

T H E S I S

THE DESIGNING AND PATENTING OF AN IMPROVEMENT IN HAY TOOLS

by

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The Designing and Patenting of an Improvement  
in Hay Tools.

Few of the younger generation of today realize that practically every tool that is in present use on the farm is the product of the inventitive genius of the past century. It is difficult for the average person to believe that the Machinery Age in which we are now living had its inception in times so recent as to be easily remembered by our grandparents or even by our parents. Such phenomenal progress seems impossible of accomplishment in so short a time, especially when we consider that prior to this short period to which we allude, man had apparently been content to toil ceaselessly in the fields, unaided by other than the most rudimentary tools. It is true that Pliny tells of a reaping machine in use in Gaul over forty centuries ago, which incorporated some of the ideas found in present-day harvesters, but the decline of Gallic field husbandry carried with it the memory of this labor-saving device, and for the forty centuries following the scythe, the reaping hook, and the cradle were the only practical tools for gathering the harvest.

Necessity is said to be the mother of invention and perhaps it is. Nevertheless a necessity for labor-saving tools certainly has existed since the inception of Agriculture, yet for centuries invention did not result. The reason for this is to be found in the fact that prior to the nineteenth century, no protection whatever was accorded the inventor of a useful article, and no sooner had one been brought forth than unscrupulous manufacturers siezed upon

it and left the inventor entirely without resource. The effect of course was to place a positive damper upon invention, for no one could well afford to spend time and money perfecting an implement unless assured that he would receive substantial remuneration, in some form or other, for his efforts.

With the adoption of the Constitution of the United States of America this condition of affairs came to an end, for by this instrument the inventor was guaranteed protection in the fruits of his genius for a long period of years. Although the framers of the Constitution knew that this clause would encourage useful inventions even they were doubtless ignorant of the tremendous impetus they were giving to Agriculture and every branch of dependent science by the insertion of this provision, for the benefits that have accrued to humanity because of it are impossible of computation. In place of the hoe, the spade, the primitive plow, the reaping hook, the cradle, the flail, and the rude ox-cart, we now have the combined motor plow and seeder, the self-binder, the harvester that cuts, threshes and sacks the grain at a single operation, and the ponderous grain barge pulled by a gasoline tractor that is capable of drawing immense loads. The comparisons of this nature that can be made are almost countless. Moreover, such progress was largely brought about by that wise provision of the United States Constitution which reads, "The Congress shall have power--<sup>8</sup> To promote the progress of science and the useful arts, by securing for limited times, to authors and inventors, the exclusive rights to their respective writings and discoveries."

Although sowing and reaping machinery were first considered

by the early inventors of agricultural tools, the field has gradually enlarged until now it covers every branch of science related to agriculture. Hay tools with which this paper has to deal show a very marked improvement over those of a century ago, although devices for handling the cured hay were impractical until after the middle of the nineteenth century. The first practical devices used were designed to put into operation the large horse fork, and for field use consisted in the main of derrick posts assembled on the principle of a crane, and held in position by guy ropes. Improved forms of these stackers are seen today in our cable and "swing" stacker outfits. With them hay can be stacked much better and faster than by hand, but they are very difficult to move about, require staking down and are dangerous to operate because of the likelihood of guys breaking or stakes pulling up. The principles of these stackers were later embodied in machines having a rigid frame and employing a crane to deposit the load upon the stack. The danger incident to the operation of the derrick stackers was thus obviated but the other objections remained as before.

Besides the principles of the cranes, other methods of hoisting the load were attempted with more or less success, chief among them being the "overshot" and "inclined" plane types. In the former, the load is elevated by means of hoisting arms and pulleys, and swings directly over the frame the arms coming to rest a short distance past the vertical. This tilts the sweep fork teeth past the perpendicular, tips the back supports of the sweep downward, and thus allows the load to slide off the fork and fall up-

on the stack to the rear. The latter type consists of an inclined plane set with its incline toward the stack. The sweep fork containing the load is made to travel up this incline and upon reaching the apex, tilts downward and deposits its load upon the stack to the rear. Two objections are peculiar to these types of stackers --- they always deposit their load in approximately the same place on the stack, thus making long stacks impossible and the load must always be raised to the maximum height before dumping, no matter what the height of the stack may be, thus causing loss of hay in windy weather.

The most noteworthy improvement in stackers, aside from the idea of carriage mounted machines that supply their own hoisting power, came when a triangular hoisting arm, fulcrumed at its upper extremity to an upright pivotal center post, was substituted as a means of elevating the load. The sweep fork containing the load is affixed to the forward extremity of this triangle, and is elevated by means of draft applied forwardly and downwardly to the rear extremity of the triangle, thus swinging the triangle upon its fulcrum, and elevating the load to any desired height, whence it is swung over the stack by means of the pivotal center post and dumped. Means are provided for holding the fork horizontal during the hoisting process. The above machine has no disadvantages peculiar to itself and is today the most satisfactory type of stationary stacker in existence. There are serious objections to it, however,, the following being the most important:

1. The machine is somewhat difficult to move about.
2. Under certain conditions it will tip with the load.

3. The load swings in a circle, and hence cannot be deposited in the center of the stack except at one point.

4. To lower the fork the draft team must be backed a distance equal to the distance they were driven forward while elevating the load.

For several years prior to the perfection of the above style of machine, inventors had been at work on a carriage mounted type of derrick. The first machines of this class were failures because of the highly impractical methods employed with which to elevate the load, a hoisting drum cranked by hand being a feature of one of the earliest types. Not long after this machine appeared an improver hit upon the scheme of placing the hoisting drum on the axle of the forward wheels, from whence it derived its hoisting power, thereby making the most noteworthy single improvement in stackers of any inventor in the history of hay tool development. This one advantage was about the only one possessed by the machine on which it was used, however, and hence brought its inventor but little return for his trouble. Several years later a hoisting frame constructed of uprights, mounted one on each side of a sweep fork, and having "goose necks" at the top, was substituted for the impractical device formerly used. Ropes passing from the sides of the sweep fork over pulleys at the top of the uprights and thence back down to drums affixed to a shaft, transmit the hoisting power, which is obtained in the following manner: A third drum, around which a cable is wound having a loop in its loose end, is affixed solidly to the shaft. As the stacker approaches the stack with its load, the loop end of the cable is dropped over a stake driven for the purpose of engaging this loop, hence as the machine is driven

onward toward the stack the cable is unwound. This turns the drum and of course the shaft to which is affixed the hoisting drums, thus winding the hoisting ropes and elevating the fork. When the fork runs out on the "goose necks" the teeth are tilted downward and the fork load slides off upon the stack. To lower the fork the reverse operation is performed. That is, the machine is backed the same distance it was moved forward in elevating the load. Besides this, the load must be elevated the maximum distance each time before it can be dumped, and several stakes must be driven at each stack if a rick of any size is to be built, consequently the invention falls far short of being a successful machine in the full sense of the word and has not proved to be as good a seller as the stationary machine to which reference was last made.

A study of the foregoing will show that all the necessary elements that go to make up a successful carriage mounted type of stacker had been perfected in some one of the various tools already patented. It only remained for some one to incorporate the good ideas of all into a single machine, when success would be assured. This was done in a very short time. The ideas incorporated from other and earlier machines being a derrick frame mounted on wheels, a hoisting drum mounted on the axle of the forward wheels of the carriage and deriving its power therefrom, a triangular hoisting frame fulcrumed at the upper extremity, and a means for holding the sweep fork, mounted on the forward end of said hoisting arm, in a horizontal position while being elevated.

The features in this machine that may be claimed as new consist mainly in the novel fork frame and derrick frame assembling.

Both of the above frames are of very simple construction, the principles employed being a framework of triangles upwardly converged. The derrick triangles, two in number, meet at the rear and are supported by a single castor wheel, the points of support in front being upon the axle beside the forward wheels. The triangles are held in position at the top by means of a cross-bar, which acts as a support and fulcrum for the hoisting arms, which likewise are composed of two triangles rearwardly converged after the manner of the derrick frame. Aside from the valuable features incorporated from other stackers, this machine possesses superior advantages in economy of construction, simplicity, and strength, and is without doubt the most efficient stacker on the market today. It is open to considerable improvement, however, chief among its defects being the following:

1. To return the fork to the ground after the load has been deposited requires backing the stacker a distance equal to that in which it was moved forward while elevating the load.
2. The construction of the machine gives rise to considerable friction in its parts, and the draft is heavy.
3. The machine is guided entirely by the team and the process is unnecessarily slow and difficult.
4. One of the most expensive operations with which the farmer has to deal is the pitching and stacking of headed grain in harvest. Neither the above stacker, nor any other stacker now on the market will successfully perform this work, all attempt to build such a machine having been, thus far, more or less complete failures.

To design a machine calculated to overcome, in a large measure,



the above objections is the ambition of the writer and his associates. The first step in this direction was made by the invention of a devise by means of which the fork may be lowered while the machine is moving forward. Following this a careful study was made of every hay tool on the market, the object being to discover the strong and weak points of each. This done, the next step was to design and construct a machine comprehending all of the best features of present stackers and such new features as were necessary in order to overcome the difficulties found in machines now on the market. This was a task of considerable magnitude and has required much time and effort.

To begin with, a theoretical machine was designed that embodied the proposed features and working drawings made. From these the necessary patterns were constructed and the castings themselves then founded. The next thing was to set up and operate the machine, the successful consummation of which was, by far, the most difficult of all. Before the parts were all assembled, defects were found that had to be corrected. Other weak points both in design and in construction were brought to light as the machine was put into operation, and defects continued to manifest themselves from time to time until nearly every part of the structure had been modified to a greater or less extent.

As soon as the success of stacker became apparent, reliable patent attorneys were retained and letters patent applied for through the United States Government Patent Office. The united step in this procedure was the drawing up of plans and specifications of the machine, these to be used by the patent attorneys for reference while making what is known as the "preliminary search"

of the records of the Patent Office, the object being to discover whether or not the invention had been anticipated by other patentees and if so to what extent. This search completed, new plans and specifications setting forth the nature and objects of the invention, and the things claimed as new were drawn up by the attorneys and signed by the patentees before a notary, and in the presence of witnesses. These plans and specifications were then filed in the Patent Office, together with a petition praying for letters patent on the claims set forth. All petitions, after they are filed, are treated in exactly the same way, and the following from a handbook on patents outlines the methods of procedure followed in the present and all similar cases:

"As soon as the petition is filed in the Patent Office the inventor is protected against the grant, without his knowledge, of a patent for the same thing to another person. The official receipt is issued by the Patent Office and sent to the inventor when the application is filed. After the application is filed it receives in its due turn, usually from four to six weeks after filing, an official examination, when the Patent Office examiner makes such objections and cites such references to other patents as he thinks proper. (If desired the applicant may ordinarily delay his answer to an official action for one year.)"

These objections and references are examined by the patent attorneys, and an effort made by written and oral argument to revolve the objections and procure an allowance of the patent. "On the second hearing new references and new objections are often cited and further time and labor are then required "on the part of the attorneys" and so on perhaps for a third and fourth hearing." A

copy of one of these objections from the Patent Office examiner follows:

Department of the Interior,  
United States Patent Office,  
Washington, D. C., Sept. 4, 1908.

Mr. Call & Orendorff,  
Care Munn & Co.,  
City.

Stackers - Filed July 1, 1908, Serial No. 441345.

Signed E. B. Moore,  
Commissioner of Patents.

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Case examined.

Page 3, line 21, and page 7, line 14, reference numerals L' and L<sup>o</sup> do not appear on the drawing.

Claim 1 is anticipated by Danielson 675,624, June 4, 1901 (57-Stackers) and by Heintz, 413,854 Oct. 29, 1889, (57-stackers). Attention is also called to Swadley Dec. 27, 1904 (-Stackers).

Claim 1 is accordingly rejected, (Swadley, Dec. 27, 1904 is No. 778,431.)

"When the Patent Office decides to allow the patent, a notice is sent to the applicant stating that the patent has been "allowed" and that the patent will be printed and issued shortly after the final Government fee of twenty-five dollars has been paid. The applicant may pay this at once and have the patent issued without delay, or he may wait six months before making the payment. This time of six months is designed to allow the American inventor an opportunity to file petitions for foreign patents before the United States patent is issued. Many foreign countries will not grant a patent on a device already patented elsewhere."

The cost of an ordinary simple patent is seventy-five dollars. Complicated inventions require more time and labor in preparing and defending claims and of course cost more. The total cost of the patent on the tool hereinafter described was one hundred five dol-

lars. From this it will be readily seen that the cost of the letter letters patent is of little consequence when compared with the cost of designing and putting into practical operation the machine itself, which cost in the present case, counting labor,, has amounted to more than ten times as much.

The extent to which the machine will warrant the claims of its inventors can be measured only by the reception it is given by the buying public. If it meets with the success hoped for it, the harvest hand problem will be solved, for the machine is calculated to do away with all of the pitching incident to harvest -- hence will make it possible for the farmer to dispense with the services of at least two laborers in each harvest crew, thus creating a saving to each wheat raiser of five dollars per day during harvest alone, beside rendering him in a large measured independent of the exacting demands of harvest laborers. The machine will stack all kinds of forage, as well as headed and bundled grain, and can thus be ranked with the farm wagon in point of utility, for it can be used from early spring until late in the fall without cessation.

The plans, specifications, and claims on which letters patent are asked, together with a copy of the petition itself follows:

There are three places to sign, viz.: Petition, end of Specification, and Oath.

P E T I T I O N .

To the Commissioner of Patents:

Your petitioners....William T. McCall and D. Lawrence Orendorff,.....  
 .....citizens.....of the...United States.....and residents  
 of...Manhattan, in the County of Riley, and State of Kansas.....  
 whose post-office address is...K. S. A. C. Box 362, as above;.....  
 pray that Letters Patent may be granted to..them...for the improvement in  
 .....S. T. A. C. K. E. R. S.,.....  
 set forth in the annexed specification; and..they....hereby appoint Munn &  
 Co., of the cities of New York, N. Y., and Washington, D. C.; or accredited  
 agents, ..their..... Attorneys, with full power of substitution and revoca-  
 tion, to prosecute this application, to make alterations and amendments  
 therein, to receive the patent, to transact all business in the Patent Of-  
 fice connected therewith, and to sign ..their.....names to the drawings.

No. 77

Signed at....., in the County of.....  
 and State of.....this.....day of.....19 .

Inventor sign full, including .....  
 middle name, here ----- .....  
 .....

Note.--The Notary, Justice or Consul will please  
 fill in the venue at the top of oath and  
 see that the inventor signs the petition,  
 oath and specification.

L.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, William T. McCall and D. Lawrence Orendorff, citizens of the United States, and residents of Manhattan, in the County of Riley, and State of Kansas, have made certain new and useful improvements in

S T A C K E R S ,

of which the following is a specification.

Our invention is in the nature of a device to be used in the field for the purpose of elevating and piling up hay or grain into stacks. It is intended primarily for the purpose of stacking grain which has been cut by a header, in which the heads of grain with a small proportion of the straw are received into a box-like receptacle and is elevated to pile the same in suitable stacks. The invention is also applicable for use as a hay stacker by simply substituting for the box-like receptacle a fork adapted to cooperate with the longer hay.

It is an improvement upon that general form of stacker in which a triangular frame mounted upon wheels is provided with an elevated framework carrying a trussed triangular fork frame whose outer end is provided with a lifting fork and whose opposite end is connected by means of a rope with a winding drum for elevating the hay or grain. Our invention consists in the novel construction and arrangement of the parts and combinations of parts forming an improved stacking device of the kind described as hereinafter more fully set forth.

In the drawing--

Figure 1 represents a plan view.

Figure 2 a side elevation.

Figure 2<sup>a</sup> a detail view showing a different position of the end of the grain receptacle.

Figure 3 is a front elevation of the entire machine.

Figure 4 is a plan view of the winding drum and its accessories.

Figure 4<sup>a</sup> is a section on line 4<sup>a</sup> - 4<sup>a</sup> of figure 4,

Figure 4<sup>b</sup> is a section on line 4<sup>b</sup> - 4<sup>b</sup> of figure 4.

Figure 5 is a plan view on a larger scale of the steering device,

Figure 6 represents an end view and a plan view of a form of fork frame to be used in the place of the grain box when our invention is applied to stacking hay instead of headed grain.

Referring to figures 1, 2, 3, the frame of the machine is seen mounted upon four wheels, the two large wheels I, I" in front, which are connected to the axle A by the usual ratchet and pawl connections employed in mowers so as to turn the axle when the wheels are moving forward and thus supply power for the operation of the winding drum hereinafter described.

The other two wheels of the frame are arranged in the rear and are shown in J - J" and are constructed on caster wheels and cooperate with the steering devices as hereinafter described.

The main frame of the stacker is mounted upon sills consisting of two side pieces G and G' arranged in triangular relation to each other, resting at the front ends upon the axle and connected at their rear ends to the cross bar G<sup>2</sup>, resting above the caster wheels, as seen in Figure 5. H is a central longitudinal supporting bar connected at its forward end by means of a fork H<sup>2</sup> to the axle A, as seen in Figure 4 and connected at its

rear end to the cross bar  $G^2$ .

Referring to Figs. 1, 2, and 3, the stationary portion of the framework consists of two convergently arranged derrick bars L and  $L^2$  on one side and  $L'$  and  $L^3$  on the other, all of which are mounted upon the sills of the main frame and the apices of which convergent side bars on one side are connected to those on the other side by means of a cross bar M, which forms the fulcrum upon which the hoisting and tilting frame turns which carries the load. This hoisting and tilting frame is composed of the bars P, O, R, arranged in triangular relation, which at the upper end are hung upon the cross bar M, which carry at their outer ends the grain box U and at their rear ends are connected by a rope 1 to the winding drum, by the winding up of which rope upon the drum the frame P, O, R, is tilted and the grain box U raised or lowered. The upper part of the grain box is connected by bars Z, Z, to the top of a frame S, S', M', which latter is fulcrumed upon the cross bar M and has rearwardly extending and rigidly attached members 8, 8, and 10, 10 arranged to cooperate with dumping devices as hereafter described.

Referring now to Figures 4,  $4^a$  and  $4^b$ , the winding device consists of the drum B, to which is rigidly fixed the bevel gear E meshing with a bevel gear F arranged in a plane at right angles and which latter bevel gear F also meshes with another bevel gear D arranged upon the main axle A. Both the drum B with its gear E and the gear D are loose upon the axle A which extends entirely through the same from one running wheel I on one side of the machine to the other one I' on the other side. C is a sliding clutch arranged upon the axle A between the gear wheels E and D and connected to said axle by means of a feather



and groove a, so that said clutch C is free to move longitudinally on the axle but is compelled to rotate rigidly with it. This clutch C is provided with engaging teeth on both its sides, one of which sets of teeth is arranged to engage similar teeth on the gear E and the other of which sets of teeth is arranged to engage the teeth on gear D, the engagement of said clutches being alternate according to the direction of the adjustment of the clutch C. A winding rope 1, see Figure 2, is connected to the rear end of the hoisting frame P, O, R, and extends thence to the winding drum B, seen in Figure 4, around which it is adapted to be wound to turn the hoisting frame P, O, R, upon its fulcrum bar M in raising or lowering the grain box U. On one end of the drum B is arranged a series of ratchet teeth r adapted to be engaged and locked by means of a spring seated detent 2, operated by a pull wire t. The clutch C is embraced by a fork on the end of an elbow lever 3, which is fulcrumed to the yoke-shaped piece H<sup>2</sup>, and which elbow lever is operated by a pull wire W.

When it is desired to lift a load the machine is started forward and the clutch C which slides on the axle A is thrown into engagement with the gear E by means of the lever 3 and pull wire W, which latter passes back to the operator's position, which is upon a platform at the rear end of the machine adjoining the draft appliance K. This causes the drum to wind forward and pulls the rear end of the hoisting frame toward the drum, and raises the front end of the hoisting frame and consequently the load contained within the box U. When the load is raised to the desired height, the clutch C may be disengaged and the drum is prevented from unwinding by means of the pawl 2, which engages with the ratchet teeth r of the drum. When it is desired to lower the load or to return the grain box or hay fork to its position when empty,

the clutch C may be engaged to gear E, the pawl 2 raised by means of the pull rod t and foot lever 4 at the rear of the machine and the machine backed, which will result in the unwinding of the drum and the consequent lowering of the grain box or hay fork, or in the place of this method, the clutch C may be engaged with the gear wheel D by means of the elbow lever 3, the pawl 2 disengaged and the machine started forward. The weight of the load will then cause the gear D to rotate with the clutch C, while the intermediate gear F will cause the gear E to turn in the opposite direction from the axle, thus unwinding the drum and lowering the load while the machine is going forward. This is a great advantage in the saving of time. In pointing out a marked advantage of our winding devices, we would state that the strain upon the drum is always borne by both wheels of the axle A, which avoids all contingency of slipping that might occur where the strain is borne by one wheel only.

We will now describe the steering devices for the machine which are located in the rear and are best shown in Figures 1, 2 and 5. In close proximity to the operator's position in the rear of the machine is arranged a crank wheel y on the rear end of an inclined shaft V which, see Figure 5, is connected through a universal joint 17 to a short shaft V<sup>4</sup> bearing two winding drums V<sup>1</sup> and V<sup>2</sup>. One of these winding drums V<sup>1</sup> is provided with a rope 18, 19, and the other winding drum V<sup>2</sup> is provided with a reversely wound rope 20, 21. One end of the rope 20 connects with the forward arm 24 rigidly connected to the upright shaft of the caster wheel J and the end 18 of the rope of the other drum V<sup>1</sup> connects with the rearwardly extending arm 23 of the shaft of the caster wheel J. In like manner on the other side of the

machine the end 19 of the rope of drum  $V^1$  connects with the rearwardly extending arm 23 and the end 21 of the rope of the drum  $V^2$  connects with the forwardly extending arm 25 of the upright shaft of the caster wheel  $J'$ . By this arrangement it will be seen that the turning of the drum  $V^1$  and  $V^2$  in a given direction will impart to the rope 18, 19, a reverse movement from the direction of the rope 20, 21, which causes a deflection of the arms 22, 24, and 23, 25, in parallel relation to each other so as to change the plane of the caster wheels  $J$  and  $J'$  in relation to the line of advance, which gives the desired steering effect. Instead of the arrangement described, chains working on sprockets or jointed rods working on gears will accomplish the same result and are within the scope of our invention.

The frame of our machine consists of the inclined braces  $L$  and  $L^2$  on one side and  $L'$  and  $L^3$  on the other, which are jointed together in pairs at the top and kept from spreading by the cross bar  $M$  which acts as the fulcrum of the hoisting frame as hereinbefore described.  $N$  and  $N'$ , see Figure 3, are diagonal cross braces to stiffen the side frames. The hoisting frame consists of the rearwardly converging braces  $P$  and  $P'$ , the bottom arms  $O$  and  $O'$  and the upper arms  $R$  and  $R'$  with braces  $Y$  and  $Y'$  extending from  $R$  and  $R'$  up to the fulcrum bar  $M$ , as seen in Figure 3. The box frame hinges on the cross bar  $M$  as a fulcrum and the cross bar  $R^2$  at the forward end of the hoisting frame joining the two sides of the same also acts as a fulcrum on which is supported and tilts the grain box  $U$  or the hay fork when that is used in the place of the grain box.

The grain box  $U$ , see Figure 1, is tapered at its rear end to conform to the shape of the machine and rests when being filled on the

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axle A, being held in position by the rods Z, Z and 10, 10, the rods Z, Z, being pivotally connected to the upper edge of the grain box. For gathering hay, the fork shown in Figure 6 is pivotally connected on the cross bar R<sup>2</sup> in the same relation occupied by the grain box U, as seen in Figure 2.

The means for holding the box or fork parallel to the ground while the load is being raised, owes its efficiency to the fact that said box or fork hinges on the front of the hoisting frame and travels in a circle whose center is the fulcrum bar M, while the box or fork itself is maintained in horizontal position by rods Z, Z, which travel in a circle whose center is the cross bar M' connecting the frame members S, S', at the top. By having the members S and S' longer than the vertical depth of the box U the rods Z, Z, allow the box or fork to gradually tip downward in front as the load is being raised and thus maintains the horizontal position of said box or fork.

We will now describe the means for dumping the grain box U, reference being had to Figure 2. The front end of the grain box consists of a hinged door y hung to the box at its lower end 16 and provided at the top with catches 11, 11, which hold it closed. From this end door at a point below the catches a rope w extends over pulley 13 and under pulley 13, thence over a pulley on the cross bar M' down to the rear lower end of the frame 8, 10, S, said rope w being attached to said rear end of the frame within easy reach of the operator. The rear end of said frame is provided with a perforated tail piece w<sup>2</sup>, through which extends the upper end of a sliding bar T. This bar T is provided at its lower end with a sliding keeper t' which embraces a parallel bar

$T^2$  fixed in vertical position upon the rear end of the framework immediately adjacent to the position of the operator. The bar  $T^2$  is provided at its upper end with a keeper  $t^2$  which embraces the parallel bar T. The upper end of the bar T is provided with a suitable head  $h$  above the tail piece  $w^2$ , which head holds the framework 8, 10, S, immovable and prevents the tilting of the box U on its rocking center  $R^2$ . Around the bar  $T^2$  is wound a spiral spring  $t^3$ . When the bar T is in its lowest position its head  $h$  holds the frame 8, 10, S, down by the locking engagement of a foot lever 5 which engages with the keeper  $t'$  at the lower end of the bar T. When, however, the foot lever 5 is turned from engagement with the lower end of the bar T then the bar T is free to rise from the weight of the loaded box, the keeper  $t'$  sliding up over the bar  $t^2$  and engaging with a cushion effect the spring  $t^3$ . This upward movement of the bar T allows the frame 8, 10, S, to move upward and forward causing a thrust upon the bar Z, which turns the grain box U upon its fulcrum center  $R^2$ .

To dump the load the catches 11 holding the front end of the box  $u$  in position, are raised and the rope  $w$  is slackened, which allows the front end of the box  $u$  to turn upon its hinges 16 and drop downward hanging in a vertically pendent position as shown in dotted lines in Figure 2. It will be noticed that in the position shown in Figure 2, the box is tilted upward so that its front edges are not in a true vertical position, but the upper part of the end of the box is slightly canted backward. By reason of this fact when the hinged end  $u$  of the box drops down, it is not in alinement with the front edges of the box but forms an obtuse angle therewith. By reason of this angle and the fact that the pulley 13 is some distance in rear of the front of the box, the pull of the rope  $w$  is in rear of the hinged center 16 and hence the operator is enabled by hauling back upon the rope  $w$  to draw the pen-

dent box door u from its dotted line position up to a position closely approximating the bottom of the box where it is out of the way of the stack of grain over which it is placed. Now to complete the dumping process the foot lever 5 at the rear is kicked forward thus releasing the rod T and allowing it to slide upward on rod T<sup>2</sup> until stopped by the spring held at the upper end of rod T<sup>2</sup>. This allows the frame 8, 10, S, to move forward and consequently the box U dips downward and forward at its lower end upon its fulcrum R<sup>2</sup>, thus discharging its load on to the stack. The rope w holding the front door of the box against its bottom is now loosened and as the box is now canted downwardly as shown in Figure 2<sup>a</sup>, the forward edges of said box when in this position are arranged at a reverse angle in relation to the vertically pendent door u with the result that the rope is now on the opposite side of the hinged center 16, so that the pulling upon the rope w will close the hinged door u up against the edges of the box for reengagement with the catches 11. It will thus be seen that the operation of adjusting the door u to its open position and the closing it again is effected by the operator from the rear end of the machine by simply operating through the rope w.

To operate the machine, see Figure 1, the horses are hitched to the double tree K and the machine moved forward <sup>beside</sup> behind the header until a sufficient load of headed grain has been received from the header elevator into the box U. The machine is then driven to the stack and when at a proper distance therefrom, depending upon the height of the stack, the clutch C is thrown into engagement with the gear E by means of the lever 14 at the rear operating through the pull rod W and elbow crank 3. When the drum has wound the load to the desired height, the clutch C is disengaged by means of the lever 14 and the machine advanced to the desired place on the

stack on which the load is to be dumped. The catches 11 having been previously disengaged, the rope w holding the front door of the box in place is loosened allowing the door to swing out and down, said door being pulled up and against the bottom of the box as hereinbefore described. As the headed grain is packed tightly against the front door its pressure will immediately cause the door to swing out. The operator then disengages the foot lever 5 and allows the load to dump. This may be done gradually if desired, by the operator's holding on to the tail piece w<sup>2</sup> of the frame member 8 acting as a lever, thus causing the box to tip slowly. When the load is dumped the front door u of the box is pulled back by means of the rope w and the box U is tilted back into position by means of the lever frame 8, 10, S, and the lower end of the vertical bar T is reengaged by the foot lever 5. Clutch C is then engaged with gear D, pawl 2 is released by means of the foot lever 4 and the machine started forward and wheeled sharply away from the stack by means of the steering gear and the box is lowered while returning to the header.

It will be seen from the foregoing that every operation except the raising of the catches 11 can be performed from the position of the operator on the rear end of the machine. The catches 11 are raised by the loader before he leaves the box prior to its being elevated.

For stacking hay or grain in the straw the fork shown in Figure 6 is employed in the place of the grain box U of Figure 2 and its operation with the single exception of the manipulation of the door u is the same as that hereinbefore described.

In defining our invention with greater clearness we will state that we are aware that the hoisting frame of a hay stacker has been heretofore

operated through a rope extending to the winding drum, in which the drum was operated through the agency of one of the running wheels only. In the heavy strain of lifting a large load of grain, the engagement of a single wheel with the ground is insufficient to supply the needed power, so that said single wheel is liable to slip especially on soft ground or when in a cavity in the field. In our invention it will be seen by reference to Figure 4 that the drum B is driven by the axle A positively from both wheels, the clutch C transmitting the power of both wheels alike alternately to the two bevel gears E and D. This engagement of both wheels of the stacker with the ground utilizes their conjoint tractive strain for the operation of the drum B and the raising of the load.

We claim--

1. A stacker comprising an upright framework having a fulcrum bar at its upper end, a triangular hoisting frame fulcrumed thereon, a receptacle for the material to be stacked fulcrumed on the outer end of the hoisting frame and a dumping device consisting of a tilting frame mounted on the fulcrum of the main frame and having bars connecting its upper end to the upper edge of said receptacle, and means for locking and releasing the rear end of said dumping devices.

2. A stacker comprising an upright framework having a fulcrum bar at its upper end, a triangular hoisting frame fulcrumed thereon, a receptacle for the material to be stacked fulcrumed on the outer end of the hoisting frame and a dumping device consisting of a tilting frame mounted on the fulcrum of the main frame and having bars connecting its upper end to the upper edge of said receptacle, and means for locking and releasing the rear end of said dumping devices, consisting of two parallel bars, one



of which is connected to the dumping frame and is arranged in slidable relation to the other parallel bar, a cushion spring for the same and a locking device for holding the movable parallel bar in its lowest position.

3. A stacking device consisting of an elevated frame, a triangular hoisting frame fulcrumed upon the top of said elevated frame, a tilting box mounted upon the outer end of said hoisting frame and having an end door hinged at the bottom thereof and catches for holding the top of the same, means for tilting said box on its fulcrum and an operating rope connected to the end gate of said box and arranged to exert a strain upon the end door upon opposite sides of the fulcrum of said door according to the position of the box on its tilting center.

4. In a stacker, the combination with the hoisting frame and a rope attached to the same, of a hoisting drum having a gear wheel on its end, a second gear facing the same, in coaxial alinement, an intermediate gear wheel engaging both of the aforementioned gear wheels, an axle passing entirely through said drum and its opposite gears and bearing running wheels adapted to travel on the ground, a double faced clutch arranged to slide upon said axle longitudinally and to rotate rigidly with it and to engage alternately with the oppositely facing gears, and means for shifting said clutch into alternate engagement with said gears, whereby the drum is actuated from either gear upon the axle with the united effect of both of the running wheels.

5. A stacker comprising a main frame mounted upon running wheels and provided with lifting devices, and a steering mechanism arranged at the rear end of said main frame and consisting of two wheels provided with vertical shafts, each shaft having oppositely projecting crank arms, two drums

with a rigidly attached shaft arranged between said wheels, a rope extending from one of said drums to the forward arms of the wheels, a second rope extending from the other drum to the rearward arms of said wheels, said two ropes being wound on their respective drums in opposite directions and a handle shaft for turning the shaft of the drums.

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Witnesses:

\_\_\_\_\_  
\_\_\_\_\_

O A T H

...State of Kansas,.....(  
  )  
  (ss:  
...County of Riley:.....)

.....William T. McCall and D. Lawrence Orendorff,  
the above-named petitioners being duly ....SWORN..... depose and say :  
that ..they are citizens.....of ...The United States,  
and residents of ...Manhattan, in the County of Riley, and  
.....State of Kansas,.....

that ..they... verily believe ..themselves.....to be the original, first  
and .joint..... inventors of the improvement in .....

.....S T A C K E R S,.....  
described and claimed in the annexed specification; that they..do not know  
and do not believe that the same was ever known or used before ..their.....  
invention or discovery thereof; or patented or described in any printed  
publication in any country before ..their.... invention or discovery thereof,  
or more than two years prior to this application; or in public use or on  
sale in the United States for more than two years prior to this applica-  
tion; and that no application for patent on said improvement has been  
filed by them....or..their...legal representatives or assigns in any country  
foreign to the United States.

Sign full, including middle, name here. ....  
.....

Sworn to and subscribed before me this.....day of

.....19  
United States Consul, Notary .....  
Public or Justice of the Peace sign here. ....

Seal here- to be  
impressed in the paper.

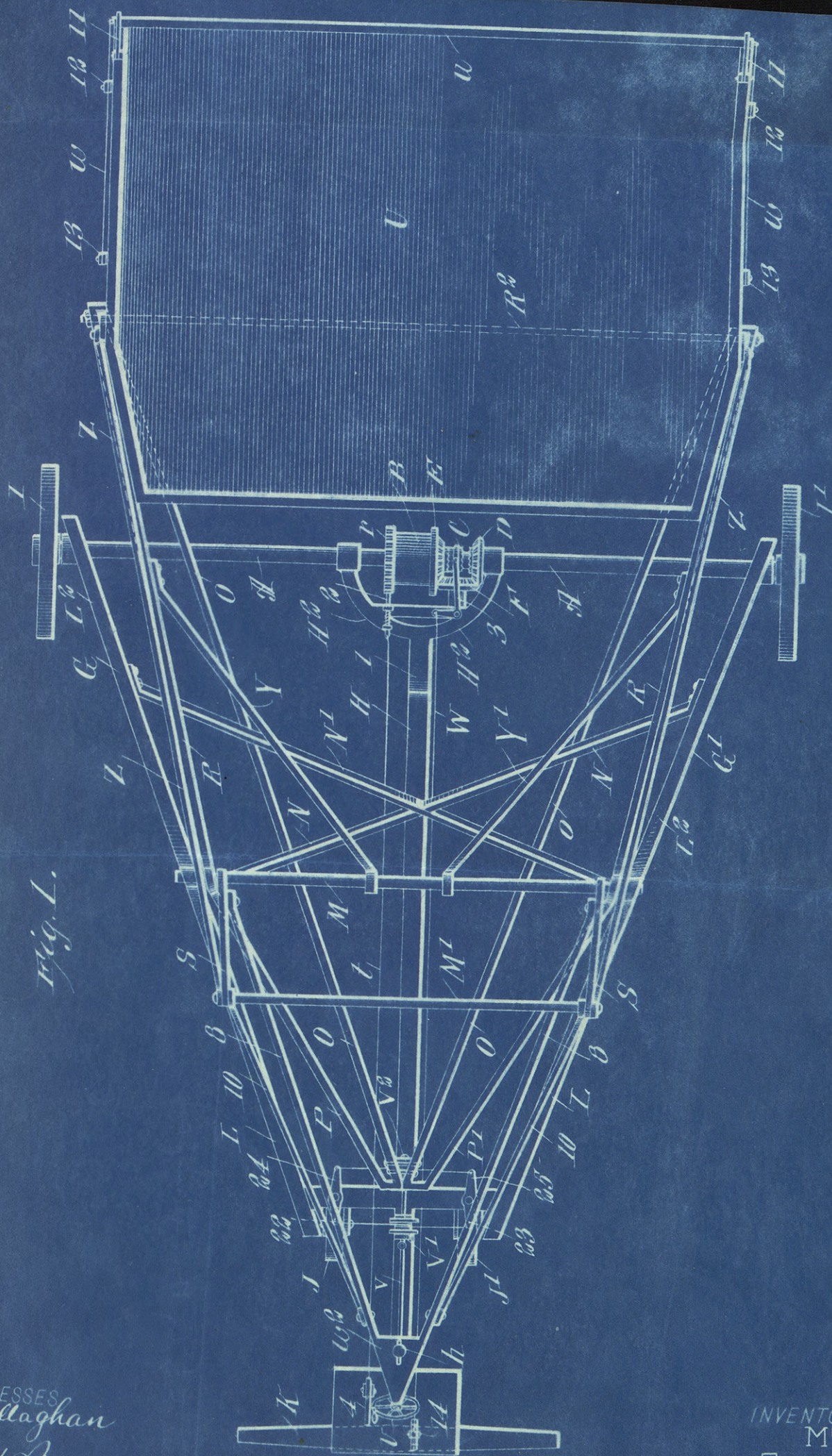


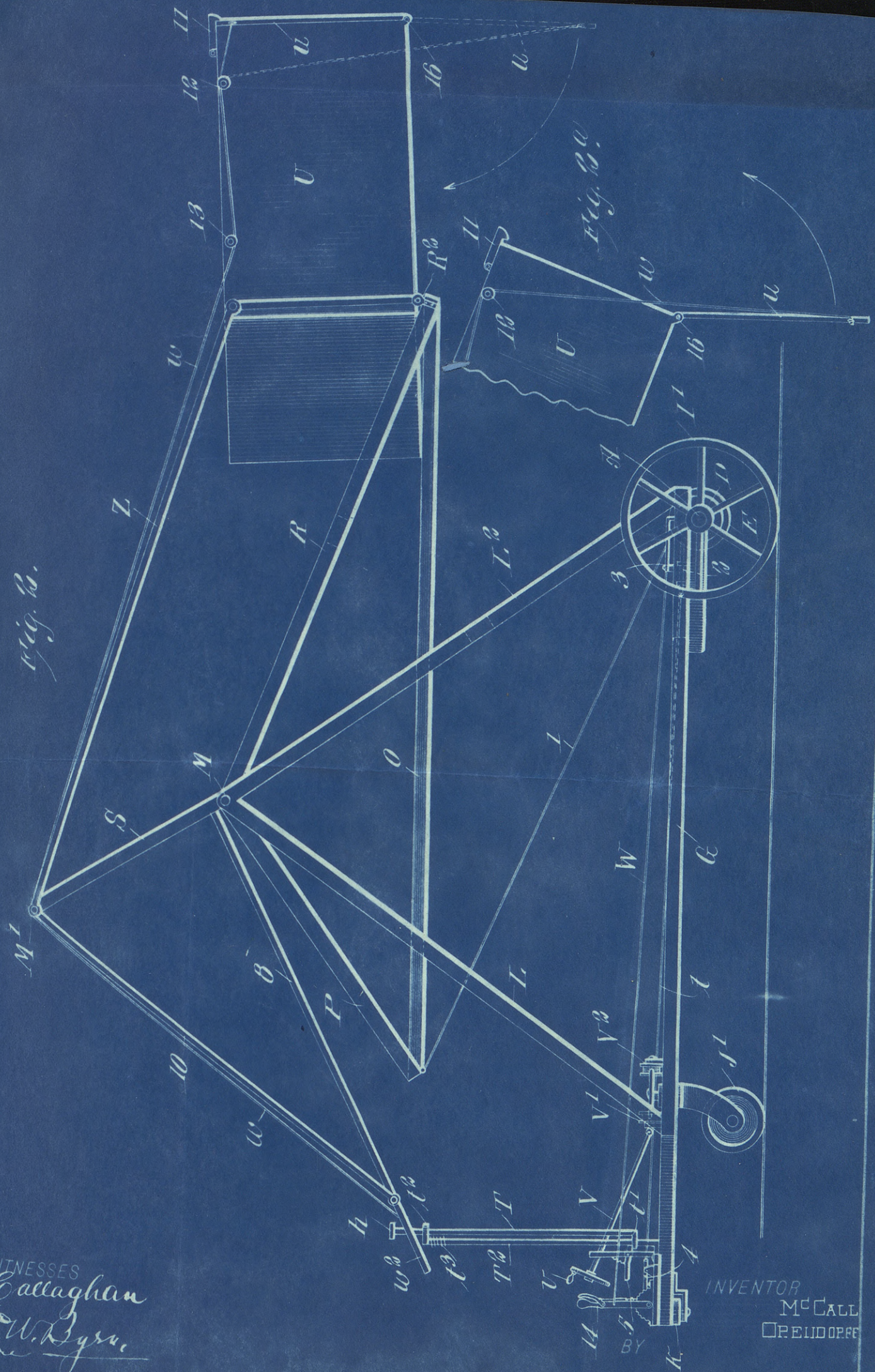
Fig. 1.

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*Fig. 20.*

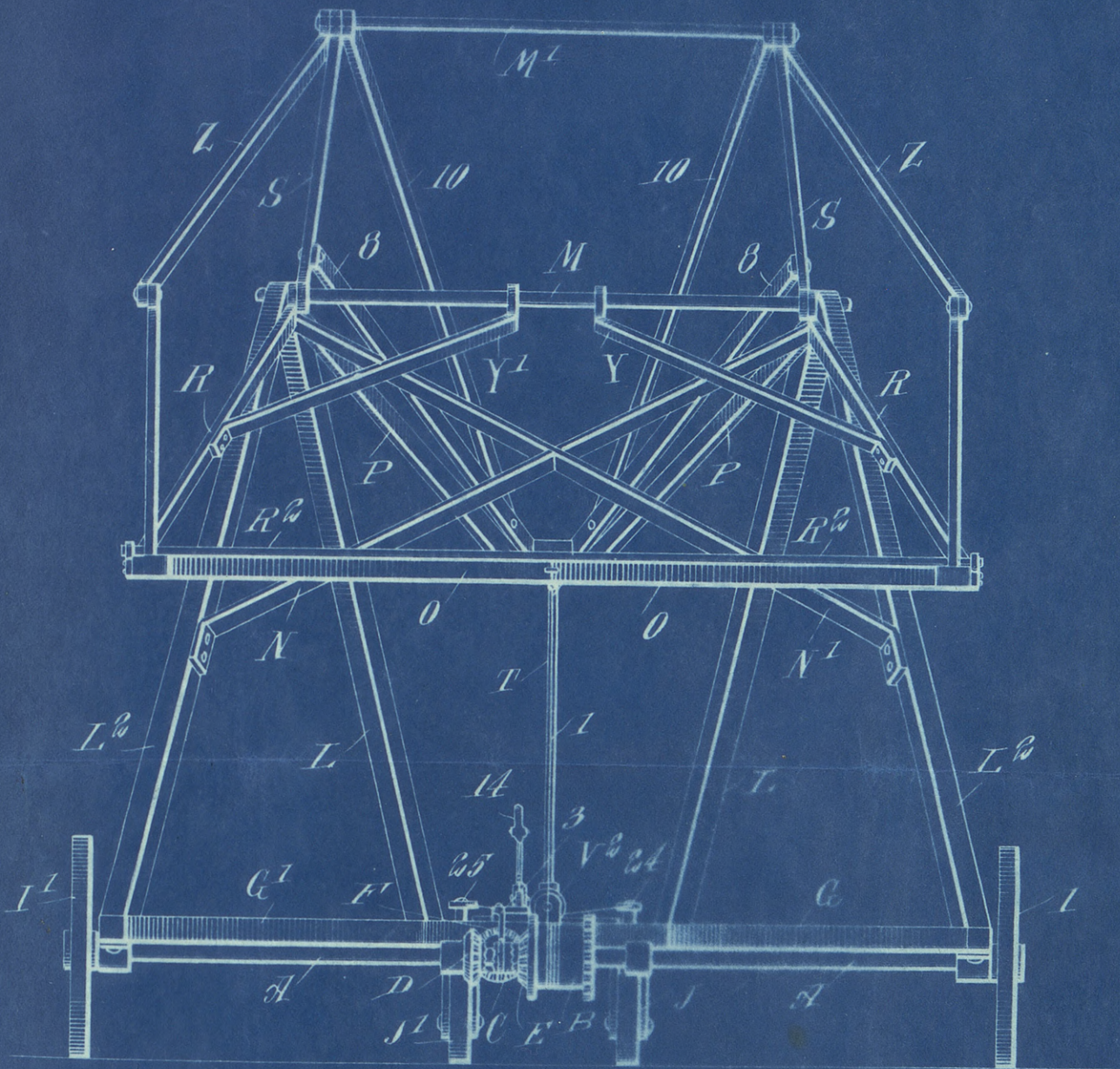
*Fig. 20a.*

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Fig. 3.



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Fig. 4.

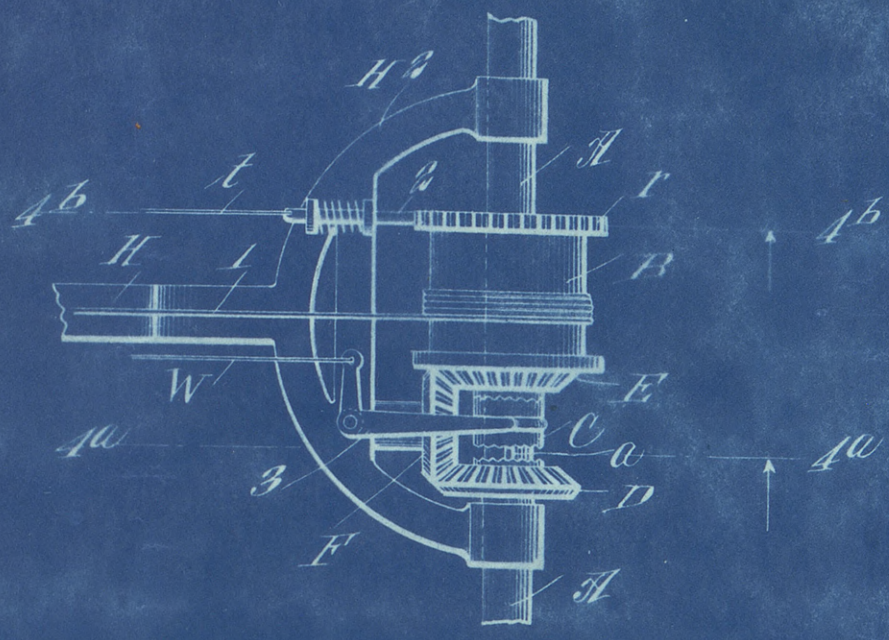


Fig. 4<sup>a</sup>

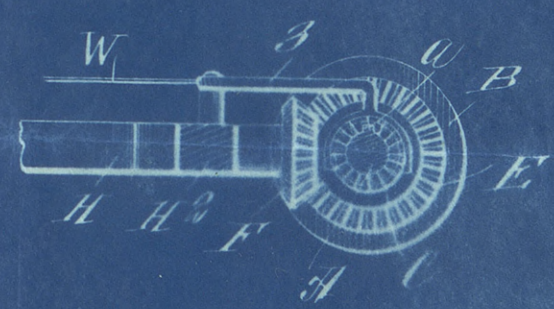
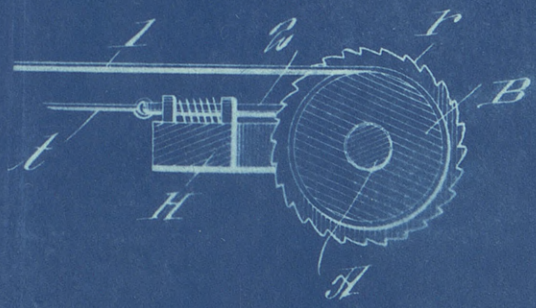
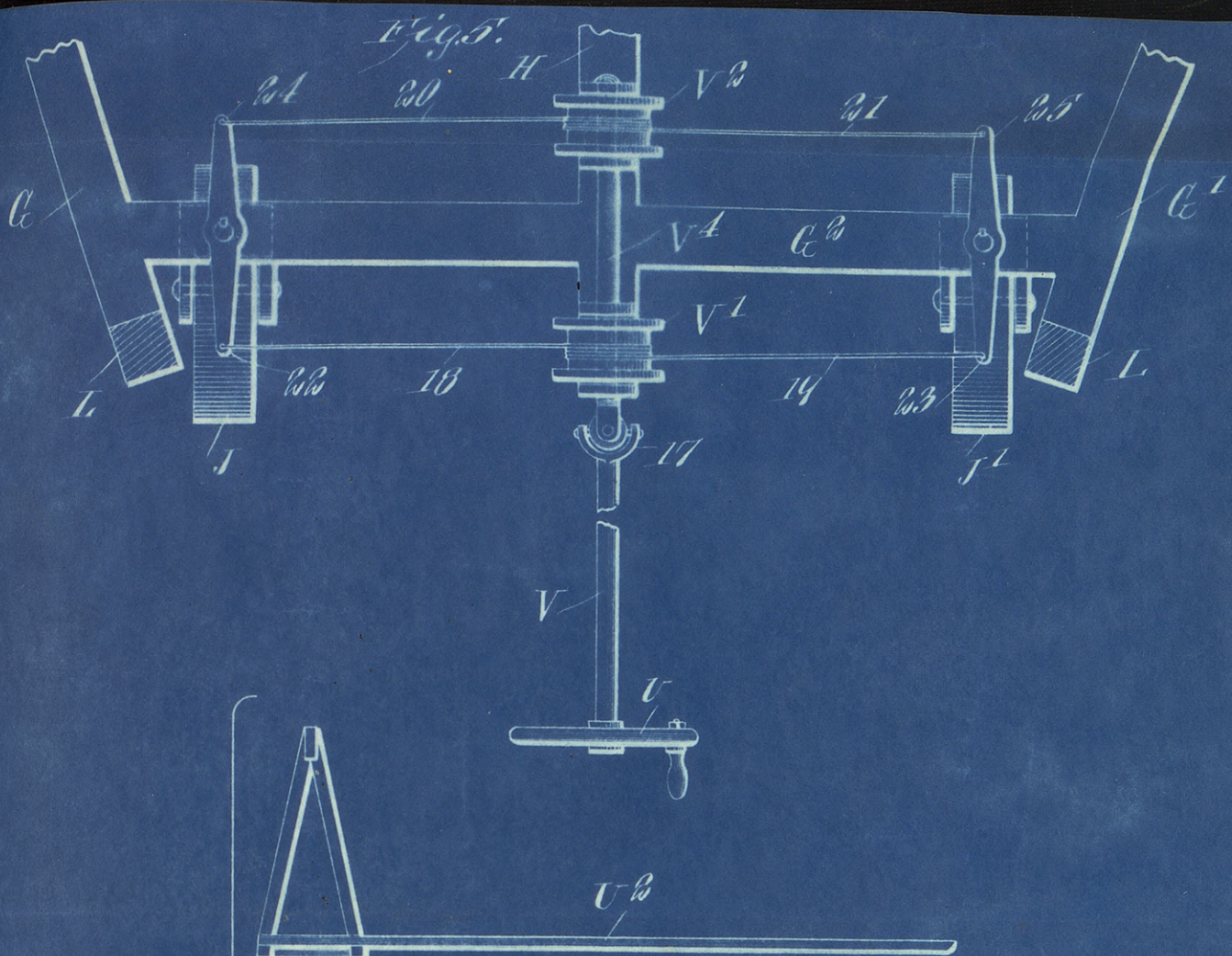


Fig. 4<sup>b</sup>

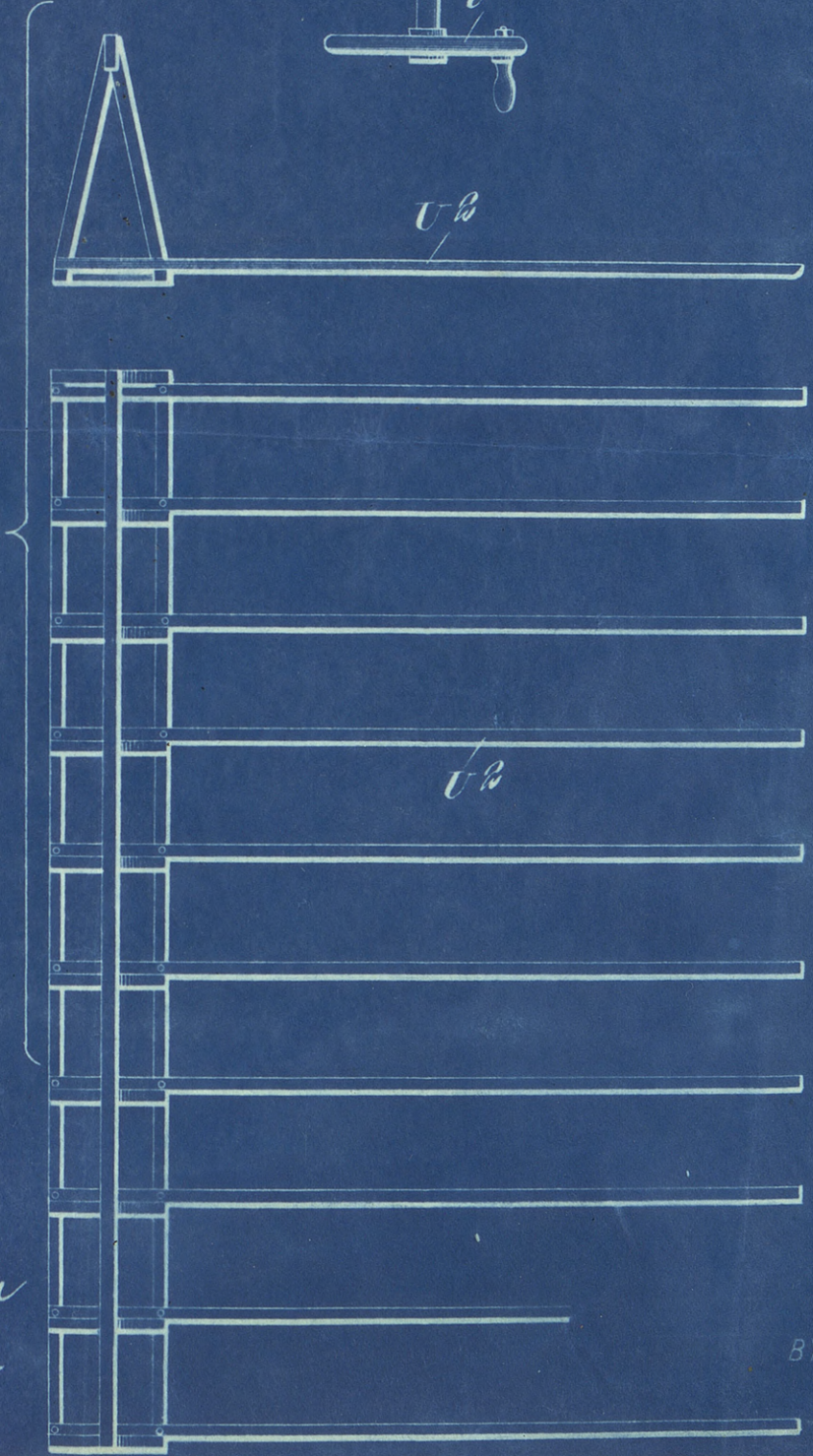


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*Fig. 6.*



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