes seems needed all round; and it must be known where and how the best success has been attained, and whether the same methods can be adopted or improved upon elsewhere.

ADMINISTRATION.

Population.

The average number of officers and members present during the year was 1,408, which is an increase of 175 over the number reported for the preceding year; and an average of 362, or 20.5 per cent was constantly absent. At date of inspection, 1,585 officers and members, including 17 temporary members, were present at the Home, which, with the civilian employees, women and children living on the reservation, made the total population present 1,627; and 391 members were absent.

The number of vacant beds was 10 in barracks and 3 in hospital, which is a little over 3 per 100 of the members then absent.

The men presented a fine appearance at the review, and showed evidence of good care.

Discipline.

Discipline seems well maintained, and a considerable decrease is noted in the number of trials during the past year as compared with the previous year, despite the increase in membership, and only about 15 per cent of the average present were tried. Over two-thirds of all trials were for drunkenness and absence without leave. The penalties attached include reprimands and caution, labor without pay, if the offender is under 64 years of age and not too much disabled, and in extreme cases, discharge from the Home.

Discipline is enforced by the company officers and Home police and the officers or foremen of the various departments. Disorderly or insubordinate men are cautioned, and if the disturbance continues, sent to the guardhouse, which was a model in order, neatness, and ventilation.

Amusements.

The library is located on the second floor of the administration building, and seems well arranged and satisfactorily conducted, but is rather distant from the barracks. At the close of the year it contained 1,727 volumes. Books may be taken from the library for one week and renewed at the expiration of that period. Books of fiction and magazine literature are reported in greatest demand, and it seems that an average of about 11 books was read by each member during the past year. This Home did not subscribe for any paper or periodicals, but received a liberal supply gratuitously.

The band was maintained during the entire year with an average membership of 11 musicians, 8 of whom are civilians. The cost of maintenance for the year, including subsistence and other allowances of civilians, has averaged $321.71 per musician and $2.51 per member, which enables some comparison of per capita cost and benefit to be made between the several Branches.

The band plays each afternoon on the balcony of the dining hall. The musicians receive the same rations as members, but no clothing. Their quarters are steam heated. There was some complaint as to the extreme paucity of patriotic, familiar, or Anglo-Saxon music, though none as to the excellent rendition of the selections.

There is no building at this Branch deserving the name of theater, and no theatrical performances are given. The small, unattractive, and unsuitable assembly hall (so called), which seats about 250, is used for entertainments, religious services, Grand Army and society meetings, and other assembly purposes. No expenses were incurred during the year for performances. When any are given, an admission charge of 10 or 15 cents is collected by the company performing. Thirteen performances were given for which admission was charged, and three were free.

Such an amusement building as was recently erected at Dayton and such a church as was built at Leavenworth would be a godsend here. A suitable hall is certainly badly needed here, and would be much appreciated by the men.

There is no billiard hall nor tables, except one in the Keeley Club. Cards are played in barracks and hospital; in the former about twenty-five tables and in the latter two tables are used for that purpose. A chessboard and men are provided in the library.

A small collection of animals assembled within screened inclosures attract considerable interest and furnish some amusement; indeed, it frequently becomes the center of a cluster of intent spectators.

Keeley Club.

This club has a membership of 51, and holds weekly meetings in a room in the hospital basement specially fitted up for the purpose. Its gain in membership during the year was 25, who took the cure for the first time, and 2 took the cure a second time. The loss from all causes was 48, of whom 39 were dropped for nonpayment of dues. The cost of taking the treatment, whether for the first or second time, is $15, and $2.30 additional for initiation. The receipts of the club during the year were $632.05, and the expenses were $24.83 in excess of the receipts. No inducements are given members to take the treatment. Occasionally a dissipated member is advised to investigate the matter, and graduates of the cure sometimes persuade others who have the drink habit to take the treatment.

In addition to the Keeley Club, there are two Grand Army posts, one Union Veteran Legion, one naval organization, and a singing club at this Home, with a total membership of 400. These societies meet weekly in the assembly hall, except the singing club, which meets in the band quarters, and are said to have an excellent effect upon the discipline of the Home. Their influence is in the direction of restraining members whose habits are bad, encouraging good conduct and observance of the rules, and giving a valued support to the administration of the Branch.

Religious services.

Divine services are held every Sunday morning and afternoon in the assembly hall or hospital, and other services are held on week days, the total number, including prayer meetings and services by volunteers, aggregating about 250 for the year. The chaplains regularly employed by the Home are a Roman Catholic and a Protestant, who receive each a compensation of $20 per month, and $5 for officiating at funerals, and do not live on the reservation. Each chaplain manifests an interest in the religious welfare of the members. They also visit the sick frequently. Religious services are reported well attended.

Farm.

The farm contains 469 acres under cultivation, and comprises the following buildings: 1 house for farm hands, a barn and shed for stock and carriages, 2 hay barns, 4 corncribs, a chicken house, slaughterhouse, 1 house for breeding hogs, 3 hog sheds, a milk house, cow shed, tool house, nursery

building, and hothouse. The horse barn and 2 hay barns are in fair condition; all others are reported in poor condition.

The transportation of the Home consists of 24 public vehicles, carts, etc., and 19 horses and 2 mules. Besides these, the farm keeps 23 cows and 225 pigs, and furnishes stabling for 7 private vehicles and 4 private horses. The farm stock on hand June 30, 1896, was valued at $4,735. The products for the year furnished the mess were estimated at a value of $9,002.07, including $2,276.64 for 14,229 gallons of milk, which is credited to the farm at 16 cents per gallon. The value of the crop raised and consumed on the farm is reported as $2,787.10, and of the products sold as $154.13. The quality of the crop compares favorably with that purchased, and no Branch has the appearance of greater interest or success in the department.

One hundred and ninety acres of land were leased for one year from November 19, 1895, by authority of the Board of Managers, for one-third crop to the Home.

Adjutant's office.

The records and files in this office were up to date and properly indexed, and showed care and system. The data required by the "application blotter" seemed to be voluminous and might be postponed until the applicant was admitted, when it is all repeated in the historical register, such as height, complexion, color of eyes, of hair, religion, ability to read or write, matters which apparently could have no bearing on his eligibility for admission.

SUPPLY DEPARTMENTS.

Buildings.

There are seven barracks at this Branch, all well policed and in good repair, except as to painting and floors; and their condition as to comfort and sanitation is reported good, though the system of ventilation, which is effected by open fireplaces and foul air ducts leading to air shafts, does not work equally well in bright and damp or foggy weather. They are heated by steam and lighted by electricity. The latter is not quite adequate, owing to necessary economy of power. It is understood the new barracks now under construction may have no basement nor chimneys, as they may be useless and cost more. The barracks were originally constructed for 100 men each; but are now occupied by an average of 187 each. This change was effected by increasing the number in the wards, using smoking and reading rooms for beds, and occupying the attics. All of the barracks have attics, and three have basements which are used as storerooms. The attics seem popular enough among the members, and have been decidedly improved as dormitories, though at first they had no special provisions for ventilation, and were not so well lighted nor heated. Lavatories, fire escapes, additional windows, ceilings, etc., have made a marked difference in their appearance and comfort.

There are 17 bath tubs in the barracks with an average number of 77 men to each tub, and there are 23 men to each hopper and 32 to each urinal. The scarcity of water, without regard to its quality, increasingly affects this question, and attention is invited to the system mentioned by Colonel Bache in his report upon the Southern Branch, as it is said to be equally efficacious with the expenditure of half the quantity of water.

Bedsteads and bedding.

The bedsteads are single, iron cots, with woven wire mattresses, 6 feet 2 inches by 2 feet 6 inches. The mattress in use is cotton and reported to weigh 16 pounds. The average supply of bedding per man consists of 1 cotton

mattress, 3 blankets, 3 sheets, 1 counterpane, 1 pillow, and 2 pillow-cases. The bedding is aired daily. The locker in use is 3 feet high, 2 wide, and 1 deep, and has a drawer in top and shelves below inclosed with panel door. Bedsteads, bedding, and lockers were reported in good condition. This being a new Branch, everything of a semi-permanent character is in excellent condition. It may be better that no more such narrow bedsteads and mattresses be purchased, but the hospital size (3 feet broad) be used throughout the camp during the declining days of these elderly men.

Supplies.

There are no storehouses at this Branch, and all quartermaster, subsistence, and medical supplies are stored in basements. These storage places are as little objectionable as could be expected for basements, and are far less objectionable for stores than for humans, and less objectionable than basements where members sleep by the score or hundred at other Branches. Inventories are taken annually of quartermaster stores, quarterly of clothing, and monthly of commissary stores, and verified by the property clerk or the quartermaster-sergeant. It is just as well not to have any excessive stock on hand. Furniture and other property of the Home is not all marked, but taken up as public property, and the quartermaster has no receipt from officers and others for property continuously in their possession, though he reports that he has a complete record of the same. Unserviceable property is disposed of by inspection and condemnation, and sale or destruction. The value of property condemned during the year is exhibited in the tables appended.

The bill of fare is made up quarterly by the treasurer, and is adhered to except under a failure to receive supplies. Weekly issues are made of sugar, tea, coffee, and groceries generally, and daily issues of beef and vegetables. The dining-room sergeant has charge of these stores and issues to the chief cook the amount required for each day. He also has supervision of the meals and cooking. The swill and refuse are carried to barrels near the kitchen. These barrels are carried each day to the farm, emptied and brought back, sometimes uncleaned. The admirable tidiness about the handling of the refuse, which is so evident at some of the branches, has hardly been attained yet at this, but the management and arrangements about the general mess have greatly improved recently.

Clothing.

All clothing issued, whether new or secondhand, is charged in the clothing ledger to the member receiving it. In case of failure on his part to account for it, when called upon to do so, he is dealt with according to the laws and regulations of April 30, 1883, applicable to such cases. The allowance of clothing and the exchange of old clothing for new are governed by the regulations. No clothing is allowed to be taken away by members who go on furlough, except by order of the governor, nor do men become entitled to issue during absence. Condemned clothing is sold as rags or destroyed. There were 5,882 pounds of rags sold during the year at one-half cent per pound.

The clothing accounts at this Branch seem very complete. All clothing received at the Home is taken up and carried, until dropped by action of an inspector. The surgeon reports all clothing destroyed by his order, or used for burial of the dead, and if a member leaves the Home with clothing, and while absent is dropped from the rolls, a board of survey reports the amount of clothing taken and these reports are all held for the action of an inspector. Clothing is not issued unless the clothing proposed to be turned in is not fit for further wear, though record is

made of clothing exchanged. Clothing fit for further wear, received from effects of dead or discharged men, is issued to men temporarily at post or exchanged with men not entitled to new clothing. The storeroom was in good condition and articles were conveniently and carefully arranged. A satisfactory test was made of certain articles reported on hand.

Laundry.

Soiled clothing and bedding are collected from companies and hospital under the supervision of noncommissioned officers on Saturdays, and sent to the laundry and returned on Fridays. Duplicate check lists are kept and verified. The average number of pieces laundered per month is reported as 9,990, of which 4,280 are shirts, 3,687 drawers, and 1,152 socks (pairs). There are 12 men employed in the laundry, to whom a compensation of $1,181.79 was paid during the year for services. The following is the reported cost per week for washing of clothing.

Steam power	$33.00
Labor	27.37
Sal soda	4.50
Lye	8.11
Total	72.98

During the week of the inspection 7,137 pieces of clothing were washed, making the expense of washing, exclusive of steam power, a fraction over one-half cent per piece. It is estimated that 200 members do their own washing wholly or partly, or have it done for them outside the laundry.

The number of dryers is reported as not sufficient for the growing needs of the camp. At least two more are needed, also an additional washer and a wringer. It is found that some Branches have not the same machinery as others. The supply of towels is reported as not sufficient; that members sometimes use pillow-cases for that purpose. The laundry was in good police and the work well done.

Fire department.

Protection against fire consists of 25 fire hydrants, 2,000 feet fire hose, fire extinguishers and grenades distributed in buildings, and a volunteer fire brigade. The hose is carried on a temporary wagon, and a suitable hose cart seems needed. The fire brigade consists of 125 men with a chief and assistants, made up of small organizations in each inhabited building, and is able to throw a stream of water on a fire, except at remote buildings, within three minutes after an alarm in daytime. The apparatus is tested usually two or three times a month, except when the water is scarce. There were no fires during the past year for which the fire department was called out. The only serious fire at this Branch occurred in 1893, when the governor's residence was completely destroyed, causing a loss of $8,000. The frame buildings here demand a particularly good fire service.

Engineer department.

The duties of the chief engineer pertain to the supervision of all construction, machinery, plumbing, repairs, etc., and he has general charge of the shops, and receives orders from the quartermaster at the treasurer's office, where he reports daily for instruction. He has been on duty here about seven years. Forty-eight men are employed under him as blacksmiths, painters, tinsmith, carpenters, engineers, plumber, coal passers, laborers, steam fitter, and clerk.

There are eleven shops at this Branch known as the bakery, carpenter, engineer, harness, horseshoeing, printing, paint, shoe, soap, tailor,

and tin, the accounts of which are under the charge of the treasurer and acting quartermaster.

Material for the shops is charged to the shop account at cost price, and credited at same rate from the shop book for quantity used and service as to time employed at average rate of pay. The annual report of the shops, made to the Board of Managers, is made from the internal vouchers, and "repairs" is charged with a sufficient amount to make up the difference between the amount expended for labor and material taken from the shop account, and the amount as shown by the internal vouchers, but the cost of service as shown by the shop accounts do not agree with the actual amount expended as appears on the pay rolls.

The shops are somewhat scattered and in temporary places, and it would seem more desirable if they were located in one suitable and presentable building.

The drainage is reported good, and the sewage, mixed with some fresh water, is carried to the vegetable garden for irrigation. The chief engineer is competent and attentive to his duties.

Water supply.

The question of water is a serious problem at this Branch. The supply is limited and not adequate to the present demands, owing to two dry seasons. Water is obtained from two distinct sources—wells and a flowing stream in one of the mountain canyons. The wells and pumps are located in the low land on the Home territory, about half a mile from the headquarters building. There are three wells—one large well 75 feet deep and two new wells 89 feet deep each. The pumps in use are a deep-well pump, with a capacity of 125 gallons, and a Worthington pump with a capacity of 160 gallons per minute. There is said to be no special difference in the quality of the water pumped from the mountains or that pumped from the wells. It contains much sand and grit, which injures and obstructs valves and cuts surfaces and wears cylinders and pump rods. There is so much scale that boilers must be cleaned every two weeks or so. A settling reservoir or a filtration system may possibly cure this. It is understood that the question of an improved water service has been brought to the attention of the Board of Managers. Large expenditures have been made to receive and hold the expected water from the canyon, but the water is not received, if there now, in the quantity needed, so recourse is had to wells and pumps; and yet, with this addition, it is insufficient, even if of the best quality, and great economy has to be observed in its daily use at the Home, and the sewage is utilized for irrigation. It would seem but proper before any further expenditures were made looking to improve the water supply that careful study and tests and detailed plans and estimates again should be made by experts in these matters. Mistakes in such matters are costly, and it is not unimportant there to get the matter fixed just right.

Dining hall and kitchen.

The kitchen is so new that of course it was in good condition, but in the dining hall the floor is considerably worn, and the plastering of the walls more or less cracked. Both places were in good police. Facilities for cooking and serving meals are reported ample, though tables have to be set twice for each meal, and several tables three times. Twenty-two men are permanently employed in the kitchen and five in the dining hall; and 72 are temporarily detailed, the details being made by the acting adjutant on the first of each month by roster from the several companies. From the reports furnished it seems that during the month of December, 1895, the daily issues to the dining hall averaged 3.25 pounds per

man at a cost of $0.127, and during June, 1896, 3.84 pounds at a cost of $0.128. The issues to the hospital averaged during December 5.51 pounds per man at a cost of $0.211, and during June 5.84 pounds at a cost of $0.199.

There are 5,760 pieces of crockery, costing $326.99, reported in daily use. The per cent of breakage for the year ranged from 10 for salt cellars and mustard pots to 90 for water pitchers.

The tea did not seem to be of good quality, and more time seems needed at meals before waiters remove the dishes. Complaint was also made of the poor quality and distribution of ice recently used for drinking water. The flavor of artificial ice sometimes is unpleasant; and this cold storage and ice plant is new and hardly working as well at first as those at the Dayton and Southern Branches now do.

None of the members of this Home receive outdoor relief in subsistence or other allowances, but several letters have been received asking for it, and it works so well at the regular Home that it seems to deserve consideration here.

MEDICAL DEPARTMENT.

The hospital is composed of four buildings connected by inclosed corridors, viz, administration building, north and south wings, and kitchen and dining hall, and with two lavatories. Its capacity for patients, without crowding, is 146. The convalescent company is quartered in one of the dormitories of Barrack No. 7, and part of the attics of the north wing of the hospital. Other parts of the attics are used as dormitories for the employees, and the basements of the hospital are used for storage. Great care seems to be taken to keep the hospital in a neat and clean condition. There are four bathrooms in the hospital, and an average of 40 patients to each bath tub. Patients are required to bathe weekly, and have the assistance of a nurse, if necessary. There are gratings in the floor for the purpose of ventilation, leading into wooden conduits, and a ventilating stack built of brick.

It seems questionable whether a water-closet should be introduced into a sick ward, as has been done at one Branch.

The average daily sick during the year was 94 in hospital, 66 in convalescent company, and 31 at sick call. There were 418 patients admitted to the hospital during the year, and 222 to the convalescent company; and 63 were discharged from the hospital as cured. The total number of patients treated during the year was 774, and each case was under treatment an average of seventy-seven days. There were no cases of contagious or infectious diseases, nor diseases of local origin reported for the year.

The death rate for the year was 46.89 per 1,000 of the average present and absent, and 38.04 per 1,000 of the whole number cared for, and is higher than reported for the preceding year. Of the 83 deaths, 68 occurred in hospital, 1 in barracks, and 14 outside of the reservation. The causes assigned are 74 natural, 2 suicide, and 7 the result of accidents. The average age at death is reported at 64⅝ years against 61 the year before.

Seventy-four of the deceased members were buried at the Home cemetery. They are buried in the Home uniform, consisting of blouse, trousers, undershirt, drawers, and socks, and in coffins made in San Francisco at a cost of $8.45 each. Coffins can be made at the Home cheaper. The cost of a funeral is reported as $15. No allowance is made for funeral expenses of members dying outside of the Home.

A more careful and closer index to the hospital records might add to their value. Money and valuables are permitted to be kept by the patients but may be turned over to the surgeon, who gives no receipts for money or articles received by him. The sick-call blotter kept at this Branch seems to be of more value than the regular sick-call record.

There are 74 hospital employees, of whom 66 are members and 8 civilians. The former serve in the capacity of druggist, hospital steward, ward masters, cooks, dishwashers, funeral escort, nurses, waiters, etc., and the latter as assistant surgeons, matron, interne, and female nurses. The ratio of these employees to the total number of patients treated is as 1 to about 10.5 and to the average daily sick as 1 to about 2.6.

Medicines are obtained from the quartermaster's department, which apparently issues in large quantities upon monthly requisitions, and issued to the patients upon the doctor's prescription. The drug storeroom was not in very good police.

There are no facilities at this Branch for the proper care of incurable or violent insane, and all such are sent at once to an asylum, after having been adjudged insane by commissioners appointed by a civil court. Seven were sent to the asylum at Highlands, Cal., during the year. Twenty-six members showed indications of disordered minds during the year, of whom 7 were considered permanently insane and 19 temporarily. The insane are quartered in hospital wards and attic, and there are 2 cells for close confinement and one strait-jacket.

Nine members at this Branch are reported totally blind, and 18 with impaired eyesight so as to be unable to read. Members requiring treatment for diseases of the eye are attended by a specialist regularly detailed as assistant surgeon.

No. 4.—Report of an Inspection of the Western Branch, made August 31, 1896.

The officers are efficient and painstaking, and exercise a watchful care over the interests of the Home. There has been no change in their personnel since last inspection.

DISBURSEMENTS.

The accounts and disbursements of the treasurer were inspected from November 19, 1895, the date of the last inspection, to August 31, 1896, and involved $635,519.19, pertaining to the general, pension, post, and improvement funds. The expenditures, as shown by vouchers and transfers, amounted to $568,779.68, leaving a balance on hand of $66,739.51, which consisted of $234.17 cash on hand and $66,505.34 on deposit in the First National Bank of Leavenworth.

General fund.

During the past fiscal year the treasurer received on account of this fund $327,273.88, consisting of $295,980.60 congressional appropriations and $31,293.28 receipts from sales and other sources. The expenditures for the same period were $232,580.50 by check and $70,129.76 in currency. At date of inspection there was a balance of $36,432.28 on deposit to the credit of this fund.

Improvement and repairs.

No special improvements were authorized or made during the past year, but during the present year a building for the insane, long needed, if it will secure better quarters and care than the basement gave they formerly occupied,

is contemplated and under construction at a cost of $5,300, and to renew and cover the steam pipes and connections, for which $7,514.75 was appropriated. The improvements reported needed for the year ending June 30, 1898, are a quartermaster's building, water filter, and building two barracks, a guardhouse, and steam boilers, at a total estimated cost of $87,400. The amount expended on repairs during the past year is reported as $26,012.48.

Nothing was received by the treasurer during the year on account of the western improvement fund. At date of last inspection, November 19, 1895, he had $840.68 on hand, of which $582.80 was disbursed during the year. The October pay roll from this fund embraced a civilian florist and 5 laborers, 2 guards, 1 machinist, 1 rodman, and 1 civil engineer, members.

The roadway leading by the most direct way from the barracks of "C," "F," "M" and "A" companies to the dining hall was paved with irregular blocks of stone, and seemed very rough.

Pension fund.

The treasurer paid out during the year on account of pensions $321,230.79, and had a balance of $16,170.55, due the pensioners at the close of the year. The average paid each pensioner during the last quarter of the year was $35.36. On June 30, 1896, there were 2,456 pensioners on the rolls at this Branch, against 2,177 a year previous, of whom 1,725 were present and 731 absent, the longest absence being four years. There were 74 pensioners, at the close of the year, who had balances to their credit. Of these, 4 had between $500 and $1,000 each; 42 between $100 and $500 each; and 28 less than $100 each. The addresses of 11 pensioners, who had a total of $450 to their credit, were not known; and 34 pensioners, with a total of $4,536.75 to their credit, had been transferred to an insane asylum. At date of inspection, August 31, 1896, the funds on hand, pertaining to pensions, were found to be $21,204.22, which were on deposit in bank.

Post fund.

The receipts from sales during the year at the Home store, restaurant, and beer hall were $38,060.31, and the expenditures $20,709.74, of which $19,501.79 was for stock and $1,207.95 for employees and incidentals. Receipts from other sources under this fund were $5,268.64, and expenditures $19,015.66. The assets reported at the close of the year were $9,983.42 cash and $2,719.82 merchandise. Goods for the store are bought on competitive bids. Some vouchers for payments from this fund sent to Hartford last April had not been returned, thus leaving the disbursing officer without any evidence of payment to present for inspection. The pay roll for July, 1896, amounted to $797.90.

At date of inspection, August 31, 1896, the treasurer had in his charge $8,845.13 pertaining to this fund.

The business of the post fund is almost entirely transacted in the basements of two barracks, and this Home has no separate buildings for store or beer hall, as found at other branches. Large upper rooms over the dining room might answer for a canteen, library, and amusement room, if properly divided, when no longer needed for a theater. They are miserable abortions when used as dormitories. These basements are not considered convenient nor suitable. There are, however, several buildings at the Branch erected in whole or part from the post fund, namely, chapel, band leader's residence, two band stands, and member's workshop. The last named is a structure designed for men who delight in passing their time making all sorts of fancy articles or working on some pet invention or scheme.

The brick plant, which was established some years ago under this fund and has furnished considerable material for paving and building, does not seem to have been profitable during the year. The reports show the receipts from the sale of brick to have been $3,850.50, and the expenditures $4,123.26. The accounts relating to it seemed to be in a confused condition. The inventory for June takes up 22,887 tiling brick as "not heretofore reported." Fifty thousand brick for the foundation of the new boilers were sold to the general fund at $6 per thousand, and 112,000 tiling brick for repairs of hospital basement and kitchen scullery at $20 per thousand, while 53 cents per thousand was paid from the general fund for hauling 400,000 brick from the brickyard to various places on the Home grounds.

The brick plant, which was inventoried June 30, 1896, at $3,500, after a credit on account of depreciation of $10,000, was sold on July 24, 1896, for $2,500, possession to be given immediately and allowed to operate until December 1, 1896. Five per cent of brick made to be left on the ground as rent and for use of clay, and all the plant to be removed March 1, 1897.

Purchases. Purchases for staple article used by the Home are usually made under contracts for three, six, nine, or twelve months. Open-market purchases are made in cases of emergency, where the articles are not covered by contract or the amount involved is less than $100. The principal articles of food for the last quarter of the fiscal year were purchased in Kansas City and Leavenworth. Flour, coffee, potatoes, fish (salt and fresh, except fresh white), beans, sirup, cheese, and sugar were obtained from the latter city, and beef (fresh and corned), tea, bacon, pork, fresh whitefish, ham, and butterine from the former city.

Employees. The daily number of employees averaged 355, and included 5 officers, 25 non-commissioned officers, 285 members, and 40 civilians. The maximum employed at one time was 379 and the minimum 308. About 41,724 days' work was performed without pay, but not as a penalty, by an average daily number of 114 members, who were detailed for dining-room or kitchen duty or picking garden products on the farm.

ADMINISTRATION.

Population. The average number of officers and members present during the year was 2,340, which is a gain of 79 over the number reported for the preceding year, and an average of 784, or 25.1 per cent, was constantly absent. The highest number present during the year was 2,531, on February 21, 1896, and the lowest 2,211, on July 1, 1895. At date of inspection the total population consisted of 2,455 persons, including temporary members, women and children, and 846 members were absent.

The transients or "temporary at post" add over seventy-five per cent to the average present to make the total cared for. Neither the transients nor the continuous absentees may be so marked a feature of this new post as some of the others, but in considering the statistics concerning the men it is apt to enlist attention everywhere.

There were no vacant beds reported in barracks or hospital at date of inspection.

The members presented a commendable appearance at inspection.

The broad pavements and beautiful site of this Home affords a rare opportunity for interesting ceremonies. Only the useful is given much

place at these inspections, where it is important to see the men and several suits of their clothing and have some test of the discipline and orderliness. But on a flag day there was a very noticeable ceremony here, when children mingled with the veterans, and the impressive features of the occasion have been most widely commended.

Discipline. Discipline is enforced by company captains and the corporal in charge of each ward, and by the guard, consisting of 1 lieutenant, 2 sergeants, 2 corporals, and 13 privates. Over 82 per cent, or 1,932 members, were reported as not tried during the year.

The penalties attached comprise extra duty without pay from thirty to sixty days, light labor, and limits of the Home grounds. Fines are not imposed, and members 64 years old and over are not required to work outside under sentence.

Amusements. Among the facilities for amusements are mentioned billiard and card tables, checkers, dominoes, theater, opera, minstrels, band concerts, boating, fishing, books, papers, and magazines, "old men's workshop," which seems growing into quite a feature and novelty, requiring some management and isolation perhaps; and quoits, with championship rules and regular organization. Of these comic opera, minstrels, and melodrama, and quoits, seem best liked.

The deer park has been abolished. The proper encouragement and arrangements for outdoor occupation in summer and indoor in winter has received considerable attention and deserves complete success at all the Branches. The active army is perhaps making more progress in this direction at present than the disabled veterans.

The library is situated in the upper story of the Ward Memorial Building. It is well lighted, roomy, clean, and tidy, and serves the purpose of a reading room as well as library.

At the close of the year there were 8,062 volumes on hand. Books may be taken from the library for a period of ten days, but must be returned in good order. Books of fiction, history, and biography, in the order named, are in greatest demand, and the books read averaged over 11 per member for the past year.

The band is maintained throughout the year, though with a considerably reduced strength during winter. Each year about October 15 the band is usually reduced to six or seven, exclusive of the leader, who is permanently employed, and in April of each year or thereabout the band is reorganized with a full membership. The number of musicians in the band throughout the year averaged $14\frac{7}{12}$. The cost of maintenance during the year, including subsistence and other allowances of civilians, has averaged $393.09 per musician and $2.45 per member. The bands appear to have been the most acceptable and successful amusement at these Homes, and it may be only fair if the Government should contribute as much to their support as it does to that of a regimental band. The musicians are quartered in a room on the first floor of one of the barracks, except the leader, who lives in a house built for his use and supplied with steam heat from the boiler house, but receives no clothing or rations. The other musicians are each furnished with a blouse and one pair of trousers, and eat at the general table with the members. Their subsistence is paid for by the post fund.

The second floor of the general dining hall is fitted up as a theater. It was in good condition, but does not seem suitable for that purpose, the seats, of which there are 1,300, being on a level, and the stage necessarily low on account of a low ceiling, and the acoustic properties are

said to be poor. The entertainments given comprise concerts, lectures, melodrama, minstrels, and general theatrical performances. No admission is charged to members, but outsiders pay 25 cents. The revenue from this source was $45.50 for the year. Sixteen performances were given, at a cost of $2,147.50.

The success of the amusement building recently erected at Dayton, in addition to its handsome theater and church, may fill a long-felt want and will be watched with interest. The mental and social side of humanity deserves considerate attention at every Home and receives it about in equal proportion at each Branch.

The billiard room is in the Keeley clubroom in the basement of the Ward Memorial Hall, and contains one billiard and one pool table. The tables are not reported in frequent use, which may be due to their location, though there is some little playing nearly every day except Sundays. There is no charge for these games. The billiard room is also used for card playing, though the latter is indulged in mainly in barracks and hospital, where about 75 card tables are in use. Perhaps cards are the most common amusement at the Homes.

The Home owns six boats, which may be used free of charge by members. Civilians pay 25 cents per hour for one person and 5 cents extra for each additional person. Disorderly or hazardous conduct is strictly prohibited. The receipts from this source were $40.20 for the year and the expenses $18.67.

There is also a quoit club at the Home and a quoiting ground in the ravine in rear of the barracks. This game is very popular.

Keeley League.

This society numbers 1,046, and holds weekly meetings in the basement of Ward Memorial Hall. Its gain in membership during the year was 72, who took the cure for the first time; and there were 20 who took it a second, and 4 a third time. The loss during the year was 72 by relapse and expulsion. The total cost of medicines in taking the cure is reported as $15 for alcoholism and $22.10 for morphinism. The total receipts during the year were $3,231.90, which, with the balance of $114.36 on hand July 1, 1895, made $3,346.26 available for disbursement. The expenditures were $2,547.29, leaving a balance on hand of $798.97. The funds are deposited in the First National Bank of Leavenworth, and its accounts are kept separate and distinct from other funds. It is reported that the members take the cure of their own volition, and no inducements are held out except the encouragement engendered by the redeemed men themselves or the moral suasion which every sober, right-thinking man exerts to save his brother from a drunkard's grave.

In addition to the Veterans' Keeley League there is a Grand Army of the Republic post (Brennan Post, No. 380) at the Home, with a membership of 300, which meets twice a month in the basement of the Ward Memorial Hall. Great interest is manifested in the welfare of these organizations by the members, and they are said to have a good effect upon the discipline of the Home.

Religious services.

Divine services are held in the two auditoriums of the chapel, or Immanuel Church, as it is known, each chaplain having his own auditorium. The Protestant chaplain, who receives a compensation of $100 per month and quarters, fuel, light, and forage and stabling for one horse, held services regularly three times each week, with occasional extra services, and officiated at all funerals of members not of the Catholic faith. He also visited the sick frequently and performed acts of kindness for them, such as letter-writing, etc. The Catholic chaplain, who receives $65 per month

and forage and stabling for one horse, but does not live at the Home, held services twice each week and benediction each Friday evening; also services during Lent and on other occasions. He visited the sick in hospital frequently, officiated at funerals of Catholic members, and attended a number of society meetings and other gatherings tending to the happiness and well-being of the members. The auditoriums have a capacity of 300 each, and services are reported well attended.

The church is comparatively new, and quite artistic from chimes to basement, and adds to the appearance and decorous spirit of the institution. It solves the problem better than usual where several denominations worship under one roof; and it is submitted that every Home should have some such place of worship.

Farm. The farm has 90 acres under cultivation, 60 less than reported last year, and contains the following buildings: A frame for storing vegetables, a tool shed, and a large, handsome brick barn and stable, all in good condition except the tool shed. The transportation consists of 16 vehicles and carts and 16 horses. Two of the vehicles were presented to the Home—a phaeton donated by the Veterans' Keeley League, and a wagon known as the Pullman coach, presented by S. F. Scott, of Kansas City, and used for hauling the sick. The Veterans' Keeley League also presented a team of horses for use of the sick. There are no other animals kept on the farm, but stabling is provided for 10 private horses and 6 carriages, 5 buggies, and 2 phaetons. The value of the farm stock on hand June 30, 1896, was estimated at $1,200. The products for the year are valued at $1,545.61, which was all used on the table except $10.84 sold, and are reported of as good quality as can be purchased outside, excepting potatoes, which are poorer. The appropriation for the farm was $8,000, but this was used also to maintain the stock and to supplement the improvement fund in the care and ornamentation of the grounds, and also to provide for the teaming about the place. This year the farm is managed by the Home. Last year the value of the products of the farm was reported as $5,704.06, of which $5,303.26 was turned into the commissary department on an appropriation of $9,700.

SUPPLY DEPARTMENTS.

Buildings. The buildings were in good police and repair and seemed well designed. There are 13 barracks, all constructed of brick, with basements and metal roof, and reported in good condition as to comfort and sanitation, and evidently receive constant and close attention. They are heated by steam and lighted by gas, and ventilation is effected by 2 large ventilating shafts extending from ground to roof, and each ward contains 6 wall ventilators, near floor, and 2 registers, 1 near ceiling and the other near floor. The system of heating, lighting, and ventilation is reported satisfactory. As the barracks are such an important element in the lives of the members, it may be due to especially commend the plan and care of these, except the use of the basements for human habitation. Few, if any, of the Branches excel the average of these. Marion and Santa Monica have not reached the dimensions of this Branch, and are still under construction. These barracks were originally constructed for 124 men, but are at present occupied by an average of 165 men each. This was made possible by placing beds in the ward aisles and occupying 8 of the basements for sleeping purposes. The other 5 basements are used for Home store, property, etc. At date of inspection

271 men were reported sleeping in basements, 229 in aisles, and 10 in other places. The basements do not seem to have as much light or ventilation as the regular dormitories, and they are reported damp at times in wet weather, though there seems to be no difference as to heat. One of the basements is used for the paint shop, which seems dangerous on account of the inflammable material therein. There are 2 bath tubs and 5 toilet rooms and urinals in each barrack. The supply of toweling, toilet paper, etc., is specially well administered.

Bedsteads and bedding.

The bedsteads are iron with spring bottoms, 2½ by 6½ feet, and the mattress in use is cotton, and reported to weigh from 8 to 11 pounds. This is less than reported at some of the other Branches. The variety reported was unexpectedly great, though the transition from a ridiculously thin pad to a serviceable mattress compelled some difference. It is to be hoped that a broader, and therefore more comfortable, bedstead will alone be bought hereafter. The uncomfortable narrow one, like the former flimsy pad, is evidently not good enough now for disabled veterans, even if they were good enough twenty years ago. The average supply of bedding per man consists of 1 mattress, 1 pillow, 2 pillow cases, 3 sheets, 3 blankets, and 1 counterpane. Each man is required to keep his cot clean, and air and dust his bedding daily. The locker in use is 3 feet high, 2 wide, and 1 deep, with 1 drawer and 2 shelves. Bedsteads, bedding, and lockers were reported in good condition.

Supplies.

There are no storehouses at this Branch, and supplies are stored in basements. The quartermaster supplies occupy basements of four barracks and two rooms at the carpenter shop; medical supplies are in a basement room of the hospital, and subsistence supplies are stored in the basement of the dining hall, which seems admirably adapted for the purpose. Inventories of quartermaster property are reported as taken semiannually and of subsistence stores quarterly. Furniture and other property of the Home is reported marked as far as practicable, and the quartermaster has memorandum receipts from officers for property continually in their possession. Supplies are taken up on inspection reports approved by the governor and issued on proper requisitions, except coal, which is charged as expended when received. No record is kept of its distribution. Unserviceable property is condemned and destroyed or sold. The supplies seemed generally of good quality and ample for the needs of the Home.

Clothing.

The clothing, as soon as received from the depot, is taken up in the cumbrous property book, and issued to members on approved requisitions. Credit is given them for articles turned in. The contrast between the paper work required for the men in a company to get two such pieces of property as tobacco and socks seems phenomenal. One requires as many signatures for each man as the other does for the company. It would be well if the system of accountability and responsibility for property were established on a better basis, with constant supervision.

If the clothing turned in is not worn out it is cleaned, pressed, and taken up as second-hand clothing and reissued to readmitted members or members returning from furlough whose clothing has been turned in. In certain cases members are permitted to wear clothing on furlough, and they are not held accountable for clothing taken with them when the time from date of issue of such clothing to date of return from furlough is equal to the time prescribed for the wear of the articles. Clothing taken with permission by furloughed members is entered in

pencil on the credit side of the clothing book as temporary memoranda. Clothing in use is not carried on the property ledgers.

Four towels of linen crash, 22 by 36 inches, are issued to each member. This seems to be an advance on other methods and in the interest of cleanliness.

Cast-off clothing is condemned, cut into rags, baled, and sold. The receipts from this source for the year were $1,126.59. The following are the amounts sold and prices per pound obtained: 1,802 pounds blouses, and 1,434 pounds dress coats, each 9 cents per pound; 296 pounds great coats, and 3,635 pounds kersey trousers, each 11 cents; 2,296 pounds wool socks, 8 cents per pound; 1,482 pounds blouse trimmings, 1,202 pounds sheet linen, and 2,213 pounds trouser trimmings, each 3 cents per pound; 2,262 pounds white linings, 3¾ cents per pound; and 2,335 pounds C. F. drawers, 2½ cents per pound.

The shop account inventories do not always agree with the property account.

Laundry. Soiled clothing and bedding are sent each Monday to the laundry and returned on Thursdays and Fridays, accompanied by lists which are verified and receipted at each end. Members are permitted to send all their soiled clothing and bedding. The following are the average number of pieces of each kind reported laundried per month: 1,654 aprons, 120 blankets, 85 blouses, 438 counterpanes, 8,984 drawers, 402 handkerchiefs, 52 overalls, 10,556 pillowcases, 10,482 sheets, 7,700 shirts, 1,924 socks (pairs), 78 tablecloths, 5,470 towels, 250 trousers, 94 waiters' jackets, 108 dress coats, 194 vests, 387 napkins, 40 waiters' caps, 14 bibbs, 78 gloves, and 374 sundry articles.

The number of pieces laundried during August, 1896, is reported as 56,045, against 51,921 for the corresponding month of the preceding year.

The laundry was in good condition and police.

Fire department. Small structures, not unlike old-time sentry boxes, containing fire plug and hose, with nozzle connected with the water main, are scattered at suitable intervals between barracks and about the grounds, and can throw a stream of water to the highest parts of adjacent buildings within 400 feet of the box. In addition, fire extinguishers are on each floor of barracks. The fire department seems well organized and the firemen can respond in a few minutes after the alarm is sounded. No fires occurred during the past year, and none have been reported for previous years, except that of a small stable in 1886. The apparatus is reported frequently tested, and the hose no longer in the best condition, owing to age.

Engineer department. The chief engineer, who has been on duty here for nearly eleven years, has charge of the boiler house, steam and gas fitting, engineer, and tin shops, and looks after the heating of the Home. In addition to the shops under charge of the engineer, there are a carpenter, paint, printing, shoe, soap, and a tailor shop, the accounts of which are under the charge of the quartermaster. There are 48 men employed under the chief engineer.

The boiler house is a large, substantial brick structure, 140 by 42 feet, with a 190-foot smokestack. It contains four boilers, two of 250 horsepower each, and two of 350 horsepower each, used for heating the Home, and supplying hot water for kitchen and bathrooms. There is also a steam pump in the boiler house, by means of which the water supply may be raised to 160 pounds if necessary. The engineer

department seemed in good condition. The sewage of the Home passes from each building to sewer pipes in the tunnel and empties into the Missouri River. The mingling of tubes in the tunnel and leading thence into inhabited buildings has received some criticism.

Dining hall and kitchen.

These give a most favorable impression in every respect, and are kept in admirable order. The dining hall seems spacious and the shelving and other conveniences adequate; but the growth of the Branch has outgrown the hall, and the 30 tables, each of which seats 36 persons, have to be set twice for each meal. The good order and management is intelligent, considerate, and effective. The kitchen is in the rear of the dining hall, and is equipped with a large range of a capacity of 1,300 pounds of food, 6 boilers with a total capacity of 480 gallons, 5 steamers holding together 15 bushels, and 5 coffee boilers of 50 gallons each. The facilities for cooking and serving meals are reported ample. Sixteen men are permanently employed in the kitchen and six in the dining hall, and there is an additional dining-room detail of 72 men, to which every member is subject, though he is permitted to hire a substitute or commute through the sergeant. Details are made for one week and average about 3 per annum for each member. During the week ending August 29, 1896, there were 16,952 rations reported issued to both general and hospital messes, costing $1,847.34. Deducting from this $50.38 for supplies furnished by farm, and adding $149.37 for bakery and $126.65 for pay, the cost of the ration was $0.1223, or without the farm account $0.1252.

Swill and garbage are given to a civilian for the hauling.

There are 11,470 pieces of crockery reported in daily use. The per cent of breakage for the year ranged from 10 for mustard pots to 71 for bowls.

None of the members receive outdoor relief in subsistence.

MEDICAL DEPARTMENT.

The hospital is a long brick structure with basement and attic, composed of a central or administrative building of three stories, and two wings on either side of two stories each. A third wing is directly in rear of the administrative building, and broad balconies, on a level with each floor, surround the hospital. It was in excellent condition and has room for 200 patients, exclusive of insane wards and the old men's building, which have a capacity of 40 and 49, respectively, and of quarters for convalescents, with a capacity of 109. The east basements of the hospital are used as a dormitory for employees, and the west basements as storerooms. The attics are used as quarters for women nurses and wards for patients. There are nine bath tubs in the hospital, and patients are required to bathe on entering, and weekly thereafter, or oftener if necessary.

The average daily sick during the year has been 177.96 in hospital, 90.60 in convalescent company, and 25 at sick call. There were 871 patients admitted to the hospital during the year, and 201 to the convalescent company; and 660 were discharged from the hospital as cured, and 40 from the convalescent company. The total number of patients treated during the year was 4,479, and, exclusive of sick-call cases, each case in hospital was 71.50 days under treatment, and in convalescent company 136.14 days. Malarial fever, of which there were 88 cases during the year, seems to be the principal disease of local origin.

The death rate for the year was 52.49 per 1,000 present and absent, and 39.93 per 1,000 of the whole number cared for, and is slightly higher than reported for the preceding year. Of the 164 deaths, 130 occurred in hospital, 7 in convalescent quarters, 1 elsewhere on the reservation, and 26 died outside of the Home. The causes assigned are 158 natural, 1 from violence, 2 from suicide, and 3 the result of accidents. The average age at death was 63.08 years, against 61 for the previous year.

One hundred and thirty-eight of the deceased members were buried at the Home cemetery. They are buried in their Home uniform and a coffin made at the Home at a cost of $3.46. The use of a caisson instead of a hearse is a feature at this Home and seems very appropriate. The cost of a funeral at the Home is reported as $7.80, and no allowances are made for funeral expenses of members dying outside.

There are 90 hospital employees, of whom 77 are members and 13 civilians. The former serve in the capacity of hospital steward, barber, cooks, driver, grave digger, nurses, reader to blind, ward masters, bread cutter, dishwashers, funeral escort, hall cleaners, orderlies, waiters, and wound dresser, and the latter as surgeon, and assistant surgeons, matron, druggist, interne, and women nurses. The ratio of these employees to the total number of patients treated is as 1 to nearly 50, and to the average daily sick as 1 to about 3.3.

Medicines are obtained upon properly approved requisitions made weekly upon the quartermaster's department, and issued to patients upon the surgeon's prescriptions. No record is kept of medicines after receipt. Whisky is issued to the hospital by the barrel. There are 443 different kinds of drugs, etc., reported in use in the dispensary, and the amount expended for them during the past year was $4,200.90.

The inadequacy of facilities to care for the insane has been mentioned in a previous report. Basements with poor light and ventilation and cheerless surroundings are hardly calculated to improve insane patients. There were 57 members showing indications of disordered minds during the year, of whom 40 were considered permanently insane and 13 were sent to St. Elizabeth's Asylum. The insane at this Branch average 44 per annum, and about 15 are sent annually to the asylum. There are no cells for close confinement.

Thirteen members are reported totally blind, and 27 with an impaired eyesight so as to be unable to read; 11 of these are cared for in hospital, 15 are quartered in Barrack C, and the others in different barracks.

The required records of the hospital were in good order and neatly kept.

No. 5.—Report of an Inspection of the Marion Branch, made September 8, 1896.

There has been no change in the officers, and the Home showed evidence of excellent administration.

DISBURSEMENTS.

The accounts and disbursements of the treasurer were inspected from November 2, 1895, the date of the last inspection, to September 7, 1896, and involved $449,067.78, pertaining to the general, pension, and post funds. The expenditures, as shown by vouchers and transfers, amounted to $413,449.64, leaving a balance on hand of $35,618.14, of which $34,506.25 was on deposit in the Indiana National Bank of Indianapolis, and $1,111.89 cash on hand.

General fund.

During the fiscal year ending June 30, 1896, the treasurer received on account of this fund $225,179.05, of which $221,421.10 were from Congressional appropriations and $3,757.95 from sales. The expenditures for the same period were $211,621.74, which was all disbursed by checks. At date of inspection there was a balance of $27,415.86 pertaining to this fund, which was all on deposit, except $35.01 cash in the hands of the treasurer.

The inventories of effects of deceased members are not filed with the treasurer, as in other Branches, but the amount is taken up from a memorandum handed in to the treasurer's office by a member of the council of administration. Often there is no report, and an examination between some of the reports and the amounts taken up showed minor discrepancies. Possibly this would not occur if the usual course were followed.

Vouchers given for cash for sales to officers and others do not always show the amount turned over to the treasurer.

Improvements and repairs.

The principal improvements made during the past year consist of two additional barracks, new dining hall, and standpipe, at a cost of $74,972.76. The improvements authorized for the present year, and already under way, are three additional barracks, a new boiler house, gas well and connections, and lease of additional grounds, and $74,800 has been appropriated for the purpose. The estimates for the year ending June 30, 1898, include a gate lodge, new barn, greenhouse, and electric-light plant, and $19,500 is asked for these improvements. The cost of repairs made during the year was $9,954.87. The most considerable repairs upon one structure consisted in painting walls of hospital and replacing window screens and floors in corridors, etc. Three hundred dollars was paid for lease of some land, for which there did not seem to be any appropriation. Five thousand dollars was appropriated this year for a natural-gas well and connections, and $10,000 is asked for an electric-light plant for next year.

Pension fund.

The treasurer paid out during the year on account of pensions $186,428.90, and had a balance of $1,876.68 due the pensioners at the close of the year. The average paid each pensioner during the last quarter was $30.67. On June 30, 1896, there were 1,544 pensioners on the rolls of this Branch, against 1,355 a year previous, of whom 1,175 were present and 369 absent; 6 being absent over one year. There were no pensioners on the rolls with balances to their credit whose addresses were unknown; and there were 4 who had between $100 and $500 to their credit each, and 48 with less than $100 each. Six of these, who have a total of $161.05 to their credit, have been transferred to an insane asylum. One clerk, at an annual salary of $240, paid from the post fund, is employed on pension business. At date of inspection, September 7, 1896, the balance to the credit of this fund was $2,882.33, which was on deposit in bank, except $350.70 cash on hand. The policy of this Branch seems to be to let the men have their pension money more freely than at other Branches, and no harm seems to arise from it.

Post fund.

The receipts from sales during the year at the Home store were $19,005.15, and the expenditures for stock $12,112.57. There is no beer hall nor restaurant at this Branch. The assets reported at the close of the year were $3,435.69 cash and $5,834.33 merchandise. At date of inspection the treasurer had in his charge $5,319.95, which was on deposit except $726.18 cash

on hand. This amount of cash on hand was reported as due to the distance from the depository at Indianapolis, Ind. It would be a convenience if a bank in Marion could be made an authorized depository for at least a part of this fund.

The Home store is reported convenient and suitable for the purpose. It was erected from old lumber taken from buildings on the grounds when the Home was first started. The revenues of the post fund at this Home are not so large as at some of the other Branches, and very little can be expended for improvements. No buildings have been erected from this fund, but nearly $3,000 was expended for scenery, seats, furniture, range, etc., of the Stinson Memorial Building. A cash register is in use at the store. This fund is also charged with the expense of bringing money from Indianapolis by express to pay pensions. The amount due for transportation is ascertained at the end of the quarter by going over the book and picking out the items not paid. A general account, showing the amount received and expended day by day on this account, would seem advisable.

Purchases. Purchases are nearly all made by contract or agreement. In cases of emergency purchases are made in open market by the treasurer, who calls upon different dealers and places the order with those giving the lowest figures, quality considered. The principal articles of food for the last quarter of the year were obtained from a number of markets, as, for instance, fresh beef, corn beef, bacon, and ham, from Chicago; coffee and sugar, A and C, from Cincinnati; granulated sugar, cheese, and fresh mackerel from Dayton; butter from Kansas City; flour, potatoes, fresh fish, and navy beans from Marion; salt pork from Hammond, Ind., and tea from Marion and Chicago.

Employees. The number of employees during the year under the general fund averaged 3 officers, 16 non-commissioned officers, 195 members, and 45 civilians, who received a total compensation of $47,473.47. Their daily pay is reported as follows:

	Maximum.	Minimum.	Average.
Officers	$7.63	$5.55	$6.59
Non-commissioned officers	1.33	.40	.86
Members	1.00	.16	.58
Civilians	4.16	.66	2.41

An average of only one member per day worked without pay during the year, not as a penalty, distributing medicines in hospital.

ADMINISTRATION.

Population. The average number of officers and members present during the year was 1,422, which is an increase of 213 over the number reported for the preceding year, and an average of 364, or 20.4 per cent, was constantly absent. The growth is shown from year to year as follows: 1893, 150; 1894, 144, and 1895, 145. The total number cared for was 2,503, against 2,160 the previous year. At date of inspection the population of the Home consisted of 1,595 persons, including temporary members, women, and children, and 488 members were absent. The number of vacant beds reported was 75 in barracks and 20 in hospital. At the inspection there were 792

men in line, including officers, members, and band, and 715 were excused by reason of sickness or extra and other duty. The men presented an excellent appearance and seemed well disciplined.

Discipline.

Compared with the previous year, there is a decrease of 172 in the number of members tried for breaches of discipline against the rules and regulations of the Home; the percentage last year of men tried to average present being about 40, but only 22 this year. About one-third of the total number of trials was for fence jumping, and less than one-fourth for drunkenness. The penalties attached usually consist of labor without pay, or confinement to the limits of the camp. Printed rules relating to discipline are posted in all wards, and violations are reported to the company captains, who correct the disorder, or call in the guard and have the offending member taken to the guardhouse. There are also four guards stationed within the camp, who are instructed to preserve order on the grounds and guard public property. Twenty-one members were dishonorably discharged during the year, and 75 were dropped from the rolls for desertion or absence without leave. Other losses during the year were 269 by discharge, 188 by transfer, 81 by death, and 11 by commitment to insane asylum, making a total loss of 645.

Amusements.

Facilities for amusements comprise theater, billiards, band, and library. Of these the band concerts given under its efficient leader seem to be best liked by the members. The Stinson Memorial Hall, which was completed during the year, has added greatly to the facilities for amusement, though its exterior architecture was apparently marred by changes of plans during the progress of construction.

The library was in good condition and contained at the close of the year 2,264 volumes. It also serves as a reading room. Books may be taken from the library by members of the Home on presentation of a library card. There were 16,879 books taken from the library during the year, and 11,000 were reported read in the reading room, which gives an average of nearly 20 books read by each member. Fiction and history of the civil war are reported in greatest demand.

The band is maintained during the entire year with an average membership of 22 musicians, of whom 19 are civilians. At date of inspection there were 17 civilians in band. The cost of maintenance during the year, including subsistence and other allowances of civilians, has averaged $326.90 per musician, and $5.06 per member present. The band practices daily, except Sunday, and the concerts are free to all. The civilian musicians are quartered in part of one of the barracks, and receive clothing and rations the same as members.

The Stinson Memorial Hall serves the purpose of a theater, and was in excellent condition, and has a seating capacity of 500. It is also used for divine services. There were 7 free performances given during the year, at an expense of $25, and 14 paid performances, at an expense of $700, which is met from the post fund. An admission of 5 and 10 cents is charged to members and of 50 cents to others, bringing a revenue of $454.85, perhaps the largest revenue in proportion to the expense for this amusement of any of the Branches, which marks good management in the first year after opening.

The billiard hall is located over the new dining room, where the upper story seems delightfully arranged for comfortable sociability. It contains 1 pool and 3 billiard tables, which are almost constantly in use from 8 a. m. to 9 p. m., except Saturday afternoons and Sundays. There is no charge for the use of the tables. Cards are played by

members in the barracks, which contain about 2 tables in each ward, and are reported to offer ample opportunity for all who desire to play.

Chloride of Gold Club.

This club has a membership of 125 and meets once in two weeks in its room over the kitchen. Its gain in membership during the year was 44, who took the cure for the first time; and 4 took the cure a second time. The loss in membership during the year was 35, of whom 4 died, 3 resigned, and 4 were transferred to other Branches or abandoned treatment; and 25 relapsed. The cost of taking the cure, whether for the first or second time, is $15. The receipts during the year were $757.35 and the expenses $644.39; and the balance reported on hand at the close of the year was $406.60. No inducements are given members to take the treatment. The accounts are kept separate and distinct from other funds by the treasurer of the Home. The attempts to cure intemperance in these ways, as a disease rather than a vice, seems to be given this social feature and a hall at all the Branches.

In addition to this club there are six other societies, viz, Union Veteran Legion, Encampment No. 90, 137 members; Union Temperance League, 250 members; Tom Bennett Post, No. 546, G. A. R., 64 members; The Christian Union, 250 members, and League of the Sacred Heart, 40 members. All but the last named have regular meetings in the assembly hall in basement of barracks No. 1. The League of the Sacred Heart meets in the chapel, but not regularly. These societies are said to have a good effect upon the discipline of the Home.

Religious services.

There is no chapel built wholly for the purpose of worship. Divine services are held twice each week by each chaplain in the Stinson Memorial Hall. There are two chaplains, a Protestant and a Catholic, who each receive a compensation of $50 per month, but do not live at the Home. The Protestant chaplain held 104 services and the Catholic about 200. They also visit the sick about three times each week and officiate at funeral services, and the Protestant chaplain acts as librarian. The services are reported fairly well attended.

Farm.

The farm contains 75 acres under cultivation, an increase of 5 acres over last year, and comprises three buildings: A barn, a carriage house, and a hay shed. These buildings are reported in bad condition and old, and were on the farm when the Home was organized. The transportation of the Home consists of 1 surrey, 1 carriage, 1 ambulance, 1 messenger wagon, 7 wagons for use around Home and on the farm, and 1 cart; total, 12; and 12 horses. There are no other animals owned by the Home, but stabling is furnished for 6 private vehicles and 6 private horses. The farm stock on hand June 30, 1896, was valued at $540. The value of the farm products furnished the commissary department is reported as $1,474.18, and that fed to the stock, $166.55. Last year it was $624, and $62.60 was received from the sale of products. The quality of the crop is reported to be as good as what was purchased. The appropriation for the farm was $6,000, which embraces the expense of maintaining the teams and drivers for the teaming about the Home and the ornamentation and care of the grounds.

SUPPLY DEPARTMENTS.

Buildings.

The buildings at this Branch are new and more are being constantly added, and they were in neat order and well policed. The barracks are all brick structures with basements and attics and slate roofs, and no Home can show a

better model nor buildings better kept. Ventilation is effected by two air flues from basement to roof, connecting with each dormitory, and by open fireplaces and transoms. They are heated by gas in open fireplaces in all dormitories, and one is also heated with hot air. During extreme cold weather the fireplaces are insufficient. Some of the cellars have been remarkably damp. The nature of the neighboring soil suggests carefully considered and extensive subsoil drainage. Light is supplied by natural gas, five double pendent burners hanging from the ceiling of each dormitory and one in each hall, but it is reported poor, though the Welsbach burner seems to improve the light. The barracks are occupied by about 50 per cent more than they were originally intended for, and there are about 90 men to a bath tub and 25 to each hopper and urinal. The basements are not used for sleeping purposes, which may be numbered among the kindly blessings of this and some of the other Homes. One is occupied as mess for clerks and the others are used as shops and for other purposes. The attics are used for sleeping purposes and storerooms, principally for personal baggage, and one as a practice room by the band. The attics at this Branch, as at Santa Monica, seem to be considered by the Home people to be as desirable as the regular dormitories, and those sleeping in them are said to prefer them on account of the quietness.

Bedsteads and bedding.

The bedsteads are 6½ feet long and 2½ feet wide, with woven-wire mattresses. The hospital bedsteads are one-half foot wider, and, therefore, decidedly more comfortable, and might wisely be gradually introduced as the adopted pattern for all. The barrack mattress, which replaced the ridiculously thin pad, is reported to weigh 17½ pounds, and the hospital 20 pounds, and both are made of cotton. The average supply of bedding per man consists of 2 pillowcases, 3 sheets, 3 blankets, 1 counterpane, 1 mattress, and 1 pillow. Bunks and mattresses are examined once each week by a man regularly detailed for such work, and the effect on cleanliness and freedom from bugs needs no comment; and all bedding is aired at least weekly, and a general house cleaning occurs twice each year. The locker in use is 28 inches high, 24 wide, and 13 deep, and has 1 shelf inside and an outside door with cupboard turn, and gives satisfaction. Bedsteads, bedding, and lockers were reported in good condition. It seems a pity that so many of the recent purchases should appear insufficient in size.

Supplies.

There is but one storehouse at this Branch, a brick structure used for both quartermaster and subsistence supplies and property, and the Home must be expected to outgrow it. It was in good condition, but of insufficient capacity, and the attics of two barracks and a basement have to be used also for quartermaster stores. Part of the subsistence and quartermaster supplies are stored together in the basement of the storehouse. Quartermaster inventories are reported as taken annually, except of clothing, and subsistence stores quarterly, and verified by the quartermaster-sergeant and property clerk. Furniture and other property of the Home is not all marked, but taken up as public property on the property ledger. Unserviceable property is condemned and disposed of as directed by the inspector. The value and amount of property condemned are exhibited in the tables appended. The supplies seemed of good quality and ample. The broom and mop stands and the fancy blacking benches noticed at this Branch may deserve mention. The former cost $3.41 and the latter $8.95 each. They are decorative and handy, instead of playing "poor puss wants a corner," as mops and

brooms usually do, quite unsuccessfully. Three grades of beef are bought at .05¼, .06, and .06½ per pound. The first and third qualities are delivered on the same date and the second on intermediate dates.

Clothing. Clothing when received is entered on the property ledger and issued on properly signed requisitions to members, who are then charged with it on the individual clothing ledger. The number of signatures required to clothe the command might excite remark in any organized body of men. New clothing is not issued unless the old clothing turned in is sufficiently worn out and unfit for further use and has been worn the prescribed time. When a member has been absent one year his clothing, with the exception of hat, greatcoat, and dress coat (if the term of using same has not expired), is distributed. Such as is found fit for reissue is taken up on the ledger and the rest placed on second hand shelf for issue, except that worn out, which is set aside for condemnation. The imperishable-property account shows only the clothing on hand for issue. Condemned clothing, of which no record is kept, is cut up and sold for rags, except shirts and drawers, which are issued for mops, and suspenders, shoes completely worn out, caps, and slippers, which are destroyed; shoes that have fair uppers are sold. Some complaint was made of delay in receiving shoes, so that second-hand shoes had to be repaired from time to time and reissued. It was stated that 600 men there required shoes, but that 310 pairs were on the way. The shoes wear well, and some will stand their half soles if nails rather than pegs are used.

The clothing condemned during the year cost originally $13,114.83, and gave 8,850 pounds of rags. No sale was effected during the year, though proposals had been invited. There was but one bidder, his offer amounting to $541.35, and ranging from 30 cents per 100 pounds for cotton lining to 13 cents per pound for sky-blue seamless; but for some unknown reason the Home authorities had not heard from him at date of inspection.

Laundry. All soiled underclothes are washed once a week, the clothing being sent from companies and hospital on stated days to the laundry; and there is no amount fixed of what each member may send. The average number of pieces of clothing laundered per month is reported as 9,330, of which 3,892 are shirts, 3,663 drawers, 1,131 pairs of socks, 27 trousers, 567 waiters' coats, 46 overalls, and 4 blouses. About 5 per cent of the members have their washing done ouside, and about 60 per cent wash their own socks. There are 15 men employed in the laundry.

Fire department. The steel standpipe erected at the Home during the year is reported to hold 238,000 gallons of water and to be kept full at all times, giving a sufficient pressure to throw water over the highest buildings. The water question here is pressing, as at other Branches. The fire apparatus consists of a large hose reel, with 1,000 feet of 2½-inch hose and small hose on hangers, in the halls of all buildings from basements to attics. The large hose is tested every thirty days and the small hose every ninety days, and both were reported in good condition and adequate. The fire company consists of 16 members, who meet every Saturday, and are said to be able to respond in case of fire in from one to five minutes. A small fire occurred on December 15, 1895, at the laundry boiler room, which was extinguished in two and one-half minutes and caused a loss of only about $1. The only other fire at this Branch occurred in 1894 at the guardhouse, where the roof caught fire from the stovepipe. The fire

company had a stream of water on the building in seven minutes, though the alarm was given at 2 a. m., and the ground was covered with snow and ice. The damage was about $10.

Engineer department.

The chief engineer has been on duty at the Home for about seven years, and has charge of all shops, pumping station, gas, and water-supply plants and superintends the erection of all buildings. Forty-five men are employed under him.

There are but six shops at this Branch, the carpenter, paint, and pipe shops located in barrack basement, the tailor and shoe shop in the storehouse, and the blacksmith shop in a separate building. The carpenter and paint shops are not considered suitably located under barracks. The quartermaster has charge of the shop accounts. Repairs are made on requisition approved by the governor and sent to the chief engineer through the quartermaster's department, though when immediate attention is needed the governor is consulted and issues the necessary orders to the engineer. A new system of shop accounts was being inaugurated here so as to show a profit or loss in each account.

The water supply is pumped from 7 gravel wells 87 feet deep and from 1 well 345 feet deep, and distributed by standpipe pressure. The gravel wells are not reported satisfactory. The sewerage is in good condition.

Dining hall and kitchen.

The dining hall, which has but recently been completed, and the kitchen were in good order and police; and the facilities for cooking and serving meals are reported ample, except that two boiling kettles are required. The shining coffee hopper is an illustration how this young Home is rivaling the best of the old ones in the absolute cleanliness and painstaking care of its management; and the design, construction, accessories, and care of the buildings here show the progress of the Branches to this, which is the latest built in brick. The appearance and conduct of the members seem to reflect the excellence of their surroundings. The dining hall has a capacity of 1,272, which was more than adequate for present use, and under the prevailing system of setting tables twice at the Homes the provision here promises to be as adequate as any. The permanent employees average 22 in kitchen and 5 in dining hall, and 42 are detailed each week for temporary duty in the dining room. The food seems well cooked and ample. During the week ending August 29, 1896, there were 10,534 rations expended in kitchen and hospital, or an average per day of 1,504$\frac{4}{7}$, which cost $1,370.76. Adding to this $109.33 for value of products of farm furnished and $116.57 for labor, the total cost was $1,596.66, which gives an average cost per ration of 15$\frac{8}{10}$ cents, or 14$\frac{7}{8}$ cents without the farm products. The average cost of the hospital ration was about 6 cents higher than that of the general dining hall.

Swill and garbage were sold last year under contract at $17 per month. The amount is estimated at 30 tons per month. This year it is given for the hauling, as it is stated no contract could be obtained.

There are 2,136 pieces of crockery reported in daily use. The per cent of breakage is reported as ranging from four-tenths for salt cellars to 67 for water pitchers.

The new type of dining-room tables, manufactured for the new mess hall, cost $6.50 each. They are a simple novelty and certainly look surprisingly satisfactory when new. Eighty-nine cast-iron table legs on hand were sold to the contractor for these tables at 70 cents each.

Nineteen members of this Branch receive outdoor relief in subsistence and clothing, at an expense per month of $106.40 for the former and $24.98 for the latter.

MEDICAL DEPARTMENT.

The hospital consists of an administration building, with a wing on each side for wards, and a building in rear, constituting the kitchen and dining room. The convalescents are quartered in wards 1 and 2 of barracks No. 4. The capacity of the hospital for patients is 224, and of the convalescent company, 64. The hospital attics are used as dormitories for the employees, and the basements are used for storage purposes and heating apparatus, except the basement beneath the kitchen and dining room, which is used as a scullery. There is a bath tub for the upper and one for the lower wards in each wing, with an average of 56 patients to each tub. Patients are given a bath as soon as admitted to the hospital, and weekly thereafter unless exempted by the physician. Patients confined to their beds receive a sponge bath weekly. The hospital was in good condition and well policed throughout. The placing of an elevator between the first and second stories was being considered. Such improvements would seem to be always desirable here as at Dayton.

The average daily sick during the year has been 213 in hospital, 53 in convalescent company, and 85 at sick call. There were 535 patients admitted to the hospital during the year, and 200 to the convalescent company, and 159 were discharged from the hospital as cured and 5 from the convalescent company. The total number of patients treated during the year was 2,598, including sick call, and each case in hospital and convalescent company was an average of 181.6 days under treatment. There were no cases of contagious or infectious diseases during the year; but there were 86 cases of malaria, which seems to be due to local conditions.

The death rate for the year was 45.35 per 1,000 of the average present and absent, and 32.36 per 1,000 of the whole number cared for, and is lower than reported for the previous year. Of the 81 deaths at this branch, 61 died in hospital, 4 elsewhere on the reservation, and 16 outside of the Home. The causes assigned are 76 natural, 1 from violence, 1 by suicide, and 3 the result of accidents. The average age at death is reported at 61.28 years, against 60.3 for the year before.

Sixty-six of the deceased members were buried at the Home cemetery. Members are buried in blouse, uniform trousers, hospital shirt, drawers, and socks, and in a coffin made at the Home at a cost, with box, of $4.96. The cost of a funeral is reported as $8.93, and no allowance is made for funeral expenses of members dying outside of the Home.

There are 52 hospital employees, of whom 37 are members and 15 civilians. The former serve in the capacity of ward masters, barbers, bread cutters, cooks, dishwashers, gravediggers, hall cleaners, nurses, and the latter as assistant surgeons, matron, druggist, nurses, and cooks. The ratio of these employees to the total number of patients treated is as 1 to about 50, and to the average daily sick as 1 to 6.7.

Medicines are obtained from the quartermaster's department upon requisitions made at least once in every two weeks and issued to patients upon the surgeon's order. There are 234 different drugs and preparations used in the dispensary, and the amount expended for them during the year was $5,820.86. Money and valuables found on patients when admitted are taken in charge by the head nurse, who deposits them in the surgeon's safe, keeping a record of the amount in a book for that purpose, and pays the money out on the request of the patients.

Facilities to care for the insane are reported insufficient, and the violently insane are confined in cells in the guardhouse and cared for by

the guard. All others are cared for by the nurses in hospital. Twenty-seven members showed indications of disordered minds during the year, all of whom were considered permanently afflicted, and eleven were sent to the Government Insane Asylum in the District of Columbia. The average annual number of insane at this Home is reported 15.6, and an average of 6.3 is sent annually to the insane asylum.

Ten members of this Branch are reported totally blind and 13 with an impaired eyesight so as to be unable to read. They are quartered in hospital and given such assistance as may be needed.

The surgeon of this Branch makes a weekly sanitary inspection report to the governor.

No. 6.—Report of an Inspection of the Central Branch, made September 14, 1896.

The officers of this Branch are Col. J. B. Thomas, governor; Capt. Milton McCoy, treasurer; Capt. James C. Michie, quartermaster; Maj. J. S. Galbraith, commissary of subsistence; Maj. Carl Berlin, adjutant-general; Dr. David C. Huffman, surgeon; Rev. Ezekiel Light, Protestant chaplain; Rev. C. S. Kemper, Catholic chaplain; Maj. John W. Byron, inspector.

There has been no change in the officers since last inspection, and their duties have been performed with the same zeal and thoroughness noted in a previous report. This is the largest of the Branches; the ratio of the annual pay of its officers and non-commissioned officers to the membership is 5.62, and the amount disbursed is .049. The question of neatness, discipline, good order, and contentment, which can not be measured by pounds or dollars, is of very great importance, and is too apt to receive ineffective or inadequate attention in such a large aggregation of men, already past middle age, and marked by the absence of women and children, and the interests and occupation of industrial life. Ultimately this, as all other questions seriously affecting the Home, must rest upon the governor to a great extent. Tact, discretion, and judgment necessarily find a marked illustration here. Perhaps the same number or proportion of members of no other Home have been promoted to offices of trust as from this. In organizing the offices at a growing Branch it may be that the position of adjutant and inspector can be made practically useful and beneficial, and demonstrate that the men are as carefully looked after and deemed of at least as much importance as the property or money. Perhaps the presence of a deputy governor at some of these Homes, a title recognized in the organic law, would be desirable, or at least admissible.

DISBURSEMENTS.

Treasurer.

The accounts and disbursements of the treasurer were inspected from October 28, 1895, the date of last inspection, to September 14, 1896, and involved $1,647,922.27, pertaining to the general, pension, and post funds. The expenditures, as shown by vouchers and transfers, amounted to $1,388,773.59, leaving a balance on hand of $259,148.68, which was all on deposit in bank, except $1,418.66 cash on hand, of which $1,350 was post-fund money. The constant balance kept on hand at the store and beer hall seemed large, though absolutely necessary.

The expenses of the general depot located at this Branch Home for the manufacture of clothing and the printing of blanks are paid by the

treasurer of this Branch with funds furnished him by the general treasurer, but the transactions do not appear in the accounts of the officer who made the actual payments, but in the accounts of the general treasurer, and the receipts to the vouchers thus paid fail to report, as required by regulation, the depository upon which drawn, and the number of the check that was issued to the payee of the voucher, and the payee is obliged to acknowledge the payment from an officer by a check on a depository of which he has no knowledge. Evidently the close connection between the voucher and the check, which it is always wise to establish, is not accomplished. Thorough inspection of this depot's methods and expenditures are not facilitated by these obscure and roundabout methods. The officer on the ground (the Branch treasurer) who pays these vouchers should be compelled to enter them in his accounts and let the records show the whole and actual transaction. All the business he does is under the general treasurer's bond to the United States, and the present confusion seems entirely unnecessary. A sort of irresponsible performance of duty and supervision exercised by those on the spot and hypothetically direct payments by a distant disbursing officer seems unbusiness-like and tangled up.

General fund.

During the year ending June 30, 1896, the treasurer received on account of the general fund $580,757.88, of which $525,122.34 were from Congressional appropriations. The expenditures for the same period were $568,683.53, which was all disbursed by check. At date of inspection there was a balance of $17,998.15 on deposit to the credit of this fund and $14.01 cash on hand.

It has become the general rule at the Homes to issue a check only on a receipted voucher. This seems entirely safe, and insures the prompt return of vouchers in proper form, and where it is not always followed at this Branch a full and satisfactory inspection is defeated, owing to the absence of some vouchers for which credit is claimed.

Improvements and repairs.

The only improvement reported made during the past year from the general fund was the erection of a gas house, at a cost of $6,419.67, and no permanent improvements were under way at date of inspection nor are any contemplated or authorized for the present year. Those reported needed for the year ending June 30, 1898, are an addition to the central boiler house, brick water-closet, addition to electric-light plant, extension of tunnel, a new barrack, and hospital out-ward. The amount expended on repairs during the year is reported as $56,894.48. The most considerable repairs upon one structure were made upon the nurses' cottage, at a cost of $1,935.89. The original inferior design and construction of the barracks here made the introduction of new ones of healthful and comfortable design very desirable. An exhaustive report upon the history and qualities of these migratory and transformed structures, accompanied by a well-considered plan to replace or supplement them with creditable ones, is required as a proper guide to Congressional action. Haphazzard or ill-planned or not well considered work of such magnitude and affecting so many people might be extravagant or unwise. Plans and cost were asked for in such form as would enable comparison with buildings for similar purposes elsewhere, but have not been received.

Pension fund.

The treasurer paid out during the year on account of pensions $745,898.29, and had a balance of $106,835.09 due the pensioners at the close of the year. The average paid each pensioner during the last quarter of the year was $35.61.

On June 30, 1896, there were 5,237 pensioners on the rolls at this Branch, against 4,958 a year previous. At the close of the year there were 824 pensioners on the rolls who had balances to their credit. Of these 5 had over $1,000 each, 31 between $500 and $1,000 each, and 219 between $100 and $500 each, and 569 less than $100 each. The addresses of 19 pensioners, who had $371.22 to their credit, were unknown, and 66 with a total amount of $7,489.96 to their credit had been transferred to an insane asylum. Six clerks at a combined salary of $1,980 per annum, paid from the post fund, are employed on pension work. The treasurer of this Branch suggests that the expenses incurred in the transaction of pension business be met from the surplus accruing from posthumous sources. At date of inspection September 14, 1896, the balance to the credit of this fund was $231,299.15. This large balance was deposited in a Dayton and New York national bank, and included the proceeds of $80,000 United States bonds sold by order of the Board of Managers. This amount of bonds represents the idle balance of this fund. The steady increment of this almost disregarded fund in the system of supervision suggests that authority be given for the deposit with the assistant treasurer in New York of all such sums over $10,000 where their safety would seem assured.

Post fund.

The receipts from sales during the year at the Home store, beer hall, and hotel and restaurant were $139,401.92, and the expenditures for stock $81,213.85. The cash reported on hand July 1, 1895, was $7,833.08 and $12,316.40 merchandise, and at the close of the year $5,042.99 cash and $16,078.68 merchandise, showing a gross profit of $61,950.35, and a net gain of $972.19. At date of inspection, September 14, 1896, the treasurer had in his charge $9,837.37 pertaining to this fund.

The largest revenues are derived from the beer hall, where 226,498 gallons of beer were sold during the year at one pint for 5 cents, and at a profit of nearly 150 per cent. The hotel does not seem to pay expenses, and seems to be classed with the theater as essentially expensive, though it appears that something near self-support should be possible. The employees under this fund averaged 2 non-commissioned officers, 82 members, and 44 civilians, whose average daily compensation was 80 cents for non-commissioned officers, 31 cents for members, and 90 cents for the civilians. The buildings occupied for post-fund purposes are reported convenient and suitable, and all were constructed originally for their present uses except the beer hall, which was built for the commissary department. The expenses of heating and lighting the post-fund buildings, heretofore paid from the post fund at an estimated cost, seem now paid entirely from the general fund, except for the coal used for cooking at the hotel.

Purchases.

Purchases are made by the treasurer under schedule regulations prescribed by the Board of Managers. The principal articles of food purchased under contract during the last quarter of the year were obtained from the following places: Flour, coffee, bacon, codfish, ham, and sugar from Dayton; fresh beef, oleomargarine, and sirup from Kansas City; tea from Boston; potatoes from Petosky, Mich.; fresh fish from Detroit; mackerel from Cincinnati; navy beans from Marion; lima beans from Xenia, and cheese from Chicago. Although the rations for flour and fresh beef were higher than at some of the other Homes, the other contracts seemed very favorable, and the average expense of maintaining a man here is less than at other Branches, as might be anticipated at the largest and centrally situated Home. The cheapest post in the Army for maintaining a cavalry soldier is Fort Riley, Kans.

Employees. The number of employees reported authorized during the year under the general fund were 8 officers, 71 non-commissioned officers, 2,008 members, and 78 civilians; total, 2,165; and the average daily number employed were 8 officers, 51 non-commissioned officers, 824 members, and 61 civilians; total, 944.

ADMINISTRATION.

Population. The average number of officers and members present during the year was 4,982, which is an increase of 215 over the number reported for the preceding year, and an average of 785, or 13.6 per cent, was constantly absent. The highest number present during the year was 5,162 on December 22, 1895, and the lowest 4,723 on July 1, 1895; and the total cared for during the year was 7,141 against 6,732 for the previous year. Their average age is reported as 62+ years, which is an increase of about 2 over the age reported for the preceding year. At date of inspection, 5,212 officers and members, including 39 temporary members, were present at the Home, and 811 were absent. Adding to these the civilian employees and members of families, including women and children, the total population present was 5,298 persons.

The number of vacant beds at date of inspection was 12 in the hospital and none in barracks.

Inspection. September 13, 1896, there were 2,759 men in line, including officers, members, and band, and 2,414 were reported absent from review, but present in camp, of whom 938 were sick, 1,043 on extra and other duty, and 433 excused. The advantage in any inspection of getting both a general and detailed view is readily recognized; and it is never more important than when considering the comfort, condition, and care of men. Every effort has been made to see the men at meal time, in mass, or at their beds, whether sick or well, and nowhere has their appearance been more effective and borne such testimony concerning their condition, surroundings, and treatment, as when thus brought all together so they can be seen face to face—an essential of effective inspection, it becomes an imperative demonstration of the excellence of the Branches. The absentees from camp on the day of the review were reported as follows: With leave or on pass, 765; without leave, 46; total, 811.

Discipline. Compared with the previous year there was a decrease of over 150 in the number of trials, and 3,617 members, or about 73 per cent of the average present, were not tried, against 3,252 reported for the preceding year. Of the total number of members tried, 887 were tried once, 288 twice, and 182 more than twice. Nearly one-third of all offenses were committed by these 182 members, and about half of all offenses were due to intemperance, or for absence without leave, and fence jumping. The penalties attached are usually work without pay, and restriction of passes, which, as a rule, are conditioned on good behavior. Fines are not imposed. There were 1,357 members in confinement during the year and 18 in confinement at date of inspection, and 299 members were dropped from the rolls for desertion or absence without leave. Discipline is enforced through company captains in barracks, and through the captain of the guard on the grounds.

Amusements. These embrace theater, concerts, library, boating, billiards, and other games. Light plays—billiards, cards, and checkers—seem to be best liked by the members. The library and reading room were in good condition. The latter

has a seating capacity of about one hundred and is reported usually filled with members. The library is not seated. There were 661 volumes presented to the library during the year, and 237 were purchased; and at the close of the year it contained 19,794. The number of books taken from the library during the year average a little over nine per member. The Home subscribed for 65 papers and 25 periodicals, and received quarterly 131 papers and 8 periodicals.

The band was maintained during the entire year with an average strength of 32 musicians, of whom 28 were civilians. The cost of maintenance for the year, including subsistence and other allowances of civilians, averaged $360.17 per musician. The band practices daily, except Sundays, and concerts are free to all. The civilian musicians are quartered in barracks and receive the same allowance of clothing and rations as members of the Home.

The theater is in the memorial hall and was in good condition. In addition to theatrical purposes, it is used for lectures, soldiers' reunions, and other assemblies. Thirty paid performances were given during the year at an expense of $6,990, and 14 free performances at a cost of $325. An admission charge of 5 and 10 cents is made to members, and of 25 and 50 cents to others. The revenue from this source was $3,007.50. The average attendance has been about 1,000, though the seating capacity is 1,500.

The billiard hall is being removed from the second floor of the laundry building, which is some distance from the center of the camp. There are four billiard and three pool tables in use, and no charge is made for these games. The billiard room is open daily except Sundays, and was in good condition. There was no card room or tables for cards, checkers, and like games; but they may be, and are, played in barracks, hospital wards, and Gold Club room. Facilities for playing cards are reported insufficient. The Home owns seven boats which may be used free of charge. The amusement room is reported as inspected by a commissioned officer weekly and oftener. At the date of inspection the new amusement hall built from the post fund was nearly ready for occupancy. It is a commodious building, finely finished in the natural wood, and frescoed ceilings. The first floor, divided by a hall, was used for a billiard room on one side, with balconies on the upper stories leading to small card rooms on each side, and on the other side is a fine, well-lighted reading room, and above this is a handsome hall arranged for society meetings. Its location is convenient, and adds another feature to this already attractive Home. The cost of the building was about $16,000 including $1,000 for fresco work. There is talk of a ten-pin alley or other improvements in the basement.

Wherrel or Gold Club.

This club has a membership of 210, and holds monthly meetings in its clubroom from April to September and bi-monthly from October to March. Its gain in membership during the year was 9, who took the cure for the first time; and 5 took the cure a second time. The treatment is not given a third time. The loss in membership was 14, of which 3 died and 11 relapsed. The cost of taking the cure for the first time is reported $15, and for the second time nothing. The receipts of the club during the year were $97.80 and the expenses $230.04, and there was a balance of $956.64 on hand at the close of the year. The funds are kept by the treasurer with the post fund, but the records are kept separate and distinct. Members needing the treatment, who have will power left, are advised to take it, and encouraged in every reasonable way. The secretary and janitor of the club are paid from the post fund; also, a payment for gold cure medicine was noted.

The following four societies are reported among the members: Grand Army of the Republic, 237 members; Union Veteran Union, 60 members; Union Veteran League, 208 members; and Naval Veterans, 52 members. These societies meet weekly and are reported to be no aid to discipline.

Religious services.

There are two chaplains at the Branch, a Protestant and a Catholic, the former holding divine services tri-weekly and the latter daily. Both are furnished quarters and live on the reservation, and receive a salary of $125 and $103.33⅓ per month, respectively. Services are reported well attended, and are held in the chapel and sometimes in memorial hall. The chaplains also visit the sick in hospital and members in barracks, the Catholic chaplain making daily visits to the sick and the Protestant on alternate days.

Farm.

The farm contains 285 acres under cultivation, and comprises the following buildings: A frame hogpen; a frame building for hog feeder, and one for dairyman; a frame dairy barn and stable; 4 cattle sheds and box stalls; a frame grain storeroom with vegetable cellar; a carriage house and stable; a frame stable for farm teams; a frame corncrib; a frame cleaning house, and a brick slaughterhouse. These buildings were all reported in fairly good condition. The transportation of the Home consists of 25 vehicles, carriages, wagons, carts, sleighs, etc., and 30 public animals. There are also kept on the farm 21 cows, 36 pigs, and some deer and bear in the park; and stabling is furnished for 7 private horses and 15 private vehicles. The farm stock on hand June 30, 1896, was valued at $2,950. The number of employees on the farm average 14 members and 2 civilians. The products of the farm are valued at $9,766.78, of which $5,558.76 was furnished to the table, $2,532.19 fed to the stock, and $1,675.83 sold. The supplies furnished the mess include 18,162 gallons of milk, credited at 10.10 cents per gallon, which is over 3 cents per gallon less than it can be purchased by the quantity in the nearest town. The quality of the crop compares very favorably with that purchased. Potatoes are not raised on the farm. The amount expended from the appropriation for the farm for the fiscal year ending June 30, 1896, to September 30, was $16,356.46, but this included the cost of maintaining all the stock at the Home, the pay of teamsters, harness maker, and stablemen, and the care and ornamentation of the grounds.

SUPPLY DEPARTMENT.

Buildings.

There are 32 barracks at this Branch, 17 frame and 15 brick, ranging in quality from the excellent one joined with the store to almost shanties, illy ventilated, designed, and constructed. All were well policed and generally in fair repair. They were reported in good sanitary condition, though the system of ventilation, which is effected in most barracks by windows and doors only, is not satisfactory in every respect, and under the floor it is still less, and this promises to be imitated in the new California barracks. They are all heated by steam and lighted by gas, except barrack No. 21, which is also supplied with electric lights. The system of heating and lighting is reported satisfactory. These 32 barracks were said to be originally intended for 3,855 men, but are now occupied by 4,385, or one-seventh more. None of the barracks have basements, but 12 have cellars which are principally used for storing property, and only one has an attic, which is used for baggage. There are no bath tubs in the barracks, except in barrack No. 30, but there is a general bath house, and members are required to bathe once weekly. There are 82 toilet rooms and 134 urinals in barracks, located in wings and corners

of building. The average number of men to each urinal is 32, and to each hopper 25. The best general bathroom and latrine is probably at the Eastern Branch. A new latrine is estimated for at the Central, and where there are so many men something more decorous and suitable should be built than any plan shown there.

Bedsteads and bedding.

The bedsteads are iron with wire mattresses, 6 feet 6 inches by 2 feet 6 inches. There are two styles of mattresses in use, said to weigh 13 and 17 pounds. The average supply of bedding per man consists of 3 blankets, 3 sheets, 1 mattress, 1 pillow, 2 pillowcases, and 1 counterpane. The bedding is aired out of doors and washed when necessary. The lockers in use are small cupboards of two sizes, the larger of which is best liked. Bedsteads, bedding, and lockers were reported in good condition.

Supplies.

There are three storehouses, one brick, one stone, and one frame in good repair, but of insufficient capacity, and supplies have to be stored in sheds and cellars. Inventories are taken quarterly and annually, and verified by the quartermaster and the commissary of subsistence. Furniture and other property of the Home is not all marked, but all is reported as accounted for as public property. Unserviceable property is disposed of by sale or destruction after condemnation. The property condemned during the year cost originally $86,026.12, and $2,559.07 was received from the sale of condemned property. The large quantity of quartermaster stores on hand at the close of the fiscal year, $26,835.78, has attracted attention. The amount is a little less than that reported last year, but it is more than the value of the combined stock of four other branches having nearly twice the population; it may be possible to further reduce the stock without detriment to the efficiency of the service. Seldom are such Government stores improved by storage. Limited purchase and steady use under their long-term contracts is apt to be economical.

Clothing.

An individual clothing account is kept with all members; and issues are made in accordance with the terms fixed in the allowance tables, with individual papers requiring thousands of signatures, but the accuracy and efficiency of the whole system depending upon the faithfulness and qualities of the quartermaster's employee in charge of the matter. No exchanges are made until the articles are sufficiently worn, and their use is not infrequently prolonged after the term fixed in the allowance table by making repairs. Members who go on furlough are not allowed to take clothing with them except by order of the governor. Cast-off clothing is sold as rags. Pains are taken to prepare the rags for the trade so good competition may be obtained, at most of the Branches. The receipts here from this source were $1,780.98 for the year. The following are the amounts sold and prices obtained per pound: 776 pounds linen rags, at $0.07; 12,014 pounds mixed rags, at $0.0075; 6,622 pounds seamless sky blue, at $0.11; 4,539 pounds seamless dark blue, at $0.065; 5,969 pounds wool seams, at $0.03; 3,410 pounds wool socks, at $0.075; 5,728 pounds white cotton, at $0.01; 2,912 pounds linen sheets and pillowcases, at $0.02; and 990 pounds linen counterpanes, at $0.02. These rags include all parts of the uniform clothing except rubber boots, shoes, and hats, for which $64.91 was received. Gloves are not issued to the members here, nor is account kept of such as are issued at other Branches to men transferred here.

Laundry.

Soiled clothing is put up in bundles in each barrack and sent to the laundry on Monday morning, and each man is permitted to send one set of underclothes per week and bedding when necessary. The average number of pieces

of each kind of clothing reported laundered per month is 78,660, consisting of 12,866 aprons, 25 dress coats, 828 handkerchiefs, 3,814 white ackets, 210 trousers, 171 blouses, 26,169 drawers, 27,926 shirts, 6,478 socks, 50 vests, and 123 overalls and jumpers. In looking over the wash lists of one of the companies for seven consecutive weeks, the entire absence of socks from the lists was noticeable, and it seemed that bed sheets and pillowcases were washed but once in two weeks. All Home clothing is washed at the laundry, except that some men wash their own underclothes and socks. An average of 40 men was reported employed in the laundry, and the pay roll during the year amounted to $4,014.59.

Engineer department.

The chief engineer has been on duty at the Home for thirteen years, and has charge of the heating, lighting, water, and sewerage systems. Eighty-eight men are employed under him, 77 of whom are members, as blacksmiths, engineers, firemen, gas makers, gasfitters, plumbers, and laborers. Orders for repairs are issued to the chief engineer from the governor's office, and the shop accounts are under the charge of the quartermaster. A change is being made in methods of keeping and reporting these accounts. Their utility and accuracy at some of the Branches has seemed at least doubtful.

The systems of water supply and sewerage and drainage have received much attention and require it, and after the improvement in recent years are reported satisfactory.

The electric plant at this Branch was installed May 12, 1894. The system in use is the Edison "three-wire system." The plant consists of two 60-kilowatt dynamos, voltage 125, set to run at 110 volts. The engine in use is a high-speed engine, set to run 235 revolutions a minute, and is rated at 145 horsepower. There are about 1,800 16-candlepower lamps on the circuit, also 18 arc lamps of 1,200-candlepower each, and 8 fan motors of one-eighth horsepower each.

The Home fire company consists of the entire force of the engineer department, and is under the immediate charge and direction of the chief engineer. The fire apparatus was reported adequate and in good condition. No fire worth mentioning has occurred since October 17, 1892, when the laundry was burned.

Dining hall and kitchen.

These were both in good condition and well policed. The facilities for cooking and serving meals are reported ample, though tables have to be set twice for each meal, even since the annex was built. The upstairs room, originally intended for another dining room, is now used as an excessively large dormitory, for which it appears as unsuited as it could have been for a dining room. Most of the men sleeping about the mess hall seemed illy located. This space seems better used at the other Branches. Fifty-seven men are permanently employed in the kitchen and 125 in the dining hall, and 220 are additionally detailed for dining-room duty, the details being made by the adjutant through company captains. From the reports furnished it seems that during the month of December, 1895, the daily issues to the dining hall averaged 3.57 pounds per man at a cost of $0.146, and during June, 1896, 3.71 pounds at a cost of $0.147. The issues to the hospital averaged during December 5.32 pounds per man at a cost of $0.156, and during June 6.13 pounds at a cost of $0.153. The weights above given are gross weights and include corn cobs, melon rinds, etc. The issue of milk for the week ending September 12, 1896, amounted to 1,974 gallons, of which 590 went to the general mess, or 4,326 men; 1,221 to the hospital, or 792 men; 50 to clerks'

mess, or 48 men; 37¼ to employees, or 102 men; 20 to bakery, and 55¾ were sold.

The sales of commissary stores to officers and members, and the making up of the individual vouchers in duplicate, are reported as taking up about one-half the time of the persons employed in this department. Subsistence was sold during July to 68 persons, and that number is reported as below the average.

Swill and garbage, including bones, grease, etc., are sold to the highest bidder. From this source $4,967.16 were received during the year, or $413.93 per month, and it is estimated that the refuse averages about 190,000 pounds per month.

There are 11,482 pieces of crockery reported in daily use, consisting of 2,014 coffee bowls, 234 pepper bottles, 332 vinegar bottles, 236 sirup pitchers, 1,982 vegetable dishes, 308 meat platters, 334 deep round plates, 4,058 dinner plates, 364 bread plates, 583 cheese plates, 572 butter plates, 230 mustard pots, and 235 saltcellars. The per cent of breakage reported for the year ranged from 1 for saltcellars to 74 for bowls. The percentage of the breakage seems large, and as it is reported to be largely due to frequent and hurried handling of the ware, would it not be possible to avoid this trouble by providing two sets of dishes, so setting the second tables would not unduly hurry the dish-washers?

MEDICAL DEPARTMENT.

The hospital is composed of the following structures: A modern building containing executive office, kitchen, dining room, seven wards; and dispensing department; one double 2-story brick; one 2-story brick, five 1-story frames, and a nurses' cottage, and has a capacity of 646 beds for patients. The so-called convalescents occupy the first floor of barracks 15 and 28, and all of barracks Nos. 21, 24, and 26. Their quarters have a capacity of 355 beds. The basements of the hospital are used as storage and baggage rooms, and furnish a limited number of sleeping quarters near the morgue for employees. The ventilation of the basement did not seem to be well established. The attics of the hospital annex are also used as dormitories for employees. The attics in the main hospital are reported not in use. There are bath tubs in each ward with from 28 to 40 patients to each tub. Ventilation is effected by open grates with natural-gas fires and by hot and cold air flues with registers.

The average daily sick during the year has been 605 in hospital, 340 in so-called convalescent companies, and 115 at sick call. There were 2,037 patients admitted to the hospital, and 559 to the convalescent companies, 66.67 per cent of whom were discharged from the hospital as cured, and 10 per cent from the convalescent companies. The total number of patients treated during the year was 6,193, and each case was under treatment an average of fifteen days.

The death rate for the year was 65.55 per 1,000 of the average present and absent, and 52.93 per 1,000 of the whole number cared for, and is higher than reported for the preceding year. Of the 378 deaths, 307 occurred in hospital, 2 in convalescent quarters, 11 elsewhere on the reservation, and 58 outside of the Home. The causes assigned of those who died at the Home are 317 natural, 2 suicide, and 1 the result of accident. The average age at death is reported 66.54 years, which is very slightly higher than for the previous year.

Three hundred and six of the deceased members were buried at the

Home cemetery. They are buried in a new uniform, underclothes, and shroud, and a coffin made at the Home carpenter shop at a cost of $3.52. The cost of a funeral is reported as $6.78. The creditable monuments and general condition of the graveyard show a becoming interest in the departed. It is the duty of another branch of the public service to care for our deceased fellow-soldiers—and it does it well, as well as the Home cares for the living—and it would possibly be better to have national cemeteries near these Homes, where so many hundreds are dying, and let each branch of the public service attend to its special duty, which it can do.

At the other Homes the cost of the telegram notifying friends of the death of a member is paid by the Home, but here the cost is taken out of the effects of the deceased if there are sufficient funds found. The files of the inventories of the effects of deceased men were not found complete.

There are 199 hospital employees, of whom 172 are members and 27 civilians. The former serve in the capacity of hospital steward, ward masters, cooks, dishwashers, house cleaners, nurses, reader to blind, waiters, etc., and the latter as assistant surgeons, matron, internes, druggists, nurses, cooks, janitress, and laundresses. The ratio of these employees to the total number of patients treated is as 1 to about 31, and to the average daily sick as 1 to about 5.3. To have special nursing or waiting on done and paid for by one patient for another as a customary matter appears a questionable or inferior system.

Medicines are obtained from the quartermaster department on weekly requisitions of the surgeon approved by the governor, and issued to patients upon the doctor's prescriptions. No record seems to be kept of medicines after they are received in considerable bulk at the hospital to show amount on hand or dispensed, though much labor is expended in duplicating records kept elsewhere. The surplus medicines not on the quartermaster papers at the Home fill the druggist's shelves and are visible in the laboratory and storeroom. Money in possession of members brought to the hospital is taken by the hospital steward and turned over to the surgeon, who puts it in his safe in an envelope marked with the owner's name, date of receipt, and date of repayments. If a large amount is received, the larger part of it is turned over to the treasurer as a special deposit. There are 225 different drugs and preparations reported in use, and $13,556.01 was expended for drugs during the year. As instances of the medicines used, 1,000 pounds magnesium sulphate, 300 pounds carbolic acid, 46 ounces of morphine, 100 pounds potassium bromide, and 46 barrels whisky are mentioned.

The facilities to properly care for the insane at this Branch are not considered complete. They are quartered in 1-story frame wards in rear of main hospital, and there are six cells for close confinement and but one strait-jacket. There were 290 members showing signs of insanity during the year, of whom 80 per cent were considered permanently insane and 20 per cent temporarily, and 10 were reported violent. The average number of insane at this Home has been 155, and about 40 are sent annually to the Government Insane Asylum in the District of Columbia. During the past year 32 were sent there. Many sent from other Branches are said ultimately to drift to Hampton.

Forty-six members at this Branch are reported totally blind and 193 with impaired eyesight so as to be unable to read. The blind are quartered in hospital and first floor of barracks No. 15. The eye, ear, and throat clinic is a feature of this Branch, and members are sometimes sent from the others for this special treatment.

No. 7.—Report of an Inspection of the Southern Branch, made October 2, 1896.

The growing population of this Branch, now second in size, would suggest the appointment of an additional officer, say a deputy governor, as mentioned in the organic act, or an adjutant and inspector, like those at Dayton or Milwaukee. The logical division of duties among the governor's subordinates is to give one the care of the personnel, another the material, another the money, and a fourth the sick. There is an evident weakness at some Branches in this respect. Dr. E. L. Welling succeeded Dr. W. W. L. Phillips as surgeon of this Branch during the year.

DISBURSEMENTS.

The accounts and disbursements of the treasurer were inspected from December 14, 1895, the date of last inspection, to September 30, 1896, and involved $918,335.68, pertaining to the general, pension, and post funds. The expenditures, as shown by vouchers and transfers, amounted to $819,722.22, leaving a balance on hand of $98,613.46, which was all on deposit in the Norfolk National Bank, except $75 cash on hand. All checks coming into the hands of the treasurer should be promptly deposited, and checks should be issued only in favor of the person entitled to the payment.

The treasurer, by an indorsement on his checks, seems to defeat the object had in view by the Comptroller's circular of May 20, 1896, paragraph 4, in accepting as satisfactory to him an indorsement on the check other than that of the payee of the check.

General fund.

During the fiscal year ending June 30, 1896, the Branch treasurer received from the general treasurer on account of the general fund $387,128.32 and from other sources $15,017.43. The expenditures for the same period were $376,710.74, of which $303,730.18 were expended by check and $72,980.56 in currency. At date of inspection there was a balance of $57,591 on deposit to the credit of this fund.

The infrequent report of funds found on the persons of deceased members in the reports of the council of administration was noticeable, but it was understood that small amounts were not turned over to the treasurer, but were allowed to remain with the clothes of the members to be turned over to their relatives or sold at auction.

Improvements and repairs.

The principal improvements made at this Branch during the year were the erection of two frame barracks of a capacity of 200 men each at a cost of over $26,500, not including the payments to a superintendent of construction and for plans, specifications, and inspection of heating, plumbing, etc., and services of a civil engineer at $20 per day, while but $25,000 was appropriated therefor; and the erection of a frame guardhouse, for which $4,000 was appropriated, but this appropriation, though largely supplemented from the post fund, was exhausted before the building was ready for occupancy, and at the date of the inspection the old guardhouse was still in use, and no appropriation has been asked to complete the building this year. Usually the Congressional appropriation is regarded as the limit for the cost of a building. The disbursements from the post fund are not yet submitted to the administrative supervision of the War Department, and some payments from it seem to be outside the object for which such funds are raised, and some for services and travel

expenses seem made with a liberal hand. The mingling of these funds with Congressional appropriations tends to confusion and inaccuracy.

The improvements authorized for the present year are sewage pumping works, including building; reservoir, machinery, pipes, ventilating chimney, and other items, for which $26,000 has been appropriated; a new gasoline lighting plant, to cost $6,000; an addition to the present latrine, $3,500, and an appropriation was made to reimburse the post fund for the amount advanced by it for additional boilers, $4,200. The estimate submitted by the Board of Managers to Congress for these boilers was $3,500.

The pumping station and reservoir were in course of construction at date of inspection.

For the coming year ending June 30, 1898, two additional barracks, at an estimated cost of $15,500 each; 30 closets in the hospital, at a cost of $1,500, and enlarging the ice plant, $5,500, are reported as needed by the Branch authorities, but the Board of Managers approve only the last item.

The amount expended on repairs during the year is reported as $27,925.40. The most considerable repairs upon one structure were made upon the main building at an expense of $2,541.21.

Pension fund.

The treasurer paid out during the year on account of pensions $475,463.36, and had a balance of $29,376.70 due the pensioners at the close of the year. The average paid each pensioner during the last quarter was $34.04. On June 30, 1896, there were 3,640 pensioners on the rolls at this Branch against 3,168 a year previous. The exact number of these pensioners present at the Home at that time is reported not known. Thirty-one of the pensioners were reported absent over one year. At the close of the year there were 275 pensioners on the rolls who had balances to their credit, of whom 2 had over $1,000 each; 6 between $500 and $1,000 each; 41 between $100 and $500 each, and 226 less than $100 each. The addresses of 56 pensioners who had a total of $2,916.38 to their credit were not known, and 12 pensioners, with a total amount of $1,257.63 to their credit, had been transferred to an insane asylum.

At date of inspection, October 2, 1896, the treasurer had a balance of $27,706.35 pertaining to this fund, all on deposit.

Post fund.

The receipts from sales during the year at the Home store, hotel and restaurant, and beer hall were $60,755.09 and the expenditures for stock $28,709.29. The assets at the beginning of the year were $28,074.97 cash and $6,033.56 merchandise, and at the close, $9,110.34 cash and $6,968.26 merchandise.

At date of inspection, September 30, 1896, the balance to the credit of this fund was $13,315.36.

From this statement it appears that all the profits on sales, $32.980.50, and $18,029.93 of the assets at the beginning of the year were expended.

The cost of laying a sewer and the placing of electric lamps and fixtures in the new barracks was charged to this fund; also the labor and material in extension of the hospital kitchen, heating and ventilating the kitchen, and alterations in the hospital pavilion, and other work connected with the new barracks and guardhouse, including $1,200 for six months' services of a superintendent of construction and $352.61 for his traveling expenses, and all the cost of procuring currency from a local bank on Norfolk checks for the payment of pensions.

The post-fund buildings are reported convenient and suited to their purpose, and, with the exception of the theater, were constructed for their present uses. The theater building was originally intended for

use as a mess hall and general kitchen on the first floor, with a theater on the second, but, a new mess hall and general kitchen being subsequently provided, the building was changed so that the theater now occupies the main section from the ground up and the remainder is occupied as a store in the one part and smoking room in the other. The other buildings pertaining to the post fund, namely, beer hall, chapel, greenhouse, pavilion, restaurant, and social hall, are used for the purposes indicated by their names, except the pavilion, which is used as a meeting place for the Grand Army of the Republic and other societies, and the social hall, which is used as a club room by the Keeley League.

At the beer hall the Milwaukee checks are used, but the system is not so closely supervised.

At the store no check is kept. The storekeeper keeps an account of his sales, but no comparison is made with cash turned in.

Purchases. All staple articles regularly used are reported as obtained by contract awarded after due advertisement inviting proposals for three, six, or twelve months' supplies. In general, supplies of a perishable nature, or those subject to frequent change of price, mainly groceries, are reported as obtained under contracts for three months; subsistence stores of a less perishable character are obtained under contract for six months; and manufacturing or construction material is included in the twelve months' contracts. Green fruits, vegetables, articles of special manufacture, and such supplies as are infrequently required, are purchased in open market in quantities not exceeding $100, and generally after personal or written inquiry as to price, etc., from two or more dealers or producers. The principal articles of food for the last quarter of the year were purchased in the following places: Flour, Fort Wayne, Ind.; fresh beef, corned beef, and bacon, Norfolk; coffee, Richmond; mackerel, sirup, and sugar, New York City; salt pork and ham, Washington; tea, New York City and Washington; potatoes, navy beans, and cheese, Hampton, Va.; fresh fish, Phœbus, Va.; codfish, Boston; lima beans and oleomargarine, Baltimore.

Employees. The average number of persons reported employed under the general fund during the year was 5 officers, 18 non-commissioned officers, 428 members, and 57 civilians, which is the same as the number reported authorized. Their daily pay is given as follows:

	Maximum.	Minimum.	Average.
Officers	$7.673	$3.333	$5.625
Non-commissioned officers	1.667	.500	.667
Members	2	.167	.276
Civilians	4.167	.333	.801

An average of 70 men per day worked during the year as waiters without pay, but not as a penalty.

ADMINISTRATION.

Population. The average number of officers and members reported present during the year in the official statement furnished in connection with the inspection was 3,084, which is an increase of 84 over the number reported for the preceding year; and an average of 1,129 was constantly absent. In a previous

statement the average present was given as 3,131, and this figure appeared subsequently in the report of the Board of Managers. Discrepancies and lack of promptness in the data furnished for the inspection add much to its difficulties.

At the date of inspection, 3,400 officers and members, including 56 temporary members were present at the Home, which with the civilian employees and women and children make a total population of 3,465 persons. The number of vacant beds at date of inspection was 5 in barracks and 10 in hospital.

Discipline.

The reports show a considerable increase in the number of trials during the past year as compared with those of the preceding year. Of the average (3,131) present it is reported 1,405 members, or nearly 45 per cent, were tried for offenses against the rules and regulations of the Home. Of this number 262 were reported tried twice and 406 more than twice during the year. Last year these figures were but 31 and 54, respectively. Nearly one-half of all trials were for drunkenness and over one-fourth for absence without leave and fence jumping. Only those on whom sentence is passed are entered on the offender's docket. The penalties attached include restrictions to the camp and police duty in periods varying with the number and gravity of the offenses. Incorrigible cases are dishonorably discharged. Discipline is enforced by the company officers, the janitors in charge of public buildings, and the Home guard, and drunken or disorderly persons, whether members or civilians, are at once arrested and confined or brought before the commandant. A police corporal and guard are stationed at each gate, and on the pier where all boats are required to land, with instructions to let no members out without a pass, and to arrest all returning under the influence of liquor; also to search for liquor and prevent intoxicated civilians and disorderly characters from entering the grounds.

The pass privileges seem consistent with a good and reasonable discipline. All members upon admission are allowed daily passes, good from 9 a. m. to 6 p. m. After six months' good conduct they are entitled to weekly passes, good from 7 a. m. to 7 p. m. (except Sundays), and renewable weekly until violated. After one year's clear record they are given a red card, good from 6 a. m. to 9 p. m. (except Sundays), until revoked for misconduct. Violation of the rules forfeits pass privileges according to the extent of the offense.

A small expenditure would improve the facility for filing papers in the vault attached to the governor's office.

Amusements.

Facilities for amusements comprise theatrical performances, lectures, library, concerts, base ball, boating, billiards, pool, cards, and other games. Among the amusement rooms are a billiard and pool room, a smoking and card room, a social hall for the Temperance League, and a reading room. The room where chess, checkers, etc., are made a specialty seems unique in its success and the quiet pleasure and pastime it affords. Base ball and theatrical performances seem best liked by the members, but each amusement room is reported thronged from opening to closing hours.

The library was in good condition and seems satisfactorily conducted. During the year the library received 258 volumes by donation and 3 by purchase, and at the close of the year it contained 10,363 volumes. Books taken from the library must be returned in good condition within two weeks. Books of fiction are reported in greatest demand, and it seems that an average of nearly 17 books was read by each member during the past year.

The band was maintained during the entire year with an average membership of 25 musicans, 22 of whom are civilians. The leader of the band is a member of the Home. The cost of maintenance for the year, including subsistence and other allowances of civilians, averaged about $295.79 per musician. The band practices two or three times per week, and there are no charges for admission to concerts. The civilian musicians are quartered in 6 small, one-room cottages, and receive the same allowances as members of the Home.

The theater at this Branch has a seating capacity of 1,400, and was in good condition. The building is principally used for theatrical performances, minstrelsy, lectures, and concerts, though encampments of the G. A. R., celebrations of anniversaries by soldier organizations, Sunday-school exhibitions, and other public meetings are also held there. There were 17 paid performances given during the year at an expense of $4,550; and 32 free performances at an expense of $5,152.15. The charges of admission are 25 cents for reserved seats in parquet, 10 cents for balcony, and 5 cents for gallery for members; others have to pay $1 for reserved seats, and 75, 50, and 25 cents for general admission, according to location of seats. The revenues from this source for the past year were $3,410.41. Performances usually draw a full house.

The billiard hall is annexed to the theater, and was in good condition. It contains 3 billiard tables and 1 pool table; and there is another pool table in the Keeley Social Hall. There are no charges for these games, and the tables are in use daily from 8 a. m. to 8 p. m., except Sundays. One large room adjoining the theater is used as a card and smoking room. There are 24 card tables, 7 checker tables, and 3 chess tables, and facilities are reported ample for all who desire to play these games. There are also 4 boats belonging to the Home, which may be used free of charge by members, and about 40 boats belonging to the members individually.

Keeley Club.

This club has a membership of 94 and holds its meetings in the social hall, weekly in winter and semi-monthly in summer. No gain in membership is reported for the year, as there has not been a doctor employed since June 30, 1895. The loss was 65 by relapse. The cost of taking the treatment is reported as $22.30. The club receipts for the year were $165.72; and the expenses $144, for the services of janitor; and there was a balance on hand at the close of the year of $197.27. The treasurer has charge of the funds, and keeps the accounts separate and distinct from other funds.

In addition to the Keeley League, there are 5 Grand Army posts, 1 Union Veteran Legion, 1 Union Veteran Union, and Ex-prisoners of War Society at this Branch, with a total membership of slightly over 600. There is a large inclosed pavilion at the Home, with a capacity of about 200, which is used by these military organizations and fitted up for their especial use. In season it is also used by excursion parties for dancing and other purposes, for which a fee of $3 is charged. These societies are said to have a good effect upon discipline and promote good order.

Religious services.

Divine services are held in the Home chapel, which has a capacity of 500. There are two chaplains, a Baptist, who occasionally exchanges pulpits with other denominations, and a Catholic. The former lives at the Home and receives a compensation of $100 per month, and the latter receives $41.67 per month, but resides outside of the reservation. The Protestant chaplain held 517 services during the year and officiated at 127

funerals, and the Catholic held 355 services and officiated at 56 funerals; and both made daily visits to the sick. The congregations are large, and the chapel at times filled to its utmost capacity.

Farm. The farm contains about 80 acres under cultivation, and comprises the following frame buildings: Mess house and quarters for foreman; sleeping quarters for employees; tool house; barn (capacity for 60 cows); shed for carts, wagons, and farm implements; shed for mules; piggery for brood sows, and butcher shop.

The quarters for employees, cow barn, and butcher shop were built by the Home and are in good condition. The other buildings are reported in poor condition, except the quarters of foreman and piggery, which are fair.

The transportation of the Home consists of 26 wagons, carts, trucks, etc., and 6 vehicles classed as carriages, 8 horses, and 13 mules. Besides these, there are 29 cows, 2 bulls, 12 heifers or calves, and 93 pigs owned by the Home, and stabling is furnished for 13 private carriages, 10 private horses, and 1 cow.

The farm stock on hand June 30, 1896, was valued at $2,975.

Considerable loss was sustained during the year by an epidemic of hog cholera, which carried off 2 boars, 26 brood sows, and 142 hogs and pigs.

The appropriation for the farm was $13,000, and the value of the farm to the Home for the year was reported to be—

Vegetables	$685.64
Milk	4,530.96
Beef, pork, etc	2,611.87
Total to commissary	7,828.47
Teaming	3,301.25
Fed to stock	2,555.00
Sales	472.15
Total	14,156.87

Milk is credited to the farm at the rate of 17⅔ cents per gallon, which is said to be less than milk can be bought for in quantity at the nearest town. Why can not the milk required for the restaurant be purchased under the same contract as for the Home mess, instead of paying 25 cents per gallon?

The appearance of the cows seemed inferior, which was said to be usual in this section.

Last year milk was charged at 21¾ cents per gallon.

The yield of the farm products is reported small. Some goes to the hospital and some is sold to the officers and others, but none of the garden truck goes to the general mess.

SUPPLY DEPARTMENTS.

Buildings. Eighteen buildings are used as barracks, not including the bakery, repair shop, and engine house, which are used in part as dormitories. Three of the barracks, the main building, and companies I and K have basements, and the convalescent company and company I have attics, which are all used as dormitories, the basements by 124 men and the attics by 139 men. The attics are not lined or plastered inside and during the heated term or the cold winter months the men often suffer from extreme temperatures. The basements seem no better and their poor ventilation

frequently renders the air foul, stifling, and unhealthy. Thirteen of the barracks were originally constructed as such, one was a female seminary, one a hospital (which might wisely be replaced by a modern and healthful structure), one a boiler house and kitchen, one a guard-house, and one was a private residence, built prior to the late war. They are all heated by steam, except the repair shop and engine house by stoves; and fifteen are lit by gas, including the bakery, three by electricity, including the two new barracks erected during the year, and one, which was formerly a private residence, by gas and candles. The repair shop and engine house still use oil. Some of these buildings are old and their sanitary condition and ventilation are reported poor, though they were generally in good police. All, except company H, are provided with bath tubs, hoppers, and urinals, but there is a latrine for general use of twenty-four hoppers and urinals.

No record has been kept of amount expended on each building.

Bedsteads and bedding.

The bedsteads in use are iron, 6 feet 6 inches long and 2 feet 6 inches wide, with woven wire mattress. The hospital bed is 6 inches wider. The mattress in use in barracks is said to weigh about 17 pounds, and in hospital, 26 pounds. The average supply of bedding per man consists of 1 cotton mattress, 3 blankets, 1 pillow, 2 sheets, 2 pillowcases, and 1 counterpane. Bedding is aired when necessary, and sheets and pillowcases sent to the laundry weekly. The locker in use is plain wood, painted, 2½ feet high, 2 feet wide, and 1 foot deep, and is hinged with a door, and has two shelves. Beds, bedding, and lockers were reported in good condition.

Supplies.

There is no regular storehouse for quartermaster stores, the lower floor of one of the frame barrack buildings and the cellars under the Home store and of barracks of I, K, and L companies being used for the purpose. These storage places are in different parts of the Home grounds, which scatters the property and makes it inconvenient in issuing and properly caring for same.

The subsistence stores are in a brick storehouse used exclusively for that purpose, and the medical supplies are stored in the basement of the hospital.

Inventories are reported as taken annually of quartermaster stores and monthly of commissary stores. Furniture and other property of the Home is not all marked, but taken up as public property. Unserviceable property is disposed of as directed by the inspector-general of the Home on inventory and inspection reports.

Clothing.

Circular order, dated Hartford, Conn., April 30, 1883, governs the system of accountability, allowance, exchange, etc., of clothing. Articles that are good and considered serviceable after the expiration of the term fixed in the allowance table are not exchanged, but must be retained in use by the members to whom they were issued until worn out. Cast-off clothing is sold to the highest bidder for the fiscal year after due advertisement. The receipts from this source for the year were $952.73 for old clothing and $121.14 for old blankets. Cotton and linen articles are used for cleaning purposes, there being no other means to obtain material for this use, and wool shirts are used as mop rags.

The company commanders present an inventory on June 30 of the clothing on hand, but no use appears to be made of these inventories, nor is there any record kept of clothing taken from the Home and not returned. The methods in use will not permit of the readiest verification of the clothing account. The dress coats of the present issue

received at this Home do not seem of as good quality or of the same color as those last received; and shoes received from the manufactory appeared of inferior quality and finish to the sample sent.

Laundry.

Company bed linen and clothing is sent to the laundry on Saturdays, and hospital clothing on Mondays. Members, however, take their own clothing to the laundry properly marked with a laundry number, and are ordinarily allowed three pieces a week, though no objection is made if they have occasionally washed more. The following is the average number of pieces of each kind of clothing reported laundered per month: 955 aprons, 313 blankets, 162 blouses, 381 counterpanes, 7,865 pairs drawers, 52 handkerchiefs, 13 pairs overalls, 13,561 pillow cases, 13,447 sheets, 9,277 shirts, 1,535 pairs socks, 79 tablecloths, 173 hand towels, 3,207 roller towels, 304 pairs trousers, 74 dress coats, 47 vests, 504 waiters' jackets, 73 pieces canvas, and 72 mattress covers.

There were 17 men employed in the laundry, and the amount expended during the year for laundry work done at the Home was $1,716, and for work done outside $109.14.

No blanks are used to show the quantity received from each company. When men use their own underwear it is washed for them.

Engineer department.

The chief engineer has been on duty at the Home over ten years, and has charge of all machinery pertaining to steam, water, gas, and other works. The engineer shop, in the basement of Company K barracks, does not seem suitably located; it is so dark that lamps are used most of the time. Thirty-five men are employed under the chief engineer as assistant engineers, steam fitters, mason, janitors, boiler cleaner, plumber, firemen, coal passers, and laborers. During the winter months there is an increase of 5 firemen and 1 coal passer.

The system of drainage, sewerage, and water supply is under process of improvement and reported in good condition. Water is obtained from the Newport News Water Company.

Fire department.

The fire apparatus is reported adequate and in good condition, and tested once in three months. The fire company consists of 16 men, who respond at once to the alarm, and are able to throw a stream of water on a fire in from three to ten minutes, according to the location. There was no fire during the year, and the last reported occurred April 13, 1884, when the stable burned down.

Dining hall and kitchen.

These were in good condition, neatly kept, and a success. Facilities for cooking and serving meals are reported ample, though tables have to be set twice for each meal, and a few tables frequently a third time. There are 22 tables, each seating 56 persons. Thirty-three men are permanently employed in the kitchen and 29 in the dining hall, and 53 are temporarily detailed in addition as helpers to the regular waiters. Details are made weekly, and no one is exempted from this duty except the noncommissioned staff and those excused by the surgeon. Pensioners physically disqualified must furnish a substitute. Substitutes are paid $2 direct by the detailed man. The average tour of this service is about once per annum and refers only to members who take their meals in the main dining room.

Swill and garbage are fed to the hogs, and what remains is sold when a purchaser can be found; otherwise it is used as fertilizer on the farm. During the past year 1,738 barrels were sold at 30 cents per barrel of 30 gallons each, yielding a revenue of $521.40.

The amount of crockery reported in daily use consists of 1,729 bowls, 618 vegetable dishes, 557 meat platters, 379 butter plates, 589 cheese plates, 348 bread plates, 3,422 dinner plates, 2,355 soup plates, 308 water pitchers, 235 molasses pitchers, 174 cups, and 371 saucers. The per cent of breakage reported ranges from less than 1 for soup plates to 81 for bowls. Breakage is said to be due principally to the quality of the material and improper nesting.

Five members of this Branch receive outdoor relief in subsistence at an average cost of $6.19 each per month.

The food seemed properly cooked and of good quality and ample.

Each officer may purchase commissaries worth the amount advanced by him, but must settle his account and buy its full value before the end of the month. This seems to be reasonable, and accords with the practice in the Army, except that no advances are there required nor percentage added. Members may not purchase from time to time from the commissary to the amount advanced by them, as the officers do, but must take out the full amount of their credit at once, except only the amount of beef paid for.

The clerical work in this department could possibly be much reduced if the sales of commissary supplies were reported on an abstract instead of on individual vouchers. It is understood the Treasury Department would as readily accept such abstract from the National Homes as it does now from the Army.

The commissary-sergeant makes up the requisition for the general mess, and for the hospital mess the matron and sergeant send a pass book, with note of such articles as they may want, to the commissary-sergeant, who adds or strikes out as he may have articles on hand. He then fills the blanks, and, after the requisitions have been filled, sends them to the officers for signature.

Shop accounts.

A new system of shop accounts was in use from July 1, 1896. Under this system the shop is charged with the amount paid for the service, but it is credited with an assumed market rate of the value of such service. In the carpenter shop, for instance, it may be the service paid is about 41⅔ cents per day, though it is valued at from $1.06 to $1.67 per day. Perhaps each shop will show a profit, on paper, to its credit at the close of the year. The labor expended in keeping these books appears more evident than the advantage of the system.

MEDICAL DEPARTMENT.

The hospital consists of a main building and a double annex containing four wards, and has a capacity for about 400 patients, though the overcrowding of the Home has compelled the department to receive and care for over 500 patients. The convalescents are quartered in a series of buildings termed the "convalescent company," which are old and might well be remodeled. The hospital attics are used as regular wards, and the basement of the east wing as "unclean ward," and of the west wing as storeroom. The hospital was in a neat condition. Each ward has a bathroom containing one bath tub. There are about 40 patients to each bath tub, and they are required to bathe once weekly. Ventilation is effected by air shafts and ventilators.

The average daily sick during the year has been 338 in hospital, 231 in convalescent company, and 233 at sick call. There were 542 patients admitted to the hospital during the year, and 256 to the convalescent company; and 382 were discharged from the hospital as cured, and 30 from the convalescent company. The total number of

patients reported treated during the year was 1,125, and each case was treated an average of seven days, which is very small as compared with some of the other Branches. The surgeon of the Home reports an epidemic of erysipelas during the year, and four cases of typhoid fever.

The death rate for the year was 49.9 per 1,000 of the average present and absent, and 41.68 per 1,000 of the whole number cared for, and is less than reported for the previous year. Of the 207 deaths, 159 occurred in hospital, 1 in the convalescent company, 1 elsewhere on the reservation, and 46 outside of the Home. The causes assigned are 157 natural, 1 from violence, 3 from suicide, and 1 the result of accident. The average age at death is reported 62 years, against 66.25 the year before.

One hundred and fifty-four of the deceased members were buried at the Home cemetery. Members are buried in a shroud furnished by the hospital and underclothes taken from their effects, and, if they are taken away for burial, in a new suit of clothes furnished by the quartermaster's department. The coffin is made at the Home carpenter shop at a cost of $1.41.

There are 108 hospital employees, of whom 91 are members and 17 civilians. The former serve as hospital steward, ward masters, nurses, waiters, scrubbers, and general laborers, and the latter as surgeons, female nurses, and druggist. The ratio of these employees to the total number of patients treated is as 1 to about 10.4 and to the average daily sick as one to about 7.4.

Medicines are obtained from the quartermaster's department by requisition, and issued to patients on the surgeons' prescriptions. There are 457 different drugs and preparations reported in use, of which 343 were bought during the year at a cost of $3,904.72. The stock of medicines in the quartermaster's hands was small, while that in the hands of the surgeon seemed large. Whisky is issued by the gallon once a week; 79 gallons were issued during the three months ending September 30, 1896; of brandy, 4 gallons were issued during the same period, and 15 gallons of sherry wine in two months. All liniments, tinctures, ointments, and sirups are made by the druggist, who keeps a record of medicines on hand, and states he takes an inventory every 15 days and puts up about 2,800 prescriptions per month.

There seemed to be no record of hospital property kept, and the storeroom where property not in use is kept will probably be in better police as the hospital steward becomes acquainted with his duties. The records of the hospital do not show the usual care and attention given them. Some members in the hospital hire from among the convalescents nurses for their personal use and pay them at the rate of $4 per month. Some of the blind have such nurses.

Facilities for the proper care of the insane are inadequate, and an isolated building for their exclusive occupancy seems needed. They are now placed in a basement ward and guarded and cared for by attendants and nurses. There are also 3 cells for close confinement, and 2 strait-jackets, but no padded cells. There were 45 members reported permanently insane during the year, and about 27 temporarily, and 15 were sent to the insane asylum, including 4 returned. During the previous year 3 were transferred there, and 4 are reported as the average number sent annually to the asylum.

Thirteen members at this Branch are reported totally blind, and 25 have impaired eyesight so as to be unable to read. Six have to be led around. The blind are quartered in the annex connected with the hospital by a covered way.

No. 8.—Report of a Medical Inspection of the Southern Branch, made by Col. D. Bache.

Washington, D. C., *November 5, 1896.*

Sir: I have the honor to report that under the letter of instructions of the Secretary of War, October 15, 1896, I reached the Southern Branch of the National Home for Disabled Volunteer Soldiers, near Hampton, Va., on the morning of October 28, and proceeded at once to the medical inspection outlined in your letter of October 19. This investigation, together with special inquiries arising in its course, occupied the greater part of five days, terminating November 1.

The barracks, adjuncts, tents, mess hall, kitchen, bakery, laundry, places of recreation, hospital, detached latrines, and sewage pumping stations were visited, and every facility for inquiry was afforded me by the governor of the Home, who accompanied me throughout, except in the inspection of the hospital. The companies were present in their quarters, so that their personal appearance could be observed; and finally I joined the governor in his inspection of the command upon Sunday morning.

Before entering into details it is proper to say here that I was strongly impressed with the unquestionable order and comfort of this large aggregation of complex invalid life, for which successful result unusual organizing and administrative ability, with continued diligence, was and is required.

As is already known to you, the most serious and pressing difficulty under which this Home labors is the intense overcrowding. Were the barracks all suitable in original provision and equipment, still the numerical excess of at least 20 per cent over any proper occupancy would be a severe and unreasonable test, so that when this rising overflow has filled the attics and basements of well or poorly designed buildings, and occupied many structures not originally intended for any such purpose, the density of some of the local populations makes a startling appeal.

Under these conditions of pressure it is perfectly useless and immaterial to cite figures of floor area and cubic air space, because no two buildings, nor the same building in its divisions, will give the same figures of allowance, and for the added reason that in the great majority of instances no correct ventilation has ever been attempted. So, too, as to any record of the allowance per capita of bath tubs, hoppers, and urinals.

Between an air space of 320 and 1,078 cubic feet per man there are a score of variations, and the allowance of bath tubs fluctuates between a maximum of 1 to 29 men (29 men in the new barrack of Company N) and a minimum of 1 to 189 men in Company E; of hoppers between 1 to every 14½ men in Company N, and to 112 occupants in Company I.

Passing beyond a criticism of widely unequal parts, it seems sufficient to state that the best hygienic conditions unquestionably exist in the two new frame barracks occupied by companies M and N, and that these barracks also represent in most respects the type of the most suitable as well as the most economical barrack construction for any contemplated additions. They will give the best results for estimated occupancy, and will suffer less in bearing any burden of general overcrowding.

As might be expected under the less favorable conditions cited in buildings hastily adapted to a dense occupancy, and with insufficient means for correction and repair, I found many utterly unsuitable and

unsanitary bath tubs, water-closets, and urinals; as to which appliances under faulty conditions it may be said that the wiser method is to separate them from the dwelling altogether. All such plumbing, unless of suitable material, well done and well kept, is soon offensive and rapidly unwholesome. Much has been done in the construction of the out-of-door latrines, to relieve the indoor demand for such facilities, but these can not be safely multiplied for an infirm and inactive population requiring the least possible exposure and exertion.

Were it not for this latter consideration I would advocate without hesitation, not for the latrines, which must be reasonably dispersed, but for the bathing, a central bath house for the Home. In this the stall rain bath of hot and cold water should be the prominent feature and constitute the principal means of ablution, a swimming pool being added if practicable. The bath tub should be subordinated, and but a very small number would be required, for selected and designated cases.

I am, however, inclined to think, under all the conditions presented or likely to develop, that such a central bath house, to which a large percentage of the Home members might be sent with regularity, supplemented by one or two bath tubs attached to each company barrack for the use of such cases as might be assigned by the medical officer, would satisfy the demands of a most difficult problem. The advantages of the central over the dispersed methods, even when the latter is ordinarily sufficient, are gains in regularity, in order, in cleanliness, and generally those of unified control.

The two sewage pumps, the second of which is under construction, should deal safely with all the liquid waste of the institution.

The messing arrangements appeared admirable, and the meal which I inspected was well prepared, of good quality, and ample. The bread was notably good. The inadequate size of the mess hall is already known to you, and any expansion a subject of convenience, the only sanitary reference ensuing from the exposure of the men waiting for the second and third sittings.

The men inspected in the barracks, as well as in review, were clean, and their clothing and bedding neat and in order.

THE HOSPITAL.

This building, a large and well-planned structure of brick, has a normal ward capacity of about 145 beds, with an actual ward occupancy of 195 beds. Besides these, there are in the ward attics 84 beds, and in the general basement 46 beds, a total in hospital of 325 patients. The excess of occupancy over allowance is therefore 180.

To the hospital two separate frame pavilions of one story and attic each are attached as an annex. The wards in this occupy both floors, and have in them 165 patients. The excess of occupancy, even were the propriety of using the attics unquestioned, is 91 beds. The total excess in the entire hospital is therefore 271 patients.

Here again, with double the number of inmates which the hospital should serve, the cleanliness, order, and comfort were most creditable to the management.

The hospital staff consists of 1 surgeon, who is the chief medical officer of the Home; 1 principal, and 3 other assistants. The service is performed by 1 matron; 13 female nurses, of whom four are trained; 1 steward, 1 clerk, 1 pharmacist, 2 assistants, and 97 members of the Home selected for the purpose. The number of cooks is 11, included in the quota of members, which also includes 2 laundrymen. Five other members of the Home are independently employed by patients.

So far as I could observe, the treatment of the sick was well ordered and judicious, their own appearance, and that of all bedding, clothing, and appliances, satisfactory. The diet, and special diet under observation, was liberal and carefully prepared.

The brick hospital proper is heated by steam, direct indirect; but the special system of ward ventilation designed, by aspiration through circular protected openings under alternate beds, has long been in disuse and the various ducts neglected. I found that the air of the occupied basement passed readily through the opened cold-air boxes into the ward above at the position of the radiators. Whether this system of ventilation proved inefficient or was abandoned without sufficient cause I am unable to determine, but unless it is restored the floor openings should be sealed, and the cold-air ducts secured against the existing very obvious evil. It should not be difficult in the mild climate of this Home to ventilate any building without undue chill to the inmates.

The number of patients treated in the hospital during the fiscal year ending June 30, 1896, was 567, the deaths numbering 163. The ratio of death should be calculated from its relation to the whole number of the members of the Home, its average strength, and not as among the hospital admissions alone. The chief causes of death were consumption, valvular disease of the heart, paresis, interstitial nephritis or Bright's disease, and pneumonia. Alcoholism is assigned as the cause of much gastric disease, and an important factor throughout. There was a small outbreak of erysipelas, but infection is not as pronounced as might be inferred from the overcrowding, and its absence is creditable to the medical management.

Of the 490 beds in hospital 26 were vacant November 4.

These simple figures represent an immense mass of the most interesting pathological material, of which systematic scientific use should be made. This now depends not upon organization, but upon individual and fragmentary industry.

The number of water-closets in the hospital is 31, of bath tubs 17, and of urinals 12; an allowance sufficient for the proper occupancy but insufficient for the increase of patients. No addition to this allowance is wise and none is recommended.

RECORDS, SUPPLIES, ETC.

The registration of patients, as affording a continuous medical history of any individual, is, in my judgment, defective, inasmuch as it does not complete the record, nor by reference to other entries assist the search. The much simpler continuous record in use in the Army, suitably modified, would prove much more satisfactory and far less cumbersome. This outline record should be expanded by a medical history contributed by case books, charts, and minutes of autopsy, records not systematically kept at this Home, and not dependent upon the individual interest and industry of the house surgeons.

The medical supplies are obtained in the same general manner as the supplies of other departments, through approved requisitions upon the treasurer; and there is an indefinite table of such supply included in the general consolidated lists. This table needs severe revision in the interest of precision of supply, correct nomenclature and classification, and economy of use. These will be best attained by a table of supply modeled upon that of the Army, and like that table supplemented by rules for requisitions and proper property disposal. By these means, and independent of the varying judgment of a chief medical officer, a hospital would be fully supplied, not only with the ordinary

remedies and stores, but with dressings, instruments, and appliances for sincere and advanced medical work. This provision should include a chemical and bacteriological set in rooms fitted for such work and a suitable operating room fully equipped. What is now left to individual and desultory effort, with varying result, would be advanced to systematic treatment, with a resulting gain in efficiency and economy of administration. It is easy to appreciate the advance upon well-directed lines of sustained effort.

SURGEON'S CALL.

The number attending sick call at the time of inspection was about one hundred, but, as might be anticipated, these figures are liable to much fluctuation and great increase. The room in which this important duty is performed is entirely unsuitable for the purpose, and the method of identifying the applicant for treatment, by cards intrusted to the individual, is loose and unsatisfactory. These cards must frequently be lost or mislaid and can serve no purpose of accurate record. There seems no reason why the company sick book should not be used, and the sick of each organization marched to the designated place by a non-commissioned officer. This would contribute to better control, and the record would be continuous and intelligible.

There is required for this military function a large, well-lighted, comfortable room, with adjoining space for a small dispensary and minor surgical operations. No attendance except upon those sick in quarters should be required of the medical officer in charge of surgeon's call, unless there is need of some minor assignment in the hospital.

THE CONVALESCENT COMPANY.

There seems no need for this separate organization. It is simply an aggregation of the more permanently disabled and answers no practical purpose of filtration as between the quarters and the hospital. The members of this company are not convalescents in any special sense, and in my judgment they would be much better off if distributed among the regular companies than they are collected in a separate building, which is really one of the most objectionable at the Home. It is wiser for discipline and all administration to have a member, if slightly or temporarily disabled, in a barrack, under his company officers; or, if more seriously sick, in the hospital under the surgeon, than to establish any intermediate stage with a dual control, under any theory of differentiation of the sick.

RECOMMENDATIONS.

The most imperative sanitary need of this Home is new construction; for the barracks such additions as will house the estimated excess of twenty per cent, about 600 members, and for the hospital an addition to accommodate 100 beds. The most suitable barrack construction is represented by the frame buildings occupied by companies M and N; for these are not only of wiser sanitary design and appointment, but they promise, at a minimum cost of erection, a sufficient endurance for the probable active life of the Home—twenty-five years.

The construction of a central bathing establishment, upon some such lines as advised, will relieve the barracks of the extra burden of bathing now imposed, and new barrack plans might well consider the reduction of the number of bath tubs to a sufficient allotment for special cases.

I am also of the opinion that additions to the hospital accommodation should be of the same inexpensive construction; but to include, besides the wards, suitable space for laboratory and operative work. To relieve the hospital of urgent pressure, such as the present reprehensible sick occupancy of dark and unsanitary basements, all insane members requiring constant care or restraint should be transferred to the Government Asylum for the Insane, and this separation should be maintained.

Again, as these Homes are to all intents and purposes large hospitals, of which the barracks are but the wards, and the hospital proper only a place of marked and final absorption, it is increasingly plain and of the greatest importance that the medical administration should be as exact and intelligent as can be attained. To this end it is essential that the chief medical officer should be selected for active administrative ability, for professional knowledge and practical value, and that none but young men of hospital experience and accredited attainments be assigned as assistants. Judging from a necessarily short observation I think that care has been used in the appointment of this latter class, and that the results are most creditable.

To attain the full value of the experience offered by this large congregation of men of advanced years and varied infirmities, to collect and codify rare and interesting data and results, the most precise records should be maintained, and but little should remain for individual choice and activity.

The method of hospital supply is now too indirect and the responsibility so distributed that accurate and intimate knowledge of what is required and what has been used does not rest in any one individual. Whether the present method of obtaining medical supplies is continued or not there should be a precise and well-considered table of supply prepared and strictly enforced.

Finally, and as a recommendation upon which all medical and sanitary suggestions converge, I advise most emphatically either that a competent medical associate be authorized by legislation upon the Board of Managers, through whom all sanitary and medical matters should proceed, and upon whom reliance could be placed for thorough medical inspection of all Home Branches or such equivalent association of medical control and advice with the Board as will secure a central and uniform medical administration. When this uninterrupted medical direction is assured, all medical and sanitary questions will be readily solved.

Very respectfully,

DALLAS BACHE,
Colonel, Assistant Surgeon-General, United States Army.

Brig. Gen. J. C. BRECKINRIDGE,
Inspector-General U. S. A., Washington, D. C.

No. 9.—GENERAL DEPOT.

This depot is located at the Central Branch, and is in charge of Mrs. E. L. Miller, as superintendent. The systematic order and neatness that everywhere prevailed was creditable, and the familiarity of the superintendent with all the details of the various shops and records evinced the personal interest and attention she gave to the performance of her duties.

At this depot is manufactured the uniform clothing, underwear, bedding, and blank forms for distribution to the several Branches of the

Home. It is located in one of the main buildings, well lighted, and occupying a floor space of nearly 41,000 square feet, divided into a tailor shop, knitting shop, suspender shop, underwear and bedding shop, printing office, bookbindery, and warerooms, while part of a cellar under one of the barrack buildings is used as a storeroom for the crockery yet on hand.

A force of 34 persons, consisting of the superintendent and 33 members of the Home, is reported as the daily average number of salaried employees—as clerks, foremen, laborers, packers, cutters, trimmers, suspender makers, and sewing-machine operators—to whom was paid during the year $7,874.55, at rates from $125 per month down to 30 cents per day. In addition to these, a number of persons are employed on piecework, the daily average reported as 71 members and 126 civilians; the civilians are mainly women of the families of old soldiers living in the vicinity of the Home. These are employed in the manufacture of uniform clothing, underwear, and bedding. The amount paid them during the year was $37,568.27. The amounts paid the civilians for making dress and great coats was $1 each; for blouses and vests, 50 cents each; for shirts, 25 cents; trousers, 35 cents; sheets, 3 cents; and pillowcases, 2 cents. To the members employed on uniform clothing the rates were from 10 to 30 per cent less.

The materials are purchased principally on contracts made by the general treasurer at Hartford, Conn., and the treasurer of the Central Branch, and all open-market purchases are made by the last-named officer, by whom all the actual disbursements are made from special remittances made to him from the general treasurer, in whose name the receipts are taken and in whose accounts the vouchers are filed as though made by him. The uniform rule in all other Government disbursements that requires the voucher to be connected directly with the check by which it is paid has been developed by long experience to be of the highest importance and such practice is clearly required by the Comptroller's circular of May 20, 1896.

The reports from the shop accounts show improvement and are more consistent in details. If the values of the different fabricated articles were based upon the actual cost of the materials used, and not upon the cost of the goods during a prior year, it would possibly lead to a clearer accounting and a statement of the actual value of the clothing on hand. The present method was doubtless adopted as the more simple.

From the reports submitted by the several branches it appears that—

The value at last report, July 1, 1895, of clothing on hand was	$75,460.72
Received during the year from depot	198,497.17
Received during the year from other places	40,952.69
Total	314,810.58
Clothing issued during the year	242,139.64
Leaving on hand June 30, 1896	72,670.94

Reports from the depot show as follows:

Clothing and bedding:		
On hand July 1, 1895	$123,942.41	
Fabricated during year	171,738.55	
Total	295,680.96	
Transferred during year	224,436.44	
On hand June 30, 1896		71,244.52
		143,915.46

Clothing and bedding material:		
On hand July 1, 1895	$30,619.63	
Purchased	118,125.52	
Total	148,745.15	
Expended and transferred	109,352.48	
On hand June 30, 1896		$39,392.67
Total value of clothing, bedding, and material on hand June 30, 1896		183,308.13

The clothing seemed to be substantially made and of good quality, though it was stated at some of the Branches that the quality of the dark-blue cloth used for blouses was not of as good quality as the former issue. The trousers seem to be cut on patterns suitable for younger men than those found at the Homes, and the tailors at nearly all the Branches stated that much of their work was the shortening the length of the leg, as the men, to get the proper girth, had to take sizes too long. A little longer over the hips would possibly add to the comfort of the wearers. If the blouses were not cut so low in the neck would it not give the men a more trim and soldierly appearance? and adding white collars and gloves to the authorized allowance, as is done in the Army, would encourage cleanliness in appearance. The only recreation possible to many of the old veterans is that of walking, so special attention is invited to their shoes. It should be possible to keep the Branches better supplied with a somewhat better class of shoes, and Regulars are now given barrack shoes also, which would be a very acceptable addition to the allowance of these veterans. Quite a variation was noted in the reported weight of the mattresses at the Branches, but it is understood that hereafter all mattresses will be made at this depot.

Under the law crockery and tableware are required to be shipped direct from the contractors to the Homes where needed. A balance of old stock, however, remained on hand at the depot when the law went into effect. This balance has been reduced $3,302.74 during the year, leaving $1,569.96 on hand June 30, 1896. The principal articles on hand are sirup pitchers, mustard pots, bedpans, table forks and spoons.

In the printing office three members are employed at an average monthly salary of $48.89, or $586.66 per annum.

There is so much variance between the report and the statements submitted with reference to the transactions of the printing office that it is thought best to make no reference to either, but attention is invited to the recommendation in last year's report, that the expense of this office be paid from one appropriation rather than distributed among the appropriations for the seven branches.

Statement of material on hand July 1, 1895, purchased and expended during the year and remaining on hand June 30, 1896.

Articles.	On hand July 1, 1895.		Purchased.		Expended and transferred.		On hand June 30, 1896.	
	Amt.	Value.	Amt.	Value.	Amt.	Value.	Amt.	Value.
Binding.....gross..	13	$9.10	29½	$22.67	42½	$31.17	.....	.....
Buckles, suspender, dozen gross	.....	.....	105	173.25	105	173.25	.....	.....
Buckles, vest.....gross..	10	1.00	100	8.98	106	9.62	4	$0.36
Buckram.....yards..	661	47.93	10,668[6]	714.81	10,270	691.73	1,059[6]	71.01
Buttons, coat.....gross..	93	344.10	75	277.50	168	621.60	.....	.....
Buttons, drawer, great gross	22	27.28	24	29.76	31½	39.06	14½	17.98
Buttons, fly.....gross..	139	5.22	660	18.98	725	22.07	74	2.13
Buttons, shirt, great gross..	27	8.33	.....	.....	7½	3.16	19½	5.17

Statement of material on hand July 1, 1895, etc.—Continued.

Articles.	On hand July 1, 1895.		Purchased.		Expended and transferred.		On hand June 30, 1896.	
	Amt.	Value.	Amt.	Value.	Amt.	Value.	Amt.	Value.
Buttons, suspender..gross..	200	$8.85	1,104	$36.80	1,252	$43.91	52	$1.74
Buttons, vest .....do....	126	233.10	100	185.00	127	234.25	99	183.15
Canvas, French.....yards..	1,320	119.34	6,000	508.20	2,783	243.26	4,537	384.28
Cloth, d. b., 20-oz.....do....	3,688	5,163.20	7,491[3]	9,214.40	7,002[6] 94[1]	9,234.54 121.58	4,082[4]	5,021.48
Cloth, d. b., 16-oz.....do....	4,579[3]	6,687.84	1,429[7]	1,672.94	5,547[7] 93[3]	7,794.62 135.60	368	430.56
Cloth, white.....do....	7[2]	24.50	10	33.80	14[4]	49.01	2[6]	9.29
Denim.....do....	.....	.....	4,177[4]	343.82	4,077[2]	335.57	100[2]	8.25
Drill, black.....do....	662[6]	39.83	2,552[2]	151.35	2,598[4]	154.62	616[4]	36.56
Drill, unbleached.....do....	4,652	227.48	45,000	2,182.49	38,729	1,882.63	10,873	527.34
Duck.....do....	59½	8.33	.....	.....	.....	.....	59½	8.33
Eyelets.....M..	10	2.20	70	15.40	60	13.20	20	4.40
Flannel, canton.....yards..	40,231[4]	2,869.48	75,000	5,902.50	64,723[4]	4,797.00	50,508	3,974.98
Flannel, coat lining..do....	5,138	1,231.58	18,024[6]	3,738.33	9,269[5]	2,088.47	13,893[1]	2,881.44
Flannel, domett.....do....	100	16.95	.....	.....	100	16.95	.....	.....
Flannel, d. b., 11½ oz..do....	7,894[4]	6,153.76	32,240[3]	23,617.92	25,215[1]	18,880.26	14,919[6]	10,891.42
Flannel, red.....do....	1,799[6]	467.75	3,042[2]	732.88	1,799[6]	467.75	3,042[2]	732.88
Interlining.....do....	2,164	35.17	8,064	128.22	5,792	92.85	4,436	70.54
Jeans, Kentucky.....do....	2,770[6]	204.20	32,004[2]	2,320.31	26,900[4]	1,953.60	7,874[4]	570.91
Kersey, s. b., 22 oz....do....	2,766[3]	2,988.93	38,837[7]	38,646.95	32,564[2] 10	32,867.08 9.70	9,030	8,759.10
Muslin, bleached.....do....	170	11.52	12,960	939.60	13,046	945.03	84	6.09
Rings, suspender...gross..	6	.93	210	32.55	208	32.24	8	1.24
Silesia.....yards..	1,432[4]	111.02	10,151[4]	601.98	10,020[6]	620.30	1,563[2]	92.70
Silk twist.....pounds..	18	76.14	60	256.80	48	204.54	30	128.40
Sheeting, ¼ cotton...yards..	4,636	276.77	8,165	498.07	4,636	276.77	8,165	498.07
Sheeting, ¼ cotton....do....	6,762[2]	829.72	14,990	1,972.68	6,762[2]	829.72	14,990	1,972.68
Sheeting, ¼ linen .....do....	.....	.....	25,295[4]	3,121.47	25,293[4] 2	3,121.22 .25	.....	.....
Sheeting, ½ linen .....do....	878[4]	193.27	50,215[4]	9,872.36	51,094	10,065.63	.....	.....
Shirting, ¼ cotton ....do....	10,206[6]	643.13	10,053	652.44	5,157[4]	325.54	15,102[2]	970.03
Straps, susp ....doz. pairs..	495	21.03	15,000	675.00	15,174	681.58	321	14.45
Tape.....dozen..	136	24.48	150	16.09	158	26.84	128	13.73
Thread, black cotton, O.N. T .....dozen..	183	73.32	2,300	841.80	1,990	734.69	493	180.43
Thread, white cotton, O.N. T .....dozen..	805	307.91	500	183.00	814	311.20	491	179.71
Thread, basting, cotton, dozen.....	38	15.20	250	99.68	181	72.21	107	42.67
Thread, linen.....dozen..	48	32.08	700	467.66	607	405.54	141	94.20
Thread, linen.....pounds..	107	118.80	125	131.88	112	124.08	120	126.60
Wadding.....dozen..	385	126.09	810	182.00	782	215.29	413	92.80
Webbing.....yards..	720	30.60	25,035[4]	1,032.70	24,993[4]	1,031.87	762	31.43
Wigan .....do....	1,013[6]	56.56	6,495[6]	361.81	4,449[2]	247.92	3,060[2]	170.45
Yarn, b. w .....pounds..	1,829	740.75	11,063	4,400.69	12,850 42	5,124.96 16.48	.....	.....
Yarn, w .....do....	12	4.86	2,809	1,108.60	2,353	929.77	468	183.69
Total	.....	30,619.63	.....	118,125.52	.....	109,352.48	.....	39,392.67

Statement of articles on hand July 1, 1895, transferred during the year, and remaining on hand June 30, 1896.

Articles.	On hand July 1, 1895.		Transferred.		On hand June 30, '96.	
	Amount.	Value.	Amount.	Value.	Amount.	Value.
Blankets, g. w.....number..	1,436	$5,706.66	1,436	$5,706.66	.....	.....
Blankets, w. w.....do....	1,406	5,180.24	201	812.04	1,205	$4,368.20
Bedsteads, barrack.....do....	54	174.96	50	162.00	4	12.96
Caps.....do....	994	459.72	292	135.05	702	324.67
Counterpanes, linen.....do....	206	155.42	206	155.42	.....	.....
Hats, black.....do....	15,912	17,662.32	8,041	8,925.51	7,871	8,736.81
Hats, drab.....do....	1,502	1,483.77	744	735.02	758	748.75
Mattresses, barrack.....do....	572	2,288.00	572	2,288.00	.....	.....
Pillows, cotton .....do....	5,356	6,052.28	1,930	2,180.90	3,426	3,871.38
Ponchos.....do....	57	85.50	.....	.....	57	85.50
Shirts, k. w.....do....	12,771	6,130.08	5,323	2,555.04	7,448	3,575.04
Shoes.....pairs..	2,627	3,468.42	494	652.22	2,133	2,816.20
Shoes, barrack .....do....	999	794.21	299	237.71	700	556.50
Slippers.....do....	2,368	1,289.14	960	522.62	1,408	766.52
Shoulder straps, captain.....do....	8	18.00	8	18.00	.....	.....
Shoulder straps, first lieutenant..do....	79	150.10	28	53.20	51	96.90
Total	.....	51,098.82	.....	25,139.39	.....	25,959.43

Statement of articles on hand July 1, 1895, fabricated and transferred during the year, and remaining on hand June 30, 1896.

Articles.	On hand July 1, 1895.		Fabricated.		Transferred.		On hand June 30, 1896.	
	Amt.	Value.	Amt.	Value.	Amt.	Value.	Amt.	Value.
Blouses.....number..	6,948	$15,271.01	16,302	$35,830.15	19,949	$43,845.89	3,301	$7,255.27
Coats, dress.....do....	3,134	13,160.61	4,535	19,043.81	7,084	29,747.83	585	2,456.59
Coats, great.....do....	1,344	6,422.44	336	1,605.61	1,528	7,301.71	248	1,185.09
Coats, great, in excess, number.....	.....	.....	96	458.75	.....	.....	.....	.....
Chevrons, corporal..pairs..	20	7.00	.....	.....	.....	.....	20	7.00
Chevrons, first sergeant, pairs.....	10	5.00	.....	.....	.....	.....	10	5.00
Chevrons, q. m. s....pairs..	3	1.80	.....	.....	.....	.....	3	1.80
Drawers, c. f.....do....	17,366	6,420.21	26 972	9,971.54	34,546	12,771.65	9,792	3,620.10
Drawers, r. f.....do....	984	924.27	283	265.83	492	462.14	775	727.96
Overalls.....do....	341	123.82	1,490	541.01	1,342	487.28	489	177.55
Pillowcases, cotton, number.....	3,638	569.35	5,240	820.05	5,000	782.49	3,878	606.91
Pillowcases, linen, number.	11,079	1,592.05	28,218	4,054.92	20,551	2,953.17	18,746	2,693.80
Sheets, cotton.....do....	1,787	648.14	2,623	951.36	3,150	1,142.50	1,260	457.00
Sheets, linen.....do....	4,564	2,677.24	20,172	11,832.90	17,625	10,338.83	7,111	4,171.31
Shirts, cotton.....do....	1,909	895.13	1,787	837.93	2,068	969.69	1,628	763.37
Shirts, d. f.....do....	1,229	822.32	34	22.75	514	343.91	749	501.16
Shirts, r. f.....do....	633	596.48	335	315.67	380	358.08	588	554.07
Socks.....doz. pairs..	2,462	4,666.89	5,263	9,972.32	5,874	11,130.04	1,852	3,509.17
Socks, stump.....do....	.....	.....	6	1.50	6	1.50	.....	.....
Stripes, captain.....pairs..	1	.40	158	63.20	158	63.20	1	.40
Suspenders.....do....	3,555	483.48	15,096	2,053.05	15,688	2,133.56	2,963	402.97
Trousers.....do....	5,613	11,161.45	25,784	51,271.47	25,764	51,231.70	5,653	11,240.99
Trousers in excess..do....	.....	.....	20	39.77	.....	.....	.....	.....
Vests.....number..	4,658	6,394.50	15,869	21,784.96	16,923	23,231.88	3,604	4,947.58
Total.....	.....	72,843.59	.....	171,738.55	.....	199,297.05	.....	45,285.09

Statement of amount and value of fabricated articles transferred to the several Branches National Home for Disabled Volunteer Soldiers for the fiscal year ending June 30, 1896.

Articles.	Central.		Northwestern.		Eastern.		Southern.	
	Amt.	Value.	Amt.	Value.	Amt.	Value.	Amt.	Value.
Blouses.....number..	5,025	$11,044.44	2,541	$5,584.86	2,400	$5,274.96	3,781	$8,310.26
Coats, dress.....do....	1,995	8,377.61	939	3,943.14	875	3,674.39	1,012	4,249.69
Coats, great.....do....	600	2,867,16	.....	.....	760	3,631.74	.....	.....
Drawers, canton flannel, pairs.....	8,375	3,096.24	4,461	1,649.22	4,800	1,774.56	5,920	2,188.63
Drawers, red flannel, pairs.	.....	.....	50	46.96	108	101.44	.....	.....
Overalls.....do....	350	127.09	225	81.70	200	72.63	.....	.....
Pillowcases, cotton, number.....	1,750	273.87	300	46.94	1,250	195.63	700	109.55
Pillowcases, linen, number.....	5,600	804.72	2,550	366.43	3,000	431.10	3,800	546.06
Sheets, cotton...number..	500	181.35	400	145.08	800	290.16	300	108.81
Sheets, linen.....do....	3,600	2,111.76	1,475	865.24	3,500	2,053.10	3,550	2,082.43
Shirts, cotton.....do....	450	211.01	.....	.....	104	48.76	602	282.28
Shirts, domett flannel, number.....	514	343.91	.....	.....	.....	.....	.....	.....
Shirts, red flannel, number.....	.....	.....	.....	.....	96	90.47	.....	.....
Socks.....dozen pairs..	1,463	2,772.09	843	1,597.31	829	1,570.79	886	1,678.79
Suspenders.....do....	3,500	476.00	2,050	278.80	2,300	312.80	2,832	385.15
Stripes.....do....	70	28.00	45	18.00	1	.40	.....	.....
Trousers.....do....	6,475	12,875.54	3,566	7,090.99	2,615	5,199.93	4,611	9,168.95
Vests.....number..	3,950	5,422.56	2,142	2,940.53	2,400	3,294.72	2,831	886.40
Total.....	.....	51,013.35	.....	24,655.20	.....	28,017.58	.....	32,997.00

Statement of amount and value of fabricated articles transferred to the several Branches National Home for Disabled Volunteer Soldiers, etc.—Continued.

Article.	Western.		Pacific.		Marion.		Total for all branches.	
	Amt.	Value.	Amt.	Value.	Amt.	Value.	Amt.	Value.
Blouses.....number..	2,200	$4,835.37	1,850	$4,066.12	1,802	$3,960.62	19,599	$43,076.63
Coats, dress.....do....	795	3,338.44	770	3,233.46	698	2,931.10	7,084	29,747.83
Coats, great.....do....	.....	.....	.....	.....	168	802.81	1,528	7,301.71
Drawers, c. f.....pairs..	4,000	1,478.80	3,945	1,458.46	3,045	1,125.74	34,546	12,771.70
Drawers, r. f.....do....	.....	.....	84	78.91	250	234.83	492	462.14
Overalls.....do....	175	63.54	150	54.46	242	87.86	1,342	487.28
Pillowcases, cotton...No..	300	46.95	400	62.60	300	46.95	5,000	782.52
Pillowcases, linen...do....	3,000	431.10	600	86.22	2,000	287.40	20,550	2,953.03
Sheets, cotton.....do....	200	72.54	600	217.62	350	126.94	3,150	1,142.50
Sheets, linen.....do....	2,500	1,466.50	700	410.62	2,300	1,349.18	17,625	10,338.83
Shirts, cotton.....do....	225	105.50	.....	.....	687	322.14	2,068	969.69
Shirts, d. f.....do....	.....	.....	.....	.....	.....	.....	514	343.91
Shirts, r. f.....do....	.....	.....	84	79.15	200	188.46	380	358.08
Socks.....dozen pairs..	840	1,591.62	441	835.61	572	1,083.83	5,874	11,130.04
Suspenders.....do....	1,900	258.40	1,150	156.40	1,956	266.01	15,688	2,133.56
Socks, stump.....do....	.....	.....	.....	.....	6	1.50	6	1.50
Stripes.....do....	20	8.00	22	8.80	.....	.....	158	63.20
Trousers.....do....	2,902	5,770.64	2,585	5,140.27	2,560	5,090.56	25,314	50,336.88
Vests.....number..	1,950	2,676.96	1,880	2,580.86	1,420	1,949.37	16,573	22,751.40
Total.....	.....	22,144.36	.....	18,469.56	.....	19,855.30	.....	197,152.35

Average quantity of goods used in the manufacture of each article of clothing, bedding, etc., for fiscal year ending June 30, 1896.

Article.	Amt.
Blouses:	
Flannel, d. b., 11½-ounce.....yards..	1.5467
Jeans, Kentucky.....do....	1.6501
Drill, unbleached.....do....	1.029
Wigan.....do....	.2729
Buttons, coat.....dozen..	⅓
Coats, dress:	
Cloth, d. b., 20-ounce.....yards..	1.5418
Flannel coat lining.....do....	1.8666
Drill, unbleached.....do....	1.563
Interlining.....do....	1.1045
Canvas, French.....do....	.5766
Wadding.....dozen..	.1089
Buttons, coat.....do....	½
Buttons, vest.....do....	⅓
Coats, great:	
Kersey, s. b.....yards..	2.1339
Flannel coat lining.....do....	2.3929
Drill, unbleached.....do....	1.75
Canvas, French.....do....	.5
Interlining.....do....	2.3304
Wadding.....dozen..	.125
Buttons, coat.....do....	⅛
Drawers, canton flannel:	
Flannel, canton.....yards..	2.3996
Buttons.....dozen..	1/6
Tape.....do....	.0058
Drawers, red flannel:	
Flannel, red.....yards..	2.911
Buttons.....dozen..	⅛
Tape.....do....	.0058
Overalls:	
Denim.....yards..	2.7362
Buckles.....dozen..	1/12
Buttons, fly.....do....	¼
Buttons, suspender.....do....	1/12
Pillowcases, cotton:	
Sheeting, ⅞.....yards..	.9135
Pillowcases, linen:	
Sheeting, ⅞.....do....	.91
Sheets, cotton:	
Sheeting, ⅞.....do....	2.5204
Sheets, linen:	
Sheeting, ⅞.....yards..	2.5138
Shirts, cotton:	
Shirting, ⅞.....do....	2.8858
Buttons.....dozen..	1/12
Shirts, domett flannel:	
Flannel.....yards..	2.9412
Buttons.....dozen..	7/12
Shirts, red flannel:	
Flannel.....yards..	2.911
Buttons.....dozen..	1/12
Socks (per pair):	
Yarn, b. w.....pounds..	.2035
Yarn, w. w.....do....	.0372
Socks, stump (per pair):	
Yarn, w. w.....do....	.5
Stripes (per pair):	
Cloth, white.....yards..	.1918
Suspenders:	
Binding.....gross..	.0028
Buckles.....dozen..	⅛
Eyelets.....do....	⅓
Rings.....do....	1/6
Straps.....dozen pair..	1
Webbing.....yards..	1.6556
Trousers:	
Kersey, s. b.....do....	1.2351
Drill, unbleached.....do....	.5557
Drill, black.....do....	.1008
Buttons, fly.....dozen..	¼
Buttons, suspender.....do....	1/12
Vests:	
Cloth, d. b., 16-ounce.....yards..	.3490
Buckram.....do....	.6472
Silesia.....do....	.6315
Muslin, bleached.....do....	.8221
Wadding.....dozen..	.0218
Buttons, vest.....do....	⅛
Buckles.....do....	1/12

Estimated cost of the material and of the fabrication of each article for fiscal year ending June 30, 1896.

Articles.	Material.	Cutting, making, etc.	Articles.	Material.	Cutting, making, etc.
Blouses	$1.3595	$0.5781	Shirts, cotton	$0.1866	$0.2734
Coats, dress	2.8512	.9466	Shirts, domett flannel	.5076	.2734
Coats, great	2.8431	.9320	Shirts, red flannel	.7664	.2734
Drawers, canton flannel	.1802	.1688	Socks ..... pairs	.0956	.0620
Drawers, red flannel	.7664	.2688	Socks, stump	.20	.05
Overalls	.2253	.1265	Stripes	.3102	.....
Pillowcases, cotton	.0575	.0319	Suspenders	.1305	.0160
Pillowcases, linen	.1144	.0319	Trousers	1.2870	.4356
Sheets, cotton	.3118	.0426	Vests	.6462	.5826
Sheets, linen	.4971	.0426			

Rates paid for each class of piecework, year ending June 30, 1896.

Articles.	To members.	To civilians.
Blouses	$0.35 each	$0.50 each.
Coats, dress	.75 each	1.00 each.
Coats, great	.75 each	1.00 each.
Drawers, canton flannel	.....	.15 each.
Drawers, red flannel	.....	.25 each.
Overalls	.....	1.25 dozen pairs.
Pillowcases, cotton	.....	.02 each.
Pillowcases, linen	.....	.02 each.
Sheets, cotton	.....	.03 each
Sheets, linen	.....	.03 each
Shirts, cotton	.....	.25 each
Shirts, domett flannel	.....	.25 each
Shirts, red flannel	.....	.25 each.
Socks	.60 dozen pairs	.....
Trousers	.30 each	.35 each.
Vests	.45 each	.50 each.

APPENDIX B.

TABLE 1.—*Roster of officers of the various Branches, National Home for Disabled Volunteer Soldiers.*

Branch.	Office.	Name.	Appointed.	Monthly salary.	Former service.
Eastern	Governor	L. Stephenson	Apr. 17, 1883	$229.167	
	Treasurer	A. L. Smith	Oct. 17, 1894	177.083	Quartermaster and commissary of subsistence, Eastern Branch, Oct. 1, 1889, to Oct. 17, 1894.
	Quartermaster and commissary of subsistence.	S. J. Gallagher	Dec. 24, 1894	137.50	
Northwestern	Governor	Cornelius Wheeler	Dec. 26, 1891	229.167	
	Treasurer	J. E. Armitage	Sept. 29, 1891	177.083	
	Quartermaster and commissary of subsistence.	W. W. Rowley	May 1, 1889	137.50	
	Surgeon	Almon Clarke	Apr. 1, 1895	166.667	
	Adjutant	Moses Harris	Jan. 6, 1893	75.00	
Pacific	Governor	J. G. Rowland	Aug. 8, 1894	229.167	
	Treasurer	F. K. Upham	Apr. 1, 1895	85.417	
	Surgeon	H. E. Hasse	Feb. 19, 1889	166.667	
Western	Governor	A. J. Smith	Apr. 7, 1885	229.167	Treasurer, Eastern Branch, Sept. 27, 1872, to Apr. 7, 1885.

TABLE 1.—*Roster of officers of the various Branches, etc.*—Continued.

Branch.	Office.	Name.	Appointed.	Monthly salary.	Former service.
Western	Treasurer	W. B. Shockley	Oct. 10, 1885	177.083	
	Quartermaster and commissary of subsistence.	D. C. Goodrich	Nov. 17, 1888	137.50	
	Surgeon	D. C. Jones	Oct. 21, 1893	200.00	
Marion	Governor	J. H. Chapman	Feb. 15, 1891	229.167	Adjutant, July 11, 1882, to Dec. 17, 1885; quarter, master and commissary of subsistence, Dec. 17, 1885, to June 1, 1890, at Central Branch.
	Treasurer	H. O. Heichert	Dec. 18, 1891	166.667	
	Surgeon	A. D. Kimball	May 21, 1890	166.667	
Central	Governor	J. B. Thomas	Nov. 17, 1888	275.00	Treasurer, Central Branch, Dec. 5, 1867, to Nov. 17, 1888.
	Treasurer	Milton McCoy	....do	220.833	
	Quartermaster	J. C. Michie	June 1, 1890	150.00	
	Commissary of subsistence.	J. S. Galbraith	Feb. 8, 1892	125.00	
	Adjutant	Carl Berlin	Dec. 17, 1885	125.00	Additional officer, Central Branch, Sept. 25, 1885, to Dec. 19, 1885.
	Inspector	J. W. Byron	Nov. 1, 1893	100.00	
	Surgeon	D. C. Huffman	May 11, 1893	200.00	
	Chaplain	Rev. E. Light	Aug. 1, 1893	125.00	
Southern	Governor	P. T. Woodfin	Mar. 31, 1874	229.167	Secretary, Eastern Branch, July 2, 1869, to Mar. 31, 1874.
	Treasurer	Wm. Thompson	Sept. 29, 1882	177.083	Steward, Central Branch, Dec. 4, 1872, to Jan. 18, 1882.
	Quartermaster and commissary of subsistence.	Chas. Candy	Jan. 1, 1888	137.50	
	Surgeon	E. L. Welling	June 26, 1896	200.00	
	Chaplain	Rev. W. Price	Feb. 1, 1893	100.00	

ALLOWANCES.

All commissioned officers are allowed furnished quarters, fuel, light, and, in addition, governors are allowed forage in kind for two horses. Treasurers, surgeons, quartermasters, commissaries of subsistence, chaplains, and adjutant-general are allowed forage for one horse.

All employees, members of the Home, are furnished with quarters, clothing, fuel, board, and washing.

Citizen employees, when permanently employed as assistant surgeons, internes, matrons, women nurses, and cooks are furnished with quarters, board, fuel, light, and laundry work.

Superintendents of repairs, chief engineers, and farm foremen are furnished with quarters.

Assistant engineers, firemen, electricians, farm hands, teamsters, musicians, blacksmiths, plumbers, gas fitters, chief bakers, and clerks are allowed quarters and rations. No commutation is permitted, and the ration is the same as supplied to the members of the Home.

TABLE 2.—*Statement showing population of Branch Homes.*

Branches.	Officers and members.						Net gain.	Admitted since June 30, 1895.
	June 30, 1895.			June 30, 1896.				
	Present.	Absent.	Total.	Present.	Absent.	Total.		
Eastern	1,726	628	2,354	1,744	722	2,466	112	102
Northwestern	2,165	446	2,611	2,345	424	2,769	158	104
Pacific	1,263	388	1,651	1,505	431	1,936	285	(1)
Western	2,165	874	3,039	2,318	893	3,211	172	113
Marion	1,237	404	1,641	1,368	490	1,858	217	243
Central	4,732	937	5,669	4,846	1,020	5,866	197	371
Southern	2,797	1,093	3,890	3,129	1,319	4,448	558	296
Total	16,085	4,770	20,855	17,255	5,299	22,554	1,699	1,229

Branches.	Average officers and members.							Total cared for during year.	Average age of members—	
	Present and absent during year.	Present during year.	Constantly absent during year.	Maximum present.	Date.	Minimum present.	Date.		To June 30, 1896.	Admitted since.
Eastern	2,394	1,855	539	1,995	1896. Mar. 10	1,710	1895. Oct. 3	3,033	61	60.67
Northwestern	2,695	2,313	382	2,436	Jan. 8 / Jan. 9	2,116	July 21 / July 22	3,406	61.9	57.49
Pacific	1,770	1,408	362	1,522	June 18	1,253	July 5	2,182	59.88	59.54
Western	3,124	2,340	784	2,531	Feb. 21	2,211	July 1	4,107	61.05	56.31
Marion	1,786	1,422	364	1,542	1895. Nov. 22	1,236	July 1	2,503	56	61
Central	5,767	4,982	785	5,162	Dec. 22	4,723	July 1	7,141	62+	67+
Southern	4,148	3,131	1,017	3,386	1896. June 16	2,792	July 3	4,966	59	60
Total	21,684	17,451	4,233	18,574	.....	16,041	.....	27,338	60.50	61.29

[1] Not reported.

TABLE 3.—*Census at date of inspection.*

Branches.	Officers.	Noncommissioned officers.	Members.	Transients or temporary members.	Civilian employees.		Members of families.			Total.			Aggregate.	Per cent of members absent to whole number present and absent.		
					Males.	Females.	Males.	Females.	Children.	Males.	Females.	Children.		1894.	1895.	1896.
Eastern	3	21	1,821	2	50	6	4	5	2	1,901	11	2	1,914	.196	.207	.225
Northwestern	6	21	2,259	58	42	1	1	31	27	2,387	32	27	2,446	.161	.141	.142
Pacific	3	16	1,549	17	19	6	1	8	8	1,605	14	8	1,627	.180	.181	.205
Western	5	21	2,306	44	38	7	4	19	11	2,418	26	11	2,455	.224	.223	.251
Marion	3	18	1,486	39	18	12	2	12	5	1,566	24	5	1,595	.202	.196	.204
Central	8	108	5,057	39	25	18	8	27	8	5,245	45	8	5,298	.135	.131	.136
Southern	5	25	3,314	56	29	19	....	9	8	3,429	28	8	3,465	.250	.244	.245
Total	33	230	17,792	255	221	69	20	111	69	18,551	180	69	18,800	.191	.185	.195

TABLE 4.—*Personnel reported at inspection.*

Branches.	Present in camp.			In line.				Not in line.				Per cent of present in line.	Absent from camp.					
													With leave.					
	Officers.	Members.	Total.	Officers.	Members.	Band.	Total.	Sick.	Extra duty.	Excused, etc.	Total.		10 days or less.	10 to 30 days.	1 to 12 months.	Over 1 year.	Without leave.	Total.
Eastern	3	1,842	1,845	3	[1]973	[2]22	998	463	312	97	872	54.1	4	....	608	17	39	[3]668
Northwestern[4]	6	2,280	2,286	....	....	....	....	....	....	....	....	....	[5]35	[5]69	[5]309	[5]74	41	487
Pacific	3	1,565	1,568	3	1,015	12	1,030	240	272	38	550	65.7	25	8	213	132	13	391
Western	5	[6]2,371	2,376	5	1,153	21	1,179	255	343	620	1,218	49.6	163	....	603	54	26	846
Marion	3	1,504	1,507	3	766	23	792	372	135	208	715	52.6	9	109	272	57	41	488
Central	8	5,165	5,173	6	2,720	33	2,759	938	1,043	433	2,414	53.3	[5]65	[5]432	[5]314	46	811	
Southern	5	[7]3,395	3,400	3	2,356	30	2,389	....	....	....	....	70.3	[5]12	[5]29	[5]858	[5]250	42	1,149
Total	33	18,122	18,155	23	8,983	141	9,147	2,268	2,105	1,396	5,769	57.6	4,721				248	4,840

[1] Includes 5 temporarily at post.
[2] Includes 2 members.
[3] Includes 15 members living with their families in vicinity of Home.
[4] No inspection in line.
[5] Absentees without leave included.
[6] Includes 44 temporary members.
[7] Includes 56 temporary members.

TABLE 5.—*Statement showing gain in average number of members present.*

Year.	Branches.							Total.
	Eastern.	Northwestern.	Pacific.	Western.	Marion.	Central.	Southern.	
1890	68	214	326	227	56	157	160	1,208
1891	11	73	159	136	462	17	138	996
1892	—74	21	95	40	252	—135	66	265
1893	73	36	166	—5	150	— 14	59	465
1894	81	77	182	149	144	165	142	940
1895	90	141	233	72	145	68	129	878
1896	78	83	175	79	213	215	131	974
Total	327	645	1,336	698	1,422	473	825	5,726
Average	46.7	92.1	190.9	99.7	203.1	67.6	117.8	818

TABLE 6.—*Statement relating to discipline.*

Branches.	Trials, etc., of average present.												Never punished.
	Not tried.		Tried once.		Tried twice.		Tried more than twice.		Dropped for absence without leave, etc.		Confinements.		
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Per cent.
Eastern	1,434	77.30	236	12.72	112	6.04	73	3.94	72	3.88	421	22.70	77.3
Northwestern	1,681	72.68	388	16.78	141	6.10	103	4.45	95	4.11	632	27.32	81
Pacific	1,199	85.16	140	9.94	39	2.77	30	2.13	23	1.63	181	12.86	95.45
Western	1,933	82.60	271	11.59	89	3.80	47	2.01	154	6.58	817	34.93	82.60
Marion	1,109	77.99	110	7.74	101	7.10	102	7.17	75	5.27	932	65.54	78
Central	3,625	72.76	887	17.81	288	5.78	182	3.65	299	6.01	1,357	27.28	74
Southern	1,726	55.13	737	23.54	262	8.37	406	12.97	86	2.75	1,887	60.27	55
Total	12,707	72.82	2,769	15.87	1,032	5.91	943	5.40	804	4.61	6,277	35.97	.....

TABLE 7*a*.—*Amusements, recreation, etc.*

Branches.	Facilities for amusements.	Amusements best liked.	Amusements tried and abandoned.
Eastern	Reading room, library, smoking and card room, billiard and pool room, deer park, concerts, and theater.	Probably band concerts, but all mentioned are enjoyed by a large number.	Shooting gallery, on account of lack of interest, and bowling alley, because too violent exercise for old men.
Northwestern	Theater, billiard room, card room, beer saloon, boating, skating, band concerts, entertainments by Keeley League, meetings of Post No. 8, Department of Wisconsin, Grand Army of the Republic, and Cushing Naval Veteran Association.	Theater, billiards, and cards.	Bowling was tried several years ago, but the alley was abandoned for want of use.
Pacific	Owing to the small building used for entertainments the facilities are poor.	Entertainments where there is good, lively music and songs, and humorous productions; also entertainments where children are performers.	None specially.
Western	Billiard and card tables, checkers, dominos, theater, opera, minstrels, concerts, boating, fishing, books, papers, magazines, "old men's workshop," quoits.	Theater, comic opera, minstrels, melodrama, quoits.	None.
Marion	Theater, billiards, and band	Band	Do.
Central	Theater, billiard room, boats, etc.	Light plays, billiards, cards, checkers, etc.	Do.
Southern	Billiard and pool room, smoking and card room, social hall for temperance league, library and reading room.	Baseball and theatrical performances; but each amusement room is thronged from opening to closing hours.	Do.

TABLE 7*b*.—*Amusements, recreation, etc.*

Branches.	Library.							
	Volumes at close of year.	Papers subscribed for.	Periodicals subscribed for.	Papers furnished free.	Periodicals furnished free.	Volumes purchased during year.	Volumes presented during year.	Books taken from library.
Eastern	8,655	58	52	102	.....	336	.....	28,406
Northwestern	7,809	103	22	25	4	906	68	31,770
Pacific	1,727	.....	.....	30	20	462	97	12,300
Western	8,062	14	10	67	12	509	76	26,650
Marion	2,264	16	8	14	2	14	179	16,879
Central	19,794	65	25	131	8	237	661	46,562
Southern	10,363	10	7	.....	.....	3	258	52,000
Total	58,674	266	124	369	46	2,467	1,339	214,567

TABLE 7*b*.—*Amusements, recreation, etc.*—Continued.

Branches.	Library.				Reading room.	
	Ten books most read.	Class of reading in greatest demand.	Seating capacity.	Average number of books read per member.	Seating capacity of reading room.	Average daily attendance.
Eastern	Jacob Faithful, Harry Lorrequer, Joseph Wilmot; Ishmael, or In the Depths; Guy Earlscourt's Wife, David Copperfield, Pickwick Papers, Barriers Burned Away, Diamond Coterie, Ben-Hur.	Fiction	(1)	15.5	250	500
Northwestern	Ishmael, Self Raised, Colonel's Daughter, Count of Monte Cristo, Ivanhoe, Barriers Burned Away, Age of Reason, The Manxman, Ben-Hur, Corporal Si Klegg.	Fiction, history, travels, explorations, adventures, etc.	(2)	13.8	112	400
Pacific	Harpers, Century, and Cosmopolitan Monthlies (bound), Midshipman Easy, Marion Crawford's Works, Life on Mississippi, Count of Monte Cristo, Captain King's Novels, Grant's and Sheridan's Memoirs.	Fiction, magazine literature.	20	10.9	30	130
Western	Pudd'nhead Wilson, Ben-Hur, She, Adam Bede, Cohaba, Robert Elsmere, The Wandering Jew, The Man in the Iron Mask, Allen Quartermain, Uncle Tom's Cabin.	Fiction, history, biography.	(1)	11.4	90	225
Marion	History of the United States Battles, and Leaders of the Civil War; History of Mexican War, David Copperfield, Little Dorrit, Vanity Fair, Jacob Faithful, East Lynne, Rob Roy, Grant's Memoirs.	Fiction, and history of civil war.	(1)	19.6	31	175
Central	Boys of '61, Chattanooga, Adrift in Dixie, Anecdotes of the Civil War, Colonel's Daughter, Adventures of Arthur O'Leary, Family Doom, Girl of the Commune, Huckleberry Finn, Pauline.	Fiction, and war history.	(2)	9.3	100	(3)
Southern	Ben-Hur, and The Fair God, by General Wallace; Works of Dickens, Reynolds, Lever, Zola, Captain Marryatt, and Mrs. Southworth.	Fiction	90	16.5	90	360
Total				13.0	703	1,790

[1] Library and reading room are same. [2] No seats. [3] Usually full.

TABLE 7c.—*Amusements, recreation, etc.*

Branches.	Band.						
	Average strength.		Cost for past year.	Number of concerts.	Average cost for year.		
	Members.	Civilians.			Per musician.	Per concert.	Per member of average present.
Eastern	.....	17	$6,631.49	278	$390.09	$23.85	$3.57
Northwestern	.....	18	6,117.44	412	339.86	14.85	2.65
Pacific	3	8	3,538.83	350	321.71	10.11	2.51
Western	½	14½	5,731.21	291	393.09	19.69	2.45
Marion	3	19	7,191.80	193	326.90	37.26	5.06
Central	4	28	11,525.42	204	360.17	56.50	2.31
Southern	3	22	7,394.69	249	295.79	29.70	2.36
Total	13½	126½	48,130.88	1,977	344.83	24.35	2.76

Branches.	Theater.							
	Capacity.	Charge of admission to—		Expense for paid performances.	Expense for free performances.	Total expense.	Receipts from sale of seats, etc.	Average attendance.
		Members.	Others.					
Eastern	1,100	10 cents, general; 25 cents, reserved.	25 cents general.	$6,525.00	$572.00	$7,097.00	$1,385.41	600
Northwestern	578	None	None	4,250.00	.....	4,250.00	.....	600
Pacific	[1] 250	15 cents; sometimes 10 cents.	Same as for members.	.....	.....	.....	.....	125
Western	1,300	None	25 cents	2,147.50	.....	2,147.50	45.50	1,200
Marion	500	5 and 10 cents	50 cents	700.00	25.00	725.00	454.85	387
Central	1,500	5 and 10 cents	25 and 50 cents	6,990.00	325.00	7,315.00	3,007.50	1,000
Southern	1,400	25 cents, 10 cents, and 5 cents.	$1, 75 cents, 50 cents, and 25 cents.	4,550.00	5,152.15	9,702.15	3,410.41	1,250
Total	6,628	.....	.....	25,162.50	6,074.15	31,236.65	8,303.67	5,162

[1] Temporary building; not equipped as a theater.

TABLE 7d.—*Amusements, recreation, etc.*

Branches.	Billiard tables.	Pool tables.	Card tables.	Facilities ample for all who desire to play cards and other games?	Amusement room—how often inspected by a commissioned officer?
Eastern	2	5	14	Yes	Daily.
Northwestern	3	3	16	Yes	Once a week; sometimes oftener.
Pacific	[1] 1	0	[2] 27	Believed to be	No special amusement room.
Western	1	1	75	Yes	Once a week.
Marion	3	1	[3]	Yes	Occasionally; no regular time.
Central	4	3	0	No	Weekly, and oftener.
Southern	3	2	24	Yes	Once a week.
Total	17	15	156		

[1] In Keeley Club room used by members of that club.
[2] 25 in barracks and 2 in hospital are used as such.
[3] Two in each ward.

TABLE 8a.—*Keeley, Wherrel, or Gold Cure, and societies.*

Branches.	Membership.	Number taking cure during year—			Number relapsed.	Loss in membership during year.	Cost of taking cure—	
		First time.	Second time.	Third time.			For first time.	For second time.
Eastern	117							
Northwestern	252	61	34	11	23	88	Medicine ..... $20.00 Badge, dues, etc. 3.75	$20.00
Pacific	51	25	2	0	4	48	Treatment ..... 15.00 Initiation 2.30	Same.
Western	1,046	72	20	4	[1]72	72	[2]Alcoholism .... 15.00 Morphinism 22.10	Same.
Marion	125	44	4	0	25	10	15.00	Same.
Central	210	9	5	0	11	14	15.00	Nothing.
Southern	94	[3]	[3]	[3]	65	76	22.30	$22.30
Total	1,895	211	65	15	200	308		

Branches.	Inducements or encouragements given members to take the cure.	Members who have taken the cure employed under pay.	Accounts kept separate and distinct from other funds?	What amounts and on what account have payments been made to officers or members of the Home?
Eastern				
Northwestern	None; it is entirely voluntary.	129	Yes	$25 per month to member as surgeon, $5 per month to member as janitor.
Pacific	None	14	Yes	Fund controlled by club, used for entertainments and paying janitor.
Western	The encouragement engendered by the redeemed men.	62	Yes	Convention expenses, loans, services, and entertainments, $276.63.
Marion	None	29	Yes	Prescriptionist, $180; janitor, $90; night watchman, $45, and secretary of club, $60.
Central	Advice	57	Yes	Janitor, $110; secretary, $24.
Southern	None; voluntary action on their part.	13	Yes	None.
Total		304		

[1] 72 reported, but it is believed that many of these had relapsed 2 and 3 years before.
[2] Cost of treatment.
[3] No Keeley doctor employed during the year.

TABLE 8b.—*Keeley, Wherrel, or Gold Cure, and societies.*

Branches.	Other societies and membership.	Total membership.	Effect of societies upon discipline.
Eastern	Cutler Post, No. 48, G. A. R., 157	274	Good.
Northwestern	Veteran Post, No. 8, G. A. R., 207; Cushing Naval Veteran Association, 42.	501	Do.
Pacific	Two G. A. R. posts, 270; Union Veteran Legion, 70; Naval Society, 35; Singing Club, 25.	451	Excellent, restraining members of bad habits; encouraging good conduct and observance of the rules.
Western	Brennan Post, No. 380, G. A. R., 300	1,346	Good; their influence permeates the entire Home.
Marion	Union Veteran Legion, No. 90, 137; Union Temperance League, 250; Tom Bennett Post, No. 546, G. A. R., 54; the Christian Union, 250; League of the Sacred Heart, 40.	856	Good.
Central	G. A. R., 237; Union Veteran Union, 60; Union Veteran Legion, 208; Naval Veterans, 52.	767	They are not aids to discipline.
Southern	Five G. A. R. posts; 1 Union Veteran Legion; 1 Union Veteran Union; 1 Ex-Prisoners of War.	700	Very good; they are promotive of discipline and good order.
Total		4,895	

TABLE 9.—*Religious services.*

Branches.	Where held.	Capacity.	When held.
Eastern	Chapel	500	Every Sunday, with special services when required.
Northwestern	do	400	Five and six times each week.
Pacific	Assembly Hall	250	Every Sunday, and also on weekdays.
Western	Chapel	600	Each chaplain 3 per week, occasionally more.
Marion	Stinson Memorial Hall	700	Twice weekly, each denomination.
Central	Chapel	[1] 950	Daily.
Southern	do	500	Sundays and Thursdays, and on holy days.
Total		3,900	

Branches.	What denominations.	Services during year by—		Attendance.
		Protestant.	Catholic.	
Eastern	Catholic, Episcopal, Methodist, Unitarian.			By larger proportion than in outside communities
Northwestern	Roman Catholic, Protestant Episcopal, and Methodist.	151	232	Good.
Pacific	Episcopal and Roman Catholic.	[2] 250		Fairly well.
Western	Protestant and Catholic	177	70 sermons, 1,400 confessions.	Good.
Marion	do	104	200	Fairly well.
Central	do	Triweekly	Daily	Good.
Southern	do	517 sermons, 127 funerals.	355 sermons, 56 funerals.	Very good.
Total		3,639		

[1] Protestant room, 450; Catholic, 500.

[2] Including services held by volunteers.

TABLE 10.—*Farm.*

Branches.	Acres under cultivation.	Buildings, etc.	Public vehicles.	Private vehicles.	Public animals.		Private horses.	Cows kept.	Other animals kept.
					Horses.	Mules.			
Eastern	500	13	38	8	16	.....	6	58	2 oxen, 1 bull, 49 calves or heifers, and 40 deer and bears.
Northwestern	150	18	15	7	22	.....	10	62	22 sheep, 19 lambs, and 18 calves and yearlings.
Pacific	469	19	24	7	19	2	4	23	225 pigs.
Western	90	3	16	13	16	.....	10	.....	
Marion	75	3	12	6	12	.....	6	.....	
Central	285	13	25	15	30	.....	7	21	36 pigs, and deer and bear in park.
Southern	80	8	32	13	8	13	10	30	93 pigs, 2 bulls, 5 calves, 7 heifers.
Total	1,649	77	162	69	123	15	53	194	

Branches.	Milk yielded, in gallons.	Value of farm stock, June 30, 1896.	Average employees on farm.		Average employed in—		Value of farm products.	Disposition of products.		
			Members.	Civilians.	Garden.	Teaming.		Turned into commissary.	Fed to stock.	Sold.
Eastern	32,533¼	$5,680.00	22	2	6	10	$14,534.83	$8,829.83	$5,705.00	.....
Northwestern	30,469	4,197.00	38	2	6	10	8,434.17	4,891.15	2,647.79	895.23
Pacific	14,229	4,735.00	55	4	11	7	11,943.30	9,002.07	2,787.10	154.13
Western	.....	1,200.00	1	.....	31	8	1,545.65	1,534.81	.....	10.84
Marion	.....	540.00	23	2	8	7	1,703.33	1,474.18	166.55	62.60
Central	18,182	2,950.00	14	2	30	15	9,589.86	5,558.76	2,532.19	1,498.91
Southern	25,647	2,975.00	1	7½	25¼	10	10,855.62	7,828.47	2,555.00	472.15
Total	121,040¾	22,277.00	154	19½	117¼	67	58,606.76	39,119.27	16,393.63	3,093.86

TABLE 11*a*.—*General fund.*

Branches.	Receipts for fiscal year ending June 30, 1896.			
	Current expenses.	Subsistence.	Clothing.	Household.
Eastern	$24,883.78	$112,211.07	$2,564.85	$48,640.22
Northwestern	33,766.93	122,344.20	3,717.14	52,687.55
Pacific	25,736.28	97,271.28	2,099.11	28,206.09
Western	33,009.91	150,879.10	3,157.80	64,562.06
Marion	27,862.75	97,415.48	2,746.30	13,563.11
Central	79,967.70	281,160.20	5,941.75	90,789.19
Southern	35,373.44	195,241.93	3,700.33	61,895.55
Total	260,600.79	1,056,523.26	23,927.28	360,343.77

Branches.	Receipts for fiscal year ending June 30, 1896.				
	Hospital.	Transportation.	Construction and repairs.	Farm.	Total.
Eastern	$25,155.00	$1,433.33	$24,502.60	$10,186.50	$249,577.35
Northwestern	24,676.65	1,252.55	34,560.41	8,894.60	281,900.03
Pacific	20,192.75	3,778.48	73,654.05	11,212.49	262,150.53
Western	28,982.45	3,292.80	33,562.53	9,827.23	327,273.88
Marion	19,863.70	1,750.00	93,506.25	5,112.09	261,721.68
Central	49,414.84	1,391.67	55,408.95	16,683.58	580,757.88
Southern	29,273.40	2,303.87	58,573.92	15,783.31	402,145.75
Total	197,558.79	15,202.70	373,768.71	77,699.80	2,365,527.10

TABLE 11*b*.—*General fund.*

Branches.	Expenditures for fiscal year ending June 30, 1896.				
	Current expenses.	Subsistence.	Clothing.	Household.	Hospital.
Eastern	$24,392.06	$107,864.02	$2,002.34	$40,350.52	$23,030.95
Northwestern	27,648.66	117,147.08	2,586.95	48,661.83	23,440.93
Pacific	21,315.58	80,970.48	1,299.68	27,020.36	17,612.10
Western	29,470.40	140,581.10	2,587.52	61,456.76	26,304.65
Marion	22,710.38	80,452.92	2,249.98	10,317.98	15,563.96
Central	70,916.00	278,340.59	5,658.09	89 170.11	49,533.34
Southern	32,171.77	184,132.80	2,677.66	58,033.78	26,464.51
Total	228,624.85	989,488.99	19,062.22	335,011.34	181,950.44

Branches.	Expenditures for fiscal year ending June 30, 1896.					
	Transportation.	Construction and repairs.	Farm.	Total.	By check.	In currency.
Eastern	$1,287.43	$23,301.92	$9,309.27	$231,538.51	$174,354.83	$57,183.68
Northwestern	881.13	30,288.37	8,019.08	258,674.03	258,674.03	.....
Pacific	3,159.04	72,385.76	9,971.61	233,734.61	184,767.62	48,966.99
Western	3,077.03	30,505.46	8,727.34	302,710.26	232,580.50	70,129.76
Marion	873.70	74,991.16	4,461.66	211,621.74	211,621.74	.....
Central	1,445.12	56,894.48	16,725.80	568,683.53	568,683.53	.....
Southern	1,804.10	56,925.40	14,500.72	376,710.74	303,730.18	72,980.56
Total	12,527.55	345,292.55	71,715.48	2,183,673.42	1,934,412.43	249,260.99

TABLE 12*a*.—*Principal articles of food.*

Branches.	Contract price for quarter ending June 30, 1896.									
	Flour, pound.	Fresh beef, pound.	Corn beef, pound.	Coffee, pound.	Tea, pound.	Bacon, pound.	Salt pork, pound.	Potatoes, pound.	Fresh fish, pound.	Codfish, pound.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Eastern	2.19	7.25	5.24	16.75	24.5	7.625	5.225	0.833	7	6
Northwestern	1.58	5.23	.....	20	32	7.000	5.125	.616	6.5	6
Pacific	1.975	5.34	.....	21.65	14.45	8.37	8	.72	4.5	5.1
Western	1.40 1.64	5.425	5.48	19	30	8.53	5.415	[1]68.	8.5 9.75	9
Marion	1.628	6.25	5.125	20	24 26	7.25	5.25	.583	8.39	.....
Central	1.781	5.698	.....	19.375	29.5	6.37	.....	[1]33	5.24	4.38
Southern	2.25	5.44	3.44	17.875	30.5 30	6.73	4.83	.983	5.75	4.5
Regular Home	1.91	5.5	2.63	15	18	7.875	4.5	.....	.....	4

Branches.	Contract price for quarter ending June 30, 1896.									
	Fresh mackerel, pound.	Navy beans, pound.	Lima beans, pound.	Ham, pound.	Butter, pound.	Sirup, gallon.	Cheese, pound.	Sugar, A, pound.	Sugar, C, pound.	Sugar, granulated, pound.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Eastern	.....	2.5	2.062	8.49	16	19	.....	.....	.....	5.125
Northwestern	.....	2.167	3.75	8.75	18	17.5	8.5	.....	.....	5.25
Pacific	.....	1.75	2.81	.....	[2]13.50	20	8.37	.....	4.75	5.52
Western	11	2.5	3.5	9.48	[2]14.90	26	8	.....	4.76	5.5
Marion	8.81	2	.....	9.125	[2]13.99	.....	8.375	4.7916	4.5441	5.31
Central	9.125	2	3.25	8.37	[2]13.85	17	8.5	4.6162	4.37	5.1
Southern	8.74	2.48	3.75	9.325	[2]15	20	9.125	4.64	3.96	5.08
Regular Home	.....	2.167	.....	10.87	[2]9.5	16	.....	4.97	4.22	.....

[1] Bushel. [2] Oleomargarine.

TABLE 12*b*.—*Principal articles of food.*

Branches.	Amount (pounds) purchased during quarter ending June 30, 1896.									
	Flour.	Fresh beef.	Corn beef.	Coffee.	Tea.	Bacon.	Salt pork.	Potatoes.	Fresh fish.	Codfish.
Eastern	96,040	41,495	27,222	14,206	1,686	2,630	3,000	143,580	11,338	2,400
Northwestern	82,320	110,000	.....	15,000	1,200	10,000	26,000	362,400	15,000	6,000
Pacific	82,500	77,000	.....	9,900	2,200	5,500	2,200	129,523	8,685	1,000
Western	106,500	89,210	10,400	17,886	1,906	3,925	2,000	[1]2,771⅛	8,360	1,400
Marion	78,400	36,473	14,000	7,800	1,259	2,900	1,200	97,200	2,550	.....
Central	215,600	276,939	.....	35,048	3,667	3,510	.....	[1]6,259	12,000	9,640
Southern	129,360	148,097	26,400	26,404	3,226	11,000	2,600	223,680	6,700	18,000

Branches.	Fresh mackerel.	Navy beans.	Lima beans.	Ham.	Butter.	Sirup (gallons).	Cheese.	Sugar, A.	Sugar, C.	Sugar, granulated.
Eastern	.....	8,011	600	6,021	15,114	206	.....	.....	.....	26,974
Northwestern	.....	7,034	2,000	21,000	14,500	1,000	2,500	.....	.....	30,000
Pacific	.....	4,292	2,787	.....	13,000	217	1,870	.....	3,300	17,600
Western	9,200	5,129	3,335	3,292	21,654	532⅓	3,099	.....	4,000	19,804
Marion	6,000	5,114	.....	6,889	10,200	.....	2,242	15,482	2,942	2,200
Central	15,000	18,000	5,221	43,529	45,900	1,095½	12,128	50,294	20,122	10,182
Southern	41,000	13,086	5,438	2,506	30,240	498	7,766	11,000	29,641	5,187

[1] Bushels.

TABLE 13.—*Average daily employees under general fund.*

Branches.	Officers.		Noncommissioned officers.		Members.		Civilians.		Total.		Average per person for year.
	Number.	Annual cost.	Number.	Annual cost.	Number.	Annual cost.	Number.	Annual cost.	Number.	Annual cost.	
Eastern	3	$6,525.00	19⅓	$5,328.00	291⅔	$32,568.12	36 7/12	$18,081.36	350¾	$62,502.48	178.19
Northwestern	6	10,625.00	23	4,906.00	419	44,688.89	34	16,238.00	482	76,457.89	158.63
Pacific	3	5,764.59	14	3,984.66	241	30,487.68	31	14,006.28	289	54,242.61	187.69
Western	5	[1]8,475.00	25	[1]5,305.25	285	[1]35,069.25	40	[1]20,976.40	355	[1]69,825.90	196.69
Marion	3	6,750.00	16	3,972.00	195	19,002.24	45	17,749.23	259	47,473.47	183.30
Central	8	15,849.96	51	12,145.32	824	98,551.24	61	35,546.45	944	162,092.97	171.79
Southern	5	9,638.33	18	4,344.00	428	42,541.13	57	16,457.10	508	72,980.56	143.66
Total	33	63,627.88	166½	39,985.23	2,683⅓	302,907.95	304 7/12	139,054.82	3,187¾	545,575.88	171.15

[1] Estimated from schedule for Western Branch, as the cost was not reported.

TABLE 14.—*Daily compensation of employees under general fund.*

Branches.	Officers.			Noncommissioned officers.			Members.			Civilians.		
	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.
Eastern	$7.64	$4.58	$5.96	$1.33	$0.50	$0.69	$0.833	$0.167	$0.35	$5.00	$0.50	$1.51
Northwestern	7.62	2.50	5.23	1.00	.50	.59	1.33	.17	.29	4.17	.50	1.33
Pacific	7.64	2.85	5.33	1.33	.25	.71	1.67	.17	.36	4.17	.33	1.67
Western	.....	.....	5.62	.....	.....	.66	.....	.....	.31	.....	.....	1.45
Marion	7.63	5.55	6.59	1.33	.40	.86	1.00	.16	.58	4.16	.66	2.41
Central	9.17	3.33	5.43	1.67	.25	.65	1.17	.17	.33	5.00	.40	1.60
Southern	7.67	3.33	5.62	1.67	.50	.67	2.00	.17	.28	4.17	.33	.80

TABLE 15.—*Cost of maintenance, including repairs, per capita for year 1895–96.*

Branches.	Subsistence.	Clothing.	Household.	Current expenses.	Hospital.	Farm.	Repairs.	Total.
Eastern	$60.37	$18.92	$26.245	$11.99	$13.41	[1]$0.55	$8.79	$139.175
Northwestern	52.13	13.78	22.57	10.37	11.32	1.23	7.76	117.70
Pacific	62.21	17.88	18.43	10.85	11.48	1.50	13.00	133.95
Western	58.66	12.31	26.01	11.08	11.21	3.54	11.48	134.29
Marion	55.84	17.48	12.09	16.14	12.23	1.16	4.89	119.83
Central	52.22	10.23	18.77	10.30	12.05	.45	9.68	113.70
Southern	58.81	11.71	18.54	10.28	8.45	4.63	18.18	130.60
Average	56.21	13.38	20.432	11.11	11.32	1.39	11.00	124.842

[1] Credit.

TABLE 16.—*Post-fund employees.*

Branches.	Average daily employees.								Average annual cost per employee.	Average daily compensation.		
	Noncommissioned officers.	Cost per year.	Members.	Cost per year.	Civilians.	Cost per year.	Total.	Total cost per year.		Noncommissioned officers.	Members.	Civilians.
Eastern	.....	.....	27	$3,426.09	24	$7,306.89	51	$10,732.98	$210.45	.....	$0.35	$0.87
Northwestern	.....	.....	51	5,155.67	26	6,115.11	77	11,270.78	146.37	.....	.54	1.49
Pacific	.....	.....	11	1,320.16	7	2,182.97	18	3,503.13	194.62	.....	.36	.92
Western	3	[1]	30	[1]	17	[1]	50	[1]	.....	$0.12	.36	.73
Marion	1	$150.00	11	1,776.00	18	3,873.13	30	5,799.13	193.30	.41	.58	1.00
Central	2	576.00	82	9,176.39	44	14,296.93	128	24,049.32	187.88	.80	.31	.90
Southern	.....	.....	43	5,239.49	27	7,691.16	70	12,930.65	184.72	.....	.41	.69
Total	6	726.00	255	26,093.80	163	41,466.19	424	68,285.99	[2]182.58	.....	.....	.....

[1] Not reported.

[2] Western branch not included.

TABLE 17*a*—*Post-fund business.*

Branches.	Cash on hand June 30—		Merchandise on hand June 30.—		Sales during year.				
	1895.	1896.	1895.	1896.	Home store.	Restaurant.	Beer hall.	Hotel.	Total.
Eastern	$7,097.37	$15,349.42	$4,066.80	$4,771.60	$16,903.94	$2,696.81	$29,916.00	.....	$49,516.75
Northwest'n	8,825.13	9,684.09	1,678.94	1,442.62	13,174.41	1,383.50	36,502.50	.....	51,060.41
Pacific	1,828.43	5,095.40	1,718.96	2,052.56	8,103.77	[1]	9,431.75	.....	17,535.52
Western	6,948.58	9,983.42	2,982.53	2,719.82	10,731.36	2,296.00	25,032.95	.....	38,060.31
Marion	6,209.93	3,435.69	2,493.71	5,834.33	19,005.15	[2]752.45	.....	.....	19,757.60
Central	7,833.68	5,042.99	12,316.40	16,078.68	38,608.07	.....	91,676.45	[3]$9,117.40	139,401.92
Southern	28,074.97	9,110.34	6,033.56	6,968.26	13,534.50	.....	38,834.24	[3]8,386.35	60,755.09
Total	66,817.49	57,701.35	31,290.90	39,867.87	120,061.20	7 128.76	231,393.89	17,503.75	376,087.60

[1] Included in Home store. [2] Miscellaneous sales. [3] Restaurant included.

TABLE 17*b*.—*Post-fund business.*

Branches.	Expenditures for—								Net profits.
	Stock home store.	Stock restaurant.	Stock beer hall.	Stock hotel.	Total for stock.	Clerk and other help.	Other items out of profits.	Total.	
Eastern	$10,688.74	$911.29	$9,924.75	.....	$21,524.78	$10,840.34	$13,275.86	$45,640.98	$8,956.85
Northwestern	9,271.92	606.77	16,768.00	.....	26,646.69	2,740.26	53,823.46	83,210.41	20,969.36
Pacific	6,335.41	[1]	3,382.00	.....	9,717.41	637.33	3,913.81	14,268.55	3,600.57
Western	8,312.68	1,846.87	9,342.24	.....	19,501.79	1,167.95	40.00	20,709.74	17,350.57
Marion	12,112.57	.....	.....	.....	12,112.57	918.16	16,071.36	29,102.09	3,681.49
Central	32,588.54	[2]	38,707.44	$9,917.87	81,213.85	8,626.99	54,488.16	144,329.00	20,115.00
Southern	11,632.74	[2]	12,008.20	5,077.35	28,709.29	3,715.91	41,128.86	73,554.06	1,111.94
Total	90,942.60	3,364.93	90,132.63	14,995.22	199,426.38	28,646.94	182,741.51	410,814.83	75,785.78

[1] Included in store. [2] Included in hotel.

TABLE 17*c*.—*Post-fund business.*

Branches.	Transportation.		Beer.				Per cent of profit.
	Amount received for.	Amount expended for.	Number of gallons sold.	Cost of.	Receipts from sale of.	Amount sold for 5 cents (in pints).	
Eastern	$9,498.27	$8,636.20	43,013	$9,924.75	$29,916.00	$\frac{8}{10}$	201+
Northwestern	6,356.55	6,313.44	77,580	16,768.00	36,502.50	1	117+
Pacific	.....	.....	11,055	3,377.10	9,431.75	$\frac{1}{2}$	179+
Western	3,401.65	3,971.76	37,936	9,342.24	25,032.95	$\frac{1}{2}$	167+
Marion	6,570.25	6,078.33	.....	.....	.....	.....	.....
Central	19,087.73	20,750.59	226,496	35,924.07	89,131.00	1	149+
Southern	13,829.88	13,931.13	62,408	10,282.19	38,834.24	$\frac{3}{4}$	277+
Total	58,744.33	59,681.45	458,488	85,618.35	228,848.44	$\frac{1}{2}$ to 1	.....

TABLE 18.—*Improvements and repairs.*

Branches.	Cost during year of—		Estimated cost for 1898 of—	
	Improvements.	Repairs.	Improvements.	Repairs.
Eastern	$6,983.00	$16,318.92	$32,500.00	$20,000.00
Northwestern	13,803.10	19,856.56	27,500.00	26,427.50
Pacific	48,498.60	19,195.42	165,200.00	46,437.38
Western	.....	26,012.48	87,400.00	29,140.23
Marion	99,971.37	9,954.87	19,500.00	19,407.55
Central	6,419.67	56,894.48	[1]	67,248.34
Southern	29,000.00	27,925.40	31,000.00	26,598.67
Total	204,675.74	176,158.13	363,100.00	235,259.67

[1] Not given.

TABLE 19*a*.—*Pensioners and pensions.*

Branches.	Pensioners.		Average paid each pensioner for last quarter.	Balance due pensioners.	Clerks on pension business.	
	On rolls June 30, 1896.	Present at Home June 30, 1896.			Number.	Annual salary.
Eastern	2,044	1,353	$32.27	$26,351.87	2	$600.00
Northwestern	2,238	1,917	31.66	19,343.08	2	1,360.00
Pacific	1,372	1,165	34.11	10,242.53	1	900.00
Western	2,456	1,725	35.36	16,170.55	2	960.00
Marion	1,544	1,175	30.67	1,876.68	1	240.00
Central	5,237	4,473	35.61	106,835.09	6	1,980.00
Southern	3,640	[1]	34.04	29,376.70	[2]3	636.83
Total	18,531	11,808	.....	210,196.50	17	6,676.83

[1] Not given. [2] One temporary.

TABLE 19*b*.—*Pensioners and pensions.*

Branches.	Per cent on rolls June 30, 1896.		Pensioners on June 30 having to their credit—			
	Pensioners.	Nonpensioners.	Less than $100.	Between $100 and $500.	Between $500 and $1,000.	Over $1,000.
Eastern	83.0	17.0	1,207	60	2	1
Northwestern	81.0	19.0	171	44	8	1
Pacific	71.0	29.0	121	28	2	0
Western	76.6	23.4	28	42	4	0
Marion	83.2	16.8	48	4	0	0
Central	89.4	10.6	569	219	31	5
Southern	81.9	18.1	226	41	6	2
Total	82.3	17.7	2,370	438	53	9

Branches.	Pensioners whose addresses are not known.		Pensioners transferred to the insane asylum.		Pensioners absent over one year.	
	Number.	Amount held to their credit.	Number.	Amount held to their credit.	Number.	Longest absence.
Eastern	2	$60.00	42	$5,394.12	79	5 years.
Northwestern	19	658.17	8	381.50	24	
Pacific	1	100.00	3	78.00	90	6 years.
Western	11	450.00	34	4,536.75	.....	4 years.
Marion	0	.....	6	161.05	6	
Central	19	371.22	66	7,489.96	300	17 years.
Southern	56	2,916.38	12	1,257.63	31	2 years.
Total	108	4,555.77	171	19,309.01	530	

TABLE 20.—*Number of pensioners on rolls June 30, 1896, at each rate per month.*

Branches.	$6.00.	$7.00.	$7.50.	$8.00.	$8.50.	$9.00.	$10.00.	$10.50.	$10.75.	$11.00.	$11.25.	$11.50.	$12.00.	$12.50.	$12.75.	$13.00.	$13.25.	$13.50.	$14.00.	$14.25.
Eastern	588	....	....	506	....	....	143	....	....	....	....	....	705	....	....	....	....	1	30	....
Northwestern	545	....	....	518	1	1	112	....	....	....	1	1	956	1	1	3	....	....	27	1
Pacific	296	....	....	297	....	....	73	....	....	....	1	....	651	....	1	....	....	....	19	....
Western	620	....	3	632	3	....	168	....	....	....	....	....	937	....	1	3	....	....	25	....
Marion	329	2	1	348	....	1	100	....	....	....	....	....	640	....	....	2	....	....	52	....
Central	882	2	1	941	2	....	287	....	....	1	....	....	2,709	2	1	1	1	1	93	....
Southern	665	1	....	708	....	3	195	2	2	....	1	....	1,777	....	....	4	1	2	57	....
Total	3,925	5	5	3,950	6	5	1,078	2	2	1	3	1	8,375	3	4	13	2	4	303	1

Branches.	$14.50.	$15.00.	$16.00.	$17.00.	$17.50.	$18.00.	$18.50.	$20.00.	$22.00.	$22.50.	$24.00.	$25.00.	$27.00.	$30.00.	$36.00.	$45.00.	$50.00.	$72.00.	Total.
Eastern	....	3	18	19	....	1	....	....	1	1	12	1	1	9	3	2	....	....	2,044
Northwestern	....	6	23	20	....	....	....	3	1	....	9	1	....	2	2	3	....	....	2,238
Pacific	....	4	12	14	....	2	....	1	....	....	1	....	....	....	....	....	....	....	1,372
Western	....	4	32	1	....	7	....	4	2	....	7	....	1	4	....	2	....	....	2,456
Marion	....	6	21	29	....	1	....	3	....	....	6	1	....	2	....	....	....	....	1,544
Central	....	10	62	93	....	2	....	11	4	....	57	6	1	48	10	6	....	3	5,237
Southern	1	7	54	40	1	4	1	9	4	....	47	2	4	27	9	5	1	6	3,640
Total	1	40	222	216	1	17	1	31	12	1	139	11	7	92	24	18	1	9	18,531

TABLE 21*a*.—*Treasurer—Funds received.*

Branches.	Amounts received during year from—				
	Congressional appropriations.	Post fund.	Keeley, Wherrel, or gold cure.	Posthumous sources.	Pension fund.
Eastern	$238,800.00	$49,516.75	Under control of governor.	$3,308.78	$246,913.72
Northwestern	270,625.01	58,016.91	$2,580.32	5,619.67	280,748.66
Pacific	254,905.34	17,535.52	632.05	2,265.26	167,347.03
Western	295,980.60	46,732.00	3,231.90	3,551.65	323,484.90
Marion	258,118.83	26,327.85	757.35	1,391.40	186,428.90
Central	525,122.34	162,191.70	97.80	22,248.76	728,249.46
Southern	340,524.67	78,045.47	.....	5,289.22	476,121.67
Total	2,184,076.79	438,366.20	7,299.42	43,674.74	2,409,294.34

TABLE 21*b*.—*Treasurer—Funds received.*

Branches.	Amount received during year from sales—general fund.							Receipts from other sources.	Total receipts from all sources.
	Current expenses.	Subsistence.	Clothing.	Household.	Hospital.	Construction.	Farm.		
Eastern	.....	$5,211.07	$1,698.18	$140.22	$30.00	$202.60	$186.50	.....	$546,607.82
Northwestern	$63.93	2,060.86	1,225.48	304.21	26.65	632.41	1,411.26	.....	623,315.37
Pacific	39.44	3,100.38	149.11	606.09	54.52	71.30	538.15	$420.94	447,665.13
Western	2.78	3,294.89	1,306.94	.90	4.60	329.99	404.48	4,126.04	682,451.67
Marion	12.90	1,843.36	174.63	63.11	113.70	49.00	3.75	106.10	475,390.88
Central	583.81	17,159.70	1,741.75	2,846.69	129.37	585.17	1,675.83	.....	1,462,632.38
Southern	.....	5,844.60	971.28	756.87	38.40	138.38	472.15	3.87	908,206.58
Total	702.86	38,514.86	7,267.37	4,718.09	397.24	2,008.85	4,692.12	4,656.95	5,145,669.83

TABLE 22*a*.—*Quartermaster's department—Barracks, etc.*

Branches.	Barracks.					
	Condition.	Bath tubs.	Men to each bath tub.	Men to each urinal.	Men to each hopper.	Ventilation.
Eastern	Good, and fairly suitable.	[1]33	50	90	45	Windows, ventilators, and chimneys not satisfactory in every respect.
Northwestern	Good	30	64	33	19	Doors and windows not satisfactory in every respect.
Pacific	Good repair, except as to painting and floors; some dampness in basements.	17	77	32	23	Open fireplaces and foul-air ducts leading to air shafts; do not regulate well if damp or foggy.
Western	Good	26	62	25	16½	Ventilating shafts, registers, and ventilators satisfactory.
Marion	New floors required and painting outside.	14	90	25	25	Air flues from basement to roofs, open fireplaces, and transoms.
Central	Good	([2])	([2])	32	25	Windows and doors in most; ventilating flues in barrack 21; not satisfactory in every respect.
Southern	Fair	43	56	29	23	No regular system; only by opening of doors and windows when necessary.
Total		163				

Branches.	Barracks.		Condition of beds, bedding, and lockers.	Reported weight of mattress.	Members present, sleeping habitually outside of Home grounds.
	Heating.	Lighting.			
				Pounds.	
Eastern	Steam; satisfactory	Electricity; adequate	Good	14	51
Northwestern	do	Gas and electricity; adequate.	do	13	7
Pacific	Steam; low pressure; indirect radiation; satisfactory.	Electricity; not quite adequate, owing to necessary economy of power.	do	16	3
Western	Steam; satisfactory	Gas; adequate	do	8 to 11	
Marion	Open fireplaces, and one also heated with hot air; insufficient on extreme cold days.	Natural gas; poor light; electric lights required.	do	17½	12
Central	Steam; satisfactory	Gas, except in barrack 21, gas and electricity; adequate.	do	[3]13 [4]17	88
Southern	Steam	Electricity in three barracks; remainder gas, oil, and candles.	do	17	100 to 150

[1] Twenty-nine of these located in laundry.
[2] General bath house; no bath tubs in barracks, except in barrack 30.
[3] Old style.
[4] New style.

TABLE 22*b*.—*Quartermaster's department—Barracks, etc.*

Branches.	Number of acres.		Barracks.				
	In reservation.	Leased.	Number.	Frame.	Stone or brick.	Number of men originally intended for.	Number of men at present occupied by.
Eastern	1,754		12	5	7		1,451
Northwestern	382.25		12		12		
Pacific	629	190	7	7		700	1,309
Western	640		13		13	1,612	2,145
Marion	259.65	120	7		7	740	1,102
Central	578		32	17	15	3,855	4,353
Southern		43	19	11	8		
Total	4,242.90	353	102	40	62		

TABLE 22*b*.—*Quartermaster's department—Barracks, etc.*—Continued.

Branches.	Floor space per man (square feet).			Air space per man (cubic feet).			Number of men sleeping—		
	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.	In attics.	In basements.	In other places not originally intended for sleeping in.
Eastern	60.6	40.25	50	726	383	554	75	.....	326
Northwestern	69	38	53.5	906	372	639	69	342	128
Pacific	149	56	73	1,941	734	815	379	2	7
Western	60	37.6	51.8	817	409	637	.....	271	240
Marion	.....	.....	.....	.....	.....	.....	94	.....	25
Central	78	48	60	1,022	432	660	.....	.....	21
Southern	88	50	69	1,078	318	698	139	124	[1]282
Total	149	37.6	65.8	1,941	318	662.3	756	639	[2]1,029

[1] Includes 150 outside of camp.

[2] None reported sleeping on floor.

TABLE 23*a*. —*Quartermaster's department—Storehouses, property, etc.*

Branches.	Storehouses.				Record kept of amount expended on each building?
	Brick or stone.	Wood.	Condition.	Sufficient capacity?	
Eastern	0	1	Good	No.	No.
Northwestern	4	0	3 good; 1 not good	No.	No.
Pacific	[1]0	0	Quite damp in rainy season	Yes.	No.
Western	[1]0	0	Damp in wet weather	No.	Yes.
Marion	1	0	Good	No.	Yes.
Central	2	1	.....do.....	No.	Yes.
Southern	.....	1	Fairly good	No.	No.
Total	7	3			

Branches.	Value of property on hand June 30, 1896.		How are stores and property accounted for?	Inventories—How often taken?
	Quartermaster stores (current supplies).	Clothing.		
Eastern	$7,059.11	$10,433.84	Taken up on property books after inspection and acceptance, and issued upon proper requisition, and charged off in property books.	Quarterly and yearly.
Northwestern	7,671.81	12,107.89	Inventories	Annually.
Pacific	[2]	14,133.89	On the books	Clothing, quarterly; stores, annually.
Western	[2]	12,397.59	Taken up on inspection reports approved by the Governor. Perishable stores issued on approved requisitions and dropped. Imperishable dropped by condemnation by proper officer or by sale.	Semiannually.
Marion	3,254.24	6,398.51	Taken up on general property ledgers and individual property books, and expended on requisition and by condemnation.	Clothing, quarterly; other property, annually.
Central	26,835.78	16,767.38	To the Board of Managers	Quarterly and annually.
Southern	7,082.81	7,487.20	On books, keeping separate accounts with each article.	Annually.
Total	52,503.75	79,726.30		

[1] Barrack basements used.

[2] No report.

TABLE 23*b*.—*Quartermaster's department—Property, etc.*

Branches.	Unserviceable property.			Rags and clippings.		
	Value of property condemned during year.	Articles condemned.	Receipts from sale of condemned property.	Pounds of, sold.	Price per pound.	Total receipts from sale of.
Eastern	$30,188.97	46,504	$1,613.02	35,075	$0.0175 to $0.05	$1,613.02
Northwestern	31,634.17	2,227	1,247.83	26,342	.0025 to .10	1,063.53
Pacific	6,737.80	15,883	71.92	5,882	.005	29.41
Western	32,139.46	67,053 1/12	1,315.01	18,857	.025 to .11	1,171.86
Marion	3,734.19	17,695	.....	[1]8,850	[2].003 to .13	.....
Central	86,026.12	119,282	2,559.07	42,960	.0075 to .11	1,780.98
Southern	8,737.95	12,357	1,150.82	.....	.....	.....
Total	199,198.66	281,001 1/12	7,957.67	137,966	.0025 to .13	5,658.80

[1] Amount advertised for sale. [2] Prices offered and accepted, but sale not consummated.

TABLE 24.—*Quartermaster's department—Clothing and laundry.*

Branches.	Value of clothing.				
	On hand July 1, 1895.	Received from depot during year.	Received from other places.	Issued during year.	Inspected and condemned.
Eastern	$6,281.26	$27,498.80	$6,802.09	$31,541.18	$30,188.97
Northwestern	10,178.74	25,308.30	6,573.05	29,753.77	25,407.09
Pacific	10,583.51	18,469.56	.....	20,715.47	5,476.64
Western	12,770.74	27,509.78	13.50	28,194.68	22,807.71
Marion	3,716.31	16,520.82	4,912.33	21,889.64	13,114.83
Central	26,919.61	50,997.44	15,737.07	71,172.28	54,712.48
Southern	7,206.17	32,292.47	6,914.65	38,872.62	22,633.89
Total	77,656.34	198,597.17	40,952.69	242,139.64	174,341.61

Branches.	Laundry.					
	Average pieces laundried per month.	Expense for laundry work at the Home during year.	Expense for laundry work done outside.	Number of men doing their own washing.	Number of employees.	Weekly allowance per man.
Eastern	29,245	$1,446.56	$63.76	[2]	13	1 shirt, 1 pair drawers, 1 pair socks, and other clothing if necessary.
Northwestern	[1]21,813	2,440.00	.....	480	20	1 shirt, 1 pair drawers, 1 pair socks, and trousers, blouses, vests, and overalls, as occasion may require.
Pacific	9,990	1,268.83	263.17	200	12	
Western	49,484	1,317.98	113.25	.....	18	All soiled clothing and bedding.
Marion	9,330	2,005.43	186.87	[3]	15	No fixed amount. All soiled underclothing is washed once a week.
Central	78,660	4,014.59	.....	[4]	40	1 set of underclothes per week, and bedding when necessary.
Southern	52,099	1,716.00	109.14	.....	17	3 pieces as a rule; no objection to an occasional greater number.
Total	250,621	14,209.39	736.19	.....	135	

[1] Pieces of clothing only.
[2] Members wash their handkerchiefs, and a few wash their shirt, drawers, and socks.
[3] Sixty per cent on socks, 8 per cent on shirts.
[4] Some men wash their underclothes and socks.

TABLE 25.—*Engineer and fire departments.*

Branches.	Engineer department.					
	Employees.		Ratio of employees under chief engineer to average present. One to—	System of water supply.	Satisfactory in every respect?	What officer has charge of shop accounts?
	Members.	Civilians.				
Eastern	36		51.5	Augusta Water Co	Yes	Quartermaster.
Northwestern	62	10	32	City of Milwaukee	do	Do.
Pacific	48		29.3	Springs in mountains and wells on Home grounds.	Inadequate	Treasurer and acting quartermaster.
Western	40	11	45.8	From Leavenworth Waterworks, from reservoir by gravitation.	Yes	Quartermaster.
Marion	41	4	31.5	Standpipe pressure; supply pumped from wells.	No	Do.
Central	77	11	56.6	Pumping and standpipe system.	Yes	Do.
Southern	25	[1]10	82.4	Newport News Water Co.	do	Do.
Total	375		46.2			

Branches.	Fire department.		
	Protection against fire.	Apparatus adequate and in good condition.	How often tested.
Eastern	Very good; 12 hydrants supplied from Augusta Water Co., 60 pounds pressure. Also, in each barrack, standpipes, hose, chemical pails, etc.	Appears so	3 or 4 times a year.
Northwestern	One fire engine; hydrants at convenient stations surrounding all public buildings; one fire pump; standpipes and hose in buildings; fire extinguishers and hand grenades.	Yes	Monthly.
Pacific	25 fire hydrants; 2,000 feet fire hose; fire extinguishers and grenades distributed in buildings.	Suitable hose cart needed.	Usually 2 or 3 times monthly.
Western	Hydrants and 2½-inch fire hose	Hose getting old	Frequently.
Marion	Steel standpipe 18 feet in diameter and 125 feet high, holding 238,000 gallons of water and kept full at all times. Hose reel with 1,000 feet 2½-inch hose; also small hose in all buildings.	Yes	Large hose monthly; small hose quarterly.
Central	Standpipe with 65 pounds pressure	do	Weekly.
Southern	One steam engine; fire hose connection in main building and hospital; fire buckets in racks in main building, convalescent company, and other barracks.	do	Frequently.

[1] Six additional in winter.

TABLE 26.—*Commissary department—Storehouses, stores, dining hall.*

Branches.	Storehouses.				Value of subsistence stores on hand June 30, 1896.	Inventories, how often taken?
	Brick or stone.	Wood.	Condition.	Sufficient capacity?		
Eastern	3	1	Fair repair	No	$4,074.30	Monthly.
Northwestern	[1]2	.....	Good and dry	Yes	4,447.82	Weekly.
Pacific	[2]0	.....	Good	Yes	2,355.55	Monthly.
Western	[2]0	.....	....do	Yes	2,697.02	Quarterly.
Marion	1	.....	....do	Yes	1,059.52	Do.
Central	1	1	....do	Yes	9,038.35	Do.
Southern	1	.....	Very fair	Yes	4,198.27	Monthly.
Total	8	2			27,870.83	

Branches.	Unserviceable property.			Dining hall.			
	Value of, condemned during year.	Number of articles condemned.	Receipts from sales of condemned property.	Capacity.	How many times are tables set for each meal?	Average permanent employees.	
						In kitchen.	In dining hall.
Eastern	$523.48	8,705	.....	950	Twice	20	33
Northwestern	639.88	3,031	$61.01	963	....do	12	54
Pacific	.....	.....	.....	574	Twice, several tables three times.	22	5
Western	1,071.38	16,253	.....	1,080	Twice	16	6
Marion	975.14	1,315	.....	1,272	Once in new, three times in old hall.	22	5
Central	[3]	[3]	[3]	2,076	Twice	57	125
Southern	1,710.95	20,538	.....	1,232	Twice, several tables three times.	33	29
Total	4,920.83	49,842	61.01	8,147		182	257

[1] Rooms in main building.
[2] Basement under dining hall used.
[3] Included in data given under Quartermaster's Department.

TABLE 27.—*Commissary department—Issues to dining hall.*

Branches.	Average per day for December, 1895.			Average per day for June, 1896.			Average per day for December, 1895.		Average per day for June, 1896.	
	Amount, in pounds, issued.	Cost.	Members present in barracks.	Amount, in pounds, issued.	Cost.	Members present in barracks.	Amount, in pounds, per man.	Cost per man.	Amount, in pounds, per man.	Cost per man.
Eastern	6,057	$226.26	1,560	5,475	$242.17	1,451	3.88	$0.145	3.77	$0.167
Northwestern	5,908	231.30	1,900	5,145	211.53	1,800	3.11	.122	2.86	.118
Pacific	4,151	162.20	1,277	5,036	168.12	1,312	3.25	.127	3.84	.128
Western	7,238	294.63	2,163	6,266	230.96	1,924	3.35	.136	3.26	120
Marion	3,717	131.78	1,244	3,178	121.31	1,117	2.99	.106	2.85	.109
Central	15,644	640.48	4,387	15,563	617.56	4,198	[1]3.57	.146	[1]3.71	.147
Southern	8,908	432.24	2,601	8,568	406.78	2,707	3.42	.166	3.17	.150
Total	51,623	2,118.83	15,132	49,231	1,998.43	14,509	3.41	.140	3.39	.138

[1] Gross weight.

TABLE 28.—*Commissary department—issues to hospital.*

Branches.	Average per day for December, 1895.			Average per day for June, 1896.			Average per day for December, 1895.		Average per day for June, 1896.	
	Amount issued.	Cost.	Members present in hospital.	Amount issued.	Cost.	Members present in hospital.	Amount per man.	Cost per man.	Amount per man.	Cost per man.
	Pounds.			*Pounds.*			*Lbs.*		*Lbs.*	
Eastern	1,572	$57.28	390	1,435	$60.08	360	4.03	$0.147	3.99	$0.167
Northwestern	2,204	80.10	500	2,058	73.27	500	4.41	.160	4.12	.147
Pacific	892	34.15	162	1,081	36.90	185	5.51	.211	5.84	.199
Western	1,312	58.46	327	1,212	59.21	337	4.01	.179	3.60	.176
Marion	1,250	51.83	257	1,120	45.54	248	4.86	.202	4.51	.184
Central	3,919	115.02	736	4,305	107.75	702	[1]5.33	.156	[1]6.13	.153
Southern	1,973	116.97	550	2,033	101.57	520	3.59	.213	3.91	.195
Total	13,122	513.81	2,922	13,244	484.32	2,852	4.49	.176	4.64	.17

[1] Gross weight.

TABLE 29.—*Commissary department—Swill, outdoor relief.*

Branches.	Swill and garbage.			Outdoor relief.		
	Disposition.	Estimated amount, per month.	Receipts from sale of, for year.	Members receiving, in subsistence.	Members receiving, in other allowances.	Average monthly cost of.
Eastern	Sold to highest bidder by contract annually.	360 to 450 barrels	$600.00	[1]33		$178.20
Northwestern	Sold under contract	18,000 pounds	240.00			
Pacific	Swill fed to hogs; garbage hauled away.					
Western	Taken by civilian daily and fed to hogs.					
Marion	Sold under contract	30 tons	204.00	19	19	131.38
Central	Sold to highest bidder	190,414 pounds	413.93			
Southern	Sent to farm for feeding hogs as required; balance sold when purchaser can be found.	108,000 to 120,000 pounds.	521.40	5		30.95
Total			1,979.33	57	19	341.53

[1] These live outside with their families.

TABLE 30.—*Commissary department—Crockery.*

Branches.	Pieces of crockery in use.	Per cent of breakage of crockery during year.																
		Bowls.	Meat platters.	Mustard pots.	Pepper bottles.	Vinegar bottles.	Dinner plates.	Soup plates.	Sirup pitchers.	Water pitchers.	Vegetable dishes.	Butter plates, individual.	Butter plates, 5 in.	Saltcellars.	Cheese plates.	Saucers, coffee.	Cups, coffee.	Bread plates.
Eastern	6,589	63	13	4	10	0.33	39	9	13	8	47	....	....	....	....	....	....	....
Northwestern	4,650	78	40	2	2	8	51	10	21	42	84	21	24	....	....	....	....	....
Pacific	5,750	60	36	10	....	13	17	.....	12	90	.....	.....	30	10	22	.....	.....	....
Western	11,470	71	24	10	39	44	27	.....	26	42	28	54	....	....	15	31	54	....
Marion	2,136	40.4	21.4	16.4	9.9	19.7	30	.6	15.1	67.2	13.2	....	44.9	.4	17.6	....	....	32.5
Central	11,482	74	20	4	48	23	46	[1]44	13	....	47	....	64	1	6	....	....	21
Southern	11,085	81	53.6	....	....	.....	62	.047	20.5	49	78	....	56.7	....	30	25	48.5	72.3
Total	53,162	....	....	....	....	.....	....	.....	....	....	....	....	....	....	....	....	....	....

[1] Deep round plates.

TABLE 31*a*.—*Medical department.*

Branches.	Capacity for patients.		Patients.						
			June 30, 1895.		June 30, 1896.		Average daily.		
	Hospital.	Convalescent companies.	Hospital.	Convalescent companies.	Hospital.	Convalescent companies.	In hospital.	In convalescent companies.	At sick call.
Eastern	292	40	184	73	266	27	278	38	69
Northwestern	169	103	140	87	148	88	172	91	75
Pacific	146	[1] 23	64	92	160	30	94	66	31
Western	[2] 200	109	144	104	190	94	177.9	90.6	25
Marion	224	64	197	22	203	53	213	53	85
Central	646	355	527	355	533	353	605	340	115
Southern	400	([3])	415	209	389	228	338	231	233
Total	2,077	694	1,671	942	1,889	873	1,877.9	909.6	633

Branches.	Principal diseases and percentage of each to whole number.			Local diseases reported.
	Chronic.	Acute.	Surgical.	
Eastern	Heart, 12.61; nervous, 10.16; pulmonary, 7.18; alimentary, 6.26; senility, 5.04; rheumatism, 2.13.	Pulmonary, 1.23; abscesses, etc., 1.31; arthritis and synovitis, 1.30; alimentary, 0.08; genito-urinary, 0.07.	Genito-urinary, 6.09; hernia, 3.37; varicose veins, 2.07; rectum, 1.35.	Pulmonary affections and inflammatory rheumatism frequently due to climatic conditions.
Northwestern	[4] Rheumatism, senile debility, paraplegia, hemiplegia, senile dementia, cystitis, phthisis, pulmonalis, heart disease.	[4] Catarrh, bronchitis, diarrhea, rheumatism, inebriation.	[4] Piles, fractures, abscesses, ulcers, dislocations, contused and incised wounds.	None.
Pacific	Senile debility, 26; catarrh of stomach, 19; bronchitis, 10; heart, mitral affection, 8; dilatation of heart, 6; hemiplegia, 6.	Bronchitis, 45; catarrh of stomach, 20; dysentery, 13; enteritis, 10; alcoholism, 8.	Hernia, 50; hemorrhoids, 13; eye diseases, 12; ear diseases, 11; cystitis, 10.	None.
Western	Senile debility, 27.9; rheumatism, 27.6; paralysis, 16.4; tuberculosis, 11.4; asthma, 7.7; diarrhea, 4.8; eye diseases, 4.2.	Malarial fever, 62.4; influenza, 13.5; erysipelas, 12.8; pneumonia, 11.3.	Cystitis, 23.6; ulcers, 22.6; wounds, 21.7; cancers, 12.2; fractures, 15.1; syphilis, 4.7.	Malarial fever and influenza.
Marion	Rheumatism, 11.7; disease of heart, 8.1; diarrhea, 3.3; bronchitis, 3.15.	Malaria, 6.3; myalgia, 1.9; pneumonia, 0.37; articular rheumatism, 0.37.	Hemorrhoids, 3.7; inguinal hernia, 2.3; varicose ulcers, 2.25; anal fistula, 0.6.	Malaria.
Central	Paralysis, 10; rheumatism, 35; nephritis, 20; heart disease, 10; pulmonary diseases, 8; gastritis, 2; nasopharyngeal catarrh, 15.	Pneumonia, 50; catarrh, 20; gastritis, 5; catarrhal conjunctivitis, 10; nervous diseases, 5; nephritis, 10.	Tumors, 30; ulcers, 30; necrosis, 10; hemorrhoids, 10.	None.
Southern	Rheumatism, 72; partial palsies, 62; nephritis, 40; phthisis, 11; bronchitis, 80; pulmonary fibrosis, 31; general malaria, 19; general valvular disease, 73.	Pneumonia, 7; dysentery, 11; delirium tremens, 4; hepatitis, 3; gastritis, 11; cystitis, 19.	Erysipelas, 2½	Acute gastritis due to alcoholism, acute cystitis due to gravel, indolent leg ulcers due to gunshot wound and injuries.

[1] Excluding attic.
[2] Exclusive of insane ward (capacity, 40), and old men's building (capacity, 49).
[3] Not reported.
[4] Percentage not reported.

TABLE 31*b*.—*Medical department.*

Branches.	Patients admitted during year.		Patients discharged cured during year.		Total patients treated during year.	Average days each case was treated.	Number of deaths.				Causes of death.			
	To hospital.	To convalescent barracks.	From hospital.	From convalescent barracks.			In hospital.	In convalescent quarters.	Elsewhere on reservation.	Outside of Home.	Natural.	Violence.	Suicide.	Result of accidents.
Eastern	607	52	236	3	2,505	43	91	.....	4	27	119	....	1	2
Northwestern	693	70	546	114	3,072	42	111	.....	6	19	128	....	....	8
Pacific	418	222	63	.....	774	77	68	.....	1	14	74	....	2	7
Western	871	251	660	40	4,479	[1]71.5	130	7	1	26	158	1	2	3
Marion	535	200	159	5	2,598	[2]181.6	61	.....	4	16	76	1	1	3
Central	2,037	559	1,358	56	6,193	15	307	2	11	58	[3]317	([3])	[3]2	[3]1
Southern	542	256	382	30	1,125	7	159	1	1	46	[3]157	([3])	[3]3	[3]1
Total	5,703	1,610	3,404	248	20,746	.....	927	10	28	206	1,029	2	11	25

[1] Hospital patients only.
[2] Hospital and convalescent patients.
[3] Exclusive of deaths outside of Home.

TABLE 31*c*.—*Medical department.*

Branches.	Average age at death.	Death rate per 1,000—		Number buried at Home cemetery during year.	Cost of funeral at Home.	Coffins.		Average cost of hospital ration per man per day, including extra diet.
		Of whole number cared for.	Of average present and absent.			Cost.	Where made.	
								Cents.
Eastern	63.7	40.22	50.91	80	$10.49	$3.50	Augusta, Me	17.44
Northwestern	66.1+	39.93	50.46	117	16.65	7.50	Milwaukee, Wis	19.50
Pacific	64.8+	37.58	46.89	74	15.00	8.45	San Francisco, Cal	17.00
Western	63.1—	39.93	52.49	138	7.80	3.46	At the Home	18.01
Marion	61.28	32.36	45.35	66	8.93	4.96	.....do	16.10
Central	66.54	52.93	65.20	306	6.78	3.52	.....do	18.69
Southern	62	41.68	49.9	154	([1])	1.41	.....do	20.97
Total	64.42	42.83	54	935	6.78 to 16.65	.....	.....	18.55

Branches.	Hospital employees.					Ratio of hospital employees to—	
			Annual cost.				
	Members.	Civilians.	Members.	Civilians.	Total.	Per capita.	Total number of patients treated during year. One to—	Average daily sick. One to—
Eastern	70	12	$7,464.00	$7,080.00	$14,544.00	$177.37	30.5	4.7
Northwestern	121	17	15,986.00	5,112.00	21,098.00	152.88	22.3	2.4
Pacific	66	8	7,530.84	2,336.67	9,867.51	133.34	10.5	2.6
Western	77	13	9,378.00	9,620.00	18,998.00	211.09	49.7	3.3
Marion	37	15	3,630.00	5,372.00	9,002.00	173.12	50	6.7
Central	172	27	18,378.80	10,526.52	28,905.32	145.25	31.1	5.3
Southern	91	17	([1])	([1])	([1])	.....	10.4	7.4
Total	634	109	[2]62,367.64	[2]40,047.19	[2]102,414.83	[2]161.28	27.9	4.6

[1] Not reported.
[2] Southern Branch not included.

TABLE 31*d*.—*Medical department.*

Branches.	Patients to each bath tub.	Drugs, chemicals, and pharmaceutical preparations.					What sanitary inspection and hygienic reports have surgeons submitted to higher authority during year?
		Number in use.	Number bought during year.	Number prepared in dispensary.	Amount paid for same during year.	What ten have been most used during year?	
Eastern	23	337	247	45	$4,255.47	Carbolic. acidum; fld. extractum digitalis; fld. extractum rhamni pursha; magnesii sulphas; malt and similar tonics; morphinæ sulphas; potassii iodidum; phenacetin; spiritus frumenti; salts of ammonia.	Verbal and written to governor from time to time. No blanks for the purpose.
Northwestern	23	250	50	200	[1]	Magnesium sulphate; iodide of potash; calomel; morphine; acetanilid; pepsin; chloral; bromide of potash; senna; quinine.	Special report to the Inspector-General of the Army and to assistant inspector-general of the Home.
Pacific	40	77	62	15	1,740.10	Quinine; morphine; phenacetin; antipyrine; chloralamid; opium; elixir of iron, quinine, and strychnia; potassium iodide; potassium bromide; fld. extract of cascara.	Monthly to governor and annually to president Board of Managers.
Western	30	443	241	148	4,200.90	Potassium bromide; fld. ext. cascara; fld. ext. digitalis; fld. ext. hydrastis; potassium iodide; pepsin; quinine; sodium salicylate; sodium phosphate; whisky.	Weekly and annual reports.
Marion	56	234	149	44	5,820.86	Alcoholic liquors; quinine; opium and its compounds; epsom salts; nux vomica; soda bicarbonate; carbolic acid; compound cathartic pills; rhubarb and pepsin.	Weekly to governor and annual report to Board of Managers.
Central	28 to 40	225	[1]	[1]	13,556.01	Whisky; wines; quinine; morphine; phenacetin; acetanilid; potassium bromide; carbolic acid; magnesium sulphate; compound cathartic pills.	None.
Southern	40	457	343	87	3,904.72	Epsom salts; rochelle salts; quinine sulphate; salol; bismuth subnitrate; gentian root; fluid extract nux vomica; castor oil; iodide potash; bromide potash.	Almost daily consultations with the governor.
Total	23 to 56	77 to 457	50 to 343	15 to 200	[2]33,478.06		

[1] Not reported.

[2] Northwestern Branch not included.

TABLE 31*e*.—*Per cent of deaths to average sick for the years 1892–1896.*

Branches.	1892.			1893.			1894.			1895.			1896.			Average per cent.
	Number died.	Average sick.	Per cent.	Number died.	Average sick.	Per cent.	Number died.	Average sick.	Per cent.	Number died.	Average sick.	Per cent.	Number died.	Average sick.	Per cent.	
Central	393	1,133	35	305	1,054	30	350	908	38	321	914	35	378	901	42	35.6
Northwestern	112	239	47	130	233	56	118	274	43	131	222	60	136	237	57	52
Eastern	100	182	55	105	229	46	120	237	50	106	262	40	122	298	41	45.8
Southern	213	655	32	200	617	32	192	630	30	220	650	34	206	659	31	32.1
Western	140	180	78	174	216	80	164	279	60	150	238	63	164	270	60	67
Pacific	56	68	82	59	75	79	56	86	65	61	137	44	83	172	48	58.5
Marion	43	68	63	56	87	64	47	137	34	71	141	50	81	255	32	43.3
Total	1,057	2,525	42	1,029	2,511	40.9	1,047	2,551	41	1,060	2,564	41.3	1,170	2,792	41.8	41.4

TABLE 31*f*.—*Per cent of average sick to average present for the years 1892–1896.*

Branches.	1892.			1893.			1894.			1895.			1896.			Average.
	Average sick.	Average present.	Per cent.	Average sick.	Average present.	Per cent.	Average sick.	Average present.	Per cent.	Average sick.	Average present.	Per cent.	Average sick.	Average present.	Per cent.	Per cent.
Central	1,133	4,548	25	1,054	4,534	23	908	4,699	19	914	4,767	19	901	4,982	18	20.8
Northwestern	239	1,976	12	233	2,012	11	274	2,089	13	222	2,230	10	237	2,313	10	11.3
Eastern	182	1,553	12	229	1,606	14	237	1,687	14	262	1,777	15	298	1,855	16	14.2
Southern	655	2,670	24	617	2,729	23	630	2,871	22	650	3,000	22	659	3,131	21	22.3
Western	180	2,044	9	216	2,039	11	279	2,188	13	238	2,261	11	270	2,340	11	10.9
Pacific	68	652	10	75	818	9	86	1,000	9	137	1,233	11	172	1,408	12	10.5
Marion	68	770	9	87	920	9	137	1,064	13	141	1,209	12	255	1,422	18	12.8
Total	2,525	14,213	18	2,511	14,658	17	2,551	15,598	16	2,564	16,477	15.5	2,792	17,451	16	16.3

TABLE 32.—*Mental alienation and blindness.*

Branches.	Insane members.			
	Number showing indications of disordered mind during year.	Principal classes of illusions.	Number sleeping under the level of the ground.	What recreation and amusement afforded them?
Eastern	114	Hallucinations of persecution; illusions of vision and hearing; melancholia and exaltation.	0	Pictorial and newspapers, and walking with an attendant.
Northwestern	36	Persecution and exaltation	0	Riding, walking, boating, music, and general.
Pacific	26	Melancholia, hypochondriasis, dementia.	0	None special.
Western	57	Conspiracy to poison; to blow him up with dynamite; to be court-martialed and shot; visions of grandeur and wealth; swindled out of fortune, etc.	57	Exercise about grounds; playing cards; reading books and papers.
Marion	27	Fear of bodily injury and erroneous inceptions of time and place.	0	Daily excursions into the grove under guard.
Central	290	Senile, paralytic, epileptic, and alcoholic dementia; acute and chronic mania.	0	Some are allowed guarded privileges; bad cases take open-air walks with attendants.
Southern	72	Seeing and hearing threats against life and of persecution.	23	None.
Total	622		80	

TABLE 32.—*Mental alienation and blindness*—Continued.

Branches.	Insane members.					Blind members.			
	Number in close confinement.	Facilities ample to properly care for them?	Members sent to insane asylum during year.	Average annual insane at Home.	Average sent annually to asylum.	Number totally blind.	Number with impaired eyesight unable to read.	Number employed to read to the blind.	Number of blind to each reader.
Eastern	14	Occasionally crowded	16	41	18	16	26	1	20
Northwestern	0	Yes; for such as ought to be cared for in the Home.	9	45	9	9	58	2	50
Pacific	0	No facilities for proper care of incurable or violent insane, and they are at once sent to asylum.	7	[1]	[1]	9	18	1	8
Western	28	No	13	44	15	13	27	1	[3]
Marion	0	No	11	15.6	6.3	10	13	1	23
Central	3 to 10	No	32	155	40	46	193	1	46
Southern	6	No	15	14	4	13	25	1	All.
Total	51 to 58		103	314.6[2]	92.3[2]	116	360	8	147

[1] Not reported. [2] Pacific Branch not included. [3] Variable.

TABLE 33.—*Statement of money accountability of Branch treasurers—General and special funds.*

Date.	Appropriation account.	Pension fund.	Post fund.	Improvement fund.	Support, 1894.	Support 1895.
	Receipts, including balance on hand last inspection.					
Oct. 19, 1895	Eastern Branch	$233,588.01	$57,500.69			$3,054.51
Oct. 28, 1895	Central Branch	899,015.79	174,486.92		$7,042.70	16,136.94
Nov. 2, 1895	Marion Branch	190,330.66	29,096.30		2,830.46	6,924.19
Nov. 11, 1895	Northwestern Branch	243,888.16	54,751.60			5,078.54
Nov. 19, 1895	Western Branch	335,714.70	36,369.00	$840.68		2,892.98
Nov. 30, 1895	Pacific Branch	136,899.90	17,157.37		104.06	3,800.75
Dec. 14, 1895	Southern Branch	441,821.30	84,466.11			8,528.66
	Total to be accounted for	2,481,258.52	453,827.99	840.68	9,977.22	46,416.57
	Expended and transferred.					
July 21, 1896	Eastern Branch	196,691.48	43,172.64			116.20
Sept. 14, 1896	Central Branch	667,716.64	164,649.55		7,042.70	16,136.94
Sept. 7, 1896	Marion Branch	187,448.33	23,776.35		2,830.46	6,852.65
July 31, 1896	Northwestern Branch	217,597.98	42,415.85			5,078.54
Aug. 31, 1896	Western Branch	314,510.48	27,523.87	582.80		2,892.98
Aug. 15, 1896	Pacific Branch	127,544.60	11,060.19		104.06	3,799.25
Sept. 30, 1896	Southern Branch	414,114,95	71,150.75			8,528.66
	Total expended and transferred	2,125,624.46	383,749.20	582.80	9,977.22	43,405.22
	Balance on hand	355,634.06	70,078.79	257.88		3,011.35

TABLE 33.—*Statement of money accountability of Branch treasurers, etc.*—Continued.

Date.	Appropriation account.	Current expenses, 1896.	Subsistence, 1896.	Clothing, 1896.	Household, 1896.	Hospital, 1896.
	Receipts, including balance on hand last inspection.					
Oct. 19, 1895	Eastern Branch	$19,136.52	$9,838.52	$2,024.76	$37,784.15	$20,283.45
Oct. 28, 1895	Central Branch	63,209.24	212,025.32	4,936.47	76,977.60	37,193.88
Nov. 2, 1895	Marion Branch	18,151.14	61,544.41	2,089.61	8,985.07	13,611.14
Nov. 11, 1895	Northwestern Branch	25,597.84	93,248.59	3,170.13	43,170.00	17,953.06
Nov. 19, 1895	Western Branch	21,121.20	95,080.08	2,059.85	43,250.95	18,350.27
Nov. 30, 1895	Pacific Branch	17,310.78	62,604.76	1,503.39	17,515.25	13,225.27
Dec. 14, 1896	Southern Branch	23,695.31	132,188.68	2,169.43	39,575.95	17,908.43
	Total to be accounted for	188,222.03	750,530.36	17,953.64	267,258.97	138,525.50
	Expended and transferred.					
July 21, 1896	Eastern Branch	18,643.90	89,491.47	1,414.25	29,785.54	18,110.15
Sept. 14, 1896	Central Branch	62,963.58	211,514.07	4,812.31	76,900.24	37,192.26
Sept. 7, 1806	Marion Branch	18,057.22	61,204.54	2,045.37	8,772.94	13,378.40
July 81, 1896	Northwestern Branch	25,294.53	92,956.74	2,870.13	42,670.00	17,724.27
Aug. 31, 1896	Western Branch	20,671.20	94,761.83	2,005.85	42,937.96	17,983.73
Aug. 15, 1896	Pacific Branch	16,978.86	62,535.56	1,466.63	17,633.78	13,197.44
Sept. 30, 1896	Southern Branch	23,343.41	131,888.68	2,006.93	39,106,71	17,688.21
	Total expended and transferred	185,952.70	744,352.89	16,621.47	257,807.17	135,274.46
	Balance on hand	2,269.33	6,177.47	1,332.17	9,451.80	3,251.04

Date.	Appropriation account.	Transportation, 1896.	Repairs, 1896.	Farm, 1896.	Current expenses, 1897.	Subsistence, 1897.	Clothing, 1897.
	Receipts, including balance on hand last inspection.						
Oct. 19, 1895	Eastern Branch	$1,222.82	$13,216.26	$8,237.26	$410.51	.....	.....
Oct. 28, 1895	Central Branch	1,214.49	36,697.15	12,224.25	13,790.17	$49,140.25	$1,232.81
Nov. 2, 1895	Marion Branch	879.18	7,540.69	3,552.32	3,854.50	13,342.89	330.00
Nov. 11, 1895	Northwestern Branch	1,009.43	15,315.70	6,264.21	764.30	102.50	11.84
Nov. 19, 1895	Western Branch	1,926.24	17,862.04	6,266.94	4,207.30	21,567.79	593.36
Nov. 30, 1895	Pacific Branch	2,494.65	15,355.66	6,890.07	1,865.55	6,734.42	161.52
Dec. 14, 1895	Southern Branch	1,490.82	18,435.57	10,213.10	6,767.82	46,092.25	350.00
	Total to be accounted for	10,237,63	124,423.07	53,648.15	31,660.15	136,980.10	2,679.53
	Expended and transferred.						
July 21, 1896	Eastern Branch	1,076.92	12,753.55	7,311.97	410.51	.....	.....
Sept. 14, 1896	Central Branch	1,203.43	36,242.74	12,133.64	10,656.37	45,081.31	667.23
Sept. 7, 1896	Marion Branch	757.49	7,495.56	3,505.63	3,739.42	6,158.31	359.89
July 31, 1896	Northwestern Branch	739.12	15,015.70	6,032.16	30.35	.....	.....
Aug. 31, 1896	Western Branch	1,807.54	17,532.82	6,038.92	2,032.93	9,289.97	101.85
Aug. 15, 1896	Pacific Branch	2,351.61	15,190.96	6,828.90	1,516.47	5,666.41	62.50
Sept. 30, 1896	Southern Branch	1,420.82	18,235.57	10,075.19	4,289.95	30,906.65	331.12
	Total expended and transferred.	9,356.93	122,466.90	51,926.41	22,676.00	97,102.65	1,522.59
	Balance on hand	880.70	1,956.17	1,721.74	8,984.15	39,877.45	1,156.94

TABLE 33.—*Statement of money accountability of Branch treasurers, etc.*—Continued.

Date.	Appropriation account.	House-hold, 1897.	Hospital, 1897.	Trans-portation 1897	Repairs, 1897.	Farm, 1897.	Total.
	Receipts, including balance on hand last inspection.						
Oct. 19, 1895	Eastern Branch					$19.00	$490,316.46
Oct. 28, 1895	Central Branch	$15,118.56	$9,324.65	$250.00	$10,803.37	3,095.25	1,643,915.81
Nov. 2, 1895	Marion Branch	1,600.00	2,425.00	250.00	2,000.00	1,100.00	370,437.56
Nov. 11, 1895	Northwestern Branch					49.81	510,375.71
Nov. 19, 1895	Western Branch	7,000.00	4,400.00	333.33	4,103.49	1,695.61	625,635.81
Nov. 30, 1895	Pacific Branch	2,002.22	1,500.75	250.00	1,833.33	857.89	310,067.59
Dec. 14, 1695	Southern Branch	12,604.04	6,021.88	200.00	6,250.00	3,566.61	862,345.96
	Total to be accounted for	38,324.82	23,672.28	1,283.33	24,990.19	10,384.17	4,813,094.90
	Expended and transferred.						
July 21, 1896	Eastern Branch						418,978.58
Sept. 14, 1896	Central Branch	12,836.21	8,201.63	246.48	5,769.89	2,799.41	1,384,766.63
Sept. 7, 1896	Marion Branch	1,209.04	2,390.22		2,041.86	952.60	352,976.28
July 31, 1896	Northwestern Branch						468,425.37
Aug. 31, 1896	Western Branch	2,551.14	2,503.57		2,138.41	911.83	568,779.68
Aug. 15, 1896	Pacific Branch	1,997.86	1,325.97	19.20	1,193.20	853.01	291,326.46
Sept. 30, 1896	Southern Branch	8,511.00	4,005.18	197.39	2,076.35	1,463.30	789,340.82
	Total expended and transferred	27,105.25	18,426.57	463.07	13,219.71	6,980.15	4,274,593.82
	Balance on hand	11,219.57	5,245.71	820.26	11,770.48	3,404.02	538,501.08

SPECIAL APPROPRIATIONS.

Date.	Appropriation account.	Gas house, 1895.	New barracks, 1895,	Boiler plant, 1895.	Tunnel, 1895.	Sewerage, 1895.	New barracks, 1896.
	Receipts, including balance on hand last inspection.						
Oct. 19, 1895	Eastern Branch						$2,794.16
Oct. 25, 1895	Central Branch	$4,006.46					
Nov. 2, 1895	Marion Branch		$5,568.91				35,010.20
Nov. 11, 1895	Northwestern Branch			$355.11	$100.04	$1,116.64	
Nov. 19, 1895	Western Branch						
Nov. 30, 1895	Pacific Branch						11,773.39
Dec. 14, 1895	Southern Branch						20,048.80
	Total to be accounted for	4,006.46	5,568.91	355.11	100.04	1,116.64	69,626.55
	Expended and transferred.						
July 21, 1896	Eastern Branch						2,777.16
Sept. 14, 1896	Central Branch	4,006.46					
Sept. 7, 1896	Marion Branch		5,568.91				28,661.70
July 31, 1896	Northwestern Branch			355.11	100.04	1,116.64	
Aug. 31, 1896	Western Branch						
Aug. 15, 1896	Pacific Branch						11,773.39
Sept. 30, 1896	Southern Branch						20,048.80
	Total expended and transferred	4,006.46	5,568.91	355.11	100.04	1,116.64	63,261.05
	Balance on hand						6,365.50

TABLE 33.—*Statement of money accountability of Branch treasurers, etc.*—Continued.

SPECIAL APPROPRIATIONS—Continued.

Date.	Appropriation account.	Dining hall, 1896.	Stand pipe, 1896.	Headquarters building, 1896.	Quartermaster and commissary storehouses, 1896.	Main kitchen, 1896.	Electric plant, 1896.
	Receipts, including balance on hand last inspection.						
Oct. 19, 1895	Eastern Branch						
Oct. 25, 1895	Central Branch						
Nov. 2, 1895	Marion Branch	$19,532.25	$5,435.50				
Nov. 11, 1895	Northwestern Branch			$10,000.00	$4,000.00		
Nov. 19, 1895	Western Branch						
Nov. 30, 1895	Pacific Branch					$8,138.29	$5,688.25
Dec. 14, 1895	Southern Branch						
	Total to be accounted for	19,532.25	5,435.50	10,000.00	4,000.00	8,138.29	5,688.25
	Expended and transferred.						
July 21, 1896	Eastern Branch						
Sept. 14, 1896	Central Branch						
Sept. 7, 1896	Marion Branch	19,507.25	5,435.50				
July 31, 1896	Northwestern Branch			10,000.00	3,803.83		
Aug. 31, 1896	Western Branch						
Aug. 15, 1896	Pacific Branch					8,138.29	5,688.25
Sept. 30, 1896	Southern Branch						
	Total expended and transferred.	19,507.25	5,435.50	10,000.00	3,803.83	1,138.29	5,688.25
	Balance on hand	25.00			196.17		

Date.	Appropriation account.	Guardhouse, 1896.	New barracks, 1897.	Boiler house, 1897.	Gas well, etc., 1897.	Leasing land, 1897.	Repairs to latrine, 1897.
	Receipts, including balance on hand last inspection.						
Oct. 19, 1895	Eastern Branch						
Oct. 25, 1895	Central Branch						
Nov. 2, 1895	Marion Branch		$4,283.36	$2,500.00	$5,000.00	$1,300.00	
Nov. 11, 1895	Northwestern Branch						
Nov. 19, 1895	Western Branch						
Nov. 30, 1895	Pacific Branch		2,000.00	2,500.00			
Dec. 14, 1895	Southern Branch	$4,000.00					$3,500.00
	Total to be accounted for	4,000.00	6,283.36	5,000.00	5,000.00	1,300.00	3,500,00
	Expended and transferred.						
July 21, 1896	Eastern Branch						
Sept. 14, 1896	Central Branch						
Sept. 7, 1896	Marion Branch		4,283.36	2,500.00	1,000.00	300.00	
July 31, 1896	Northwestern Branch						
Aug. 31, 1896	Western Branch						
Aug. 15, 1896	Pacific Branch		152.95	199.30			
Sept. 30, 1896	Southern Branch	4,000.00					16.95
	Total expended and transferred.	4,000.00	4,436.31	2,699.30	1,000,00	300.00	16.95
	Balance on hand		1,847.05	2,300.70	4,000.00	1,000.00	3,483.05

TABLE 33.—*Statement of money accountability of Branch treasurers, etc.*—Continued.

SPECIAL APPROPRIATIONS—Continued.

Date.	Appropriation account.	Reimbursement post fund, boilers, 1897.	Gasoline plant, 1897.	Sewage pumping works, 1897.	Total special appropriations.	Total general and special funds.	Grand total.
	Receipts, including balance on hand last inspection.						
Oct. 19, 1895	Eastern Branch	.....	.....	.....	$2,794.16	$490,316.46	$493,110.62
Oct. 25, 1895	Central Branch	.....	.....	.....	4,006.46	1,643,915.81	1,647,922.27
Nov. 2, 1895	Marion Branch	.....	.....	.....	78,630.22	370,437.56	449,067.78
Nov. 11, 1895	Northwestern Branch	.....	.....	.....	15,571.79	510,375.71	525,947.50
Nov. 19, 1895	Western Branch	.....	.....	.....	.....	625,635.81	625,635.81
Nov. 30, 1895	Pacific Branch	.....	.....	.....	30,099.93	310,067.59	340,167.52
Dec. 14, 1895	Southern Branch	$4,200.00	$6,000.00	$18,240.92	55,989.72	862,345.96	918,335.68
	Total to be accounted for	4,200.00	6,000.00	18,240.92	187,092.28	4,813,094.90	5,000,187.18
	Expended and transferred.						
July 21, 1896	Eastern Branch	.....	.....	.....	2,777.16	418,978.58	421,755.74
Sept. 14, 1896	Central Branch	.....	.....	.....	4,006.46	1,384,766.63	1,388,773.09
Sept. 7, 1896	Marion Branch	.....	.....	.....	67,256.72	352,976.28	420,233.00
July 31, 1896	Northwestern Branch	.....	.....	.....	15,375.62	468,425.37	483,800.99
Aug. 31, 1896	Western Branch	.....	.....	.....	.....	568,779.68	568,779.68
Aug. 15, 1896	Pacific Branch	.....	.....	.....	25,952.18	291,326.46	317,278.64
Sept. 30, 1896	Southern Branch	4,200.00	.....	2,115.65	30,381.40	789,340.82	819,722.22
	Total expended and transferred	4,200.00	.....	2,115.65	145,749.54	4,274,593.82	4,420,343.36
	Balance on hand	.....	6,000.00	16,125.27	41,342.74	538,501,08	579,843,82

TABLE 34.—*Statement of the money accountability of the general treasurer, from January 1 to October 20, 1896.*

Appropriation account.	General fund.				State aid.		Total.
	1894.	1895.	1896.	1897.	1896.	1897.	
Balance on hand last inspection	.....	$29,173.89	$46,476.80	.....	$10,044.58	.....	$85,695.27
Received since:							
By Treasury drafts	$1,309.10	18,813.88	1,259,671.00	$883,070.85	618,750.00	$181,250.00	2,962,864.83
By transfers	9,977.22	33,696.22	55,230.03	.....	.....	.....	98,903.47
From sales	.....	.....	2,691.53	2.20	.....	.....	2,693.73
Disallowed by United States accounting officers	.....	77.98	.....	.....	.....	.....	77.98
Overpayments refunded	.....	.....	27.02	.....	.....	.....	27.02
Total to be accounted for	11,286.32	81,761.97	1,364,096.38	883,073.05	628,794.58	181,250.00	3,150,262.30
Credits claimed:							
Expended, as shown by vouchers	.....	18,813.88	157,711.02	34,678.33	607,211.65	.....	818,414.88
Transferred	.....	.....	1,098,693.03	581,505.67	.....	.....	1,680,198.70
Deposited to credit of Treasurer United States	9,977.22	62,810.39	99,785.68	.....	21,582.93	.....	194,156.22
Total expended and transferred	9,977.22	81,624.27	1,356,189.73	616,184.00	628,794.58	.....	2,692,769.80
Balance on hand	1,309.10	137.70	7,906.65	266,889.05	.....	181,250.00	457,492.50

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