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1918

# Division of Mechancial Devices: Punching-- Sorting--Tabulating machines

Anonymous

F. E. Freeman

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### Recommended Citation

Haskins & Sells Bulletin, Vol. 01, no. 06 (1918 August 15), p. 47-49; Haskins & Sells Bulletin, Vol. 01, no. 08 (1918 October 15), p. 66-68; Haskins & Sells Bulletin, Vol. 02, no. 02 (1919 February 15), p. 12-14

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essential industries. This classification was considered especially severe in view of the large number of accountants who are assisting the Government at the present time in the conduct of the war. It was the opinion of many persons that there must have been an error in this classification, as a number of the local draft boards failed to follow it with regard to public accountants. The matter was taken up with the Provost Marshal General by the American Institute of Accountants with the result that, under date of July 30, General Crowder advised the secretary of the American Institute that "Public Accountants, as such, are not included within the operations of the above regulations."

It seems desirable to us that members of our organization when giving their occupation should designate themselves as "public accountants in practice," as distinguished from "accountants." If a local board should question the distinction, reference may be made to the letter of the Provost Marshal General. It is not desirable, however, to refer to this ruling unless absolutely necessary.

*The Accountant*, a London publication which carries the news of accountancy especially to the chartered accountants, prints on page 462 of the issue of June 29 an article by Mr. E. C. Gause, Manager of the Pittsburgh Office, on the "Relation between Interest and Manufacturing Costs." This article appeared first in the *Journal of Accountancy* in the number of March, 1918.

With the great uncertainty of the "manpower" situation we are considering seriously the utilization of women on the staff. With this in mind we hope to add to the bookkeeping force a number of women, who, together with those already employed, will form a nucleus from which additions to the staff may be developed.

In response to a request of the National Board of the Young Women's Christian Association, the firm has arranged a course of six lectures to be delivered during the summer session of the National Training School for Business Secretaries. Mr. Wildman will give the lectures, the subject

of which will be "Principles of Accounting and Auditing and Their Application to Young Women's Christian Associations."

### Changes in the Personnel

THE stars in our service flag still continue to multiply. During July several of our number have joined the country's colors.

Mr. M. P. Swan and Mr. J. E. Henriques, of the New York Office, and Mr. A. T. Farber, of the Pittsburgh Office, have enrolled themselves with the army. Mr. Swan is stationed at Camp Devens, Mass., Mr. Henriques at Camp Hancock, Georgia, and Mr. Farber at Camp Zachary Taylor, Kentucky.

Mr. J. D. Maver has enlisted in the Marine Corps.

Mr. L. E. Wright and Mr. J. M. Lavelle have gone with the Shipping Board.

Mr. P. J. Mayer has entered the office of the Alien Property Custodian.

Mr. Eugene Wrigley has joined the Quartermaster's Department.

Mr. Edward Brady and Mr. R. E. Terwilliger, of the New York Office, and Mr. E. K. Meredith, of the Cleveland Office, have withdrawn from our staff to accept positions with other firms.

To compensate for this depletion of our ranks we have, during July, had our staff augmented by the following new members:

Mr. W. S. Baldwin, Mr. S. W. Clark, Mr. C. A. Earl, Mr. C. C. James, Mr. N. E. King, Mr. C. C. Leib, Mr. D. W. Molloy, Mr. C. B. Mount, Jr., Mr. C. S. O'Connell, and Mr. B. J. Porter.

### Punching—Sorting—Tabulating Machines

THERE is no problem in connection with the use of office appliances that will so test the ingenuity of an accountant as the problem of arranging work to be applied to this type of machine.

The fundamental principle on which the method is based is classifying by numbers. For illustration, main classes are numbered ranging from 00-09 to 90-99. Classes requiring them are sub-divided into ten divisions each, viz., 001 to 009, and each of the divisions into sections, viz., 0001 to 0009.

The following chart is given to explain it more clearly:

Classes	Divisions	Sections	
01	011	0111	
		0112	
		0113	
		0114	
		0115	
		0116	
		0117	
		0118	
		0119	
	012	012	0121
			0122
			0123
			0124
			0125
			0126
			0127
			0128
			0129
	013	013	0131
0132			
0133			
0134			
0135			
0136			
0137			
0138			
0139			
014	014	0141	
		0142	
		0143	
		0144	
		0145	
		0146	
		0147	
		0148	
		0149	
015	015	0151	
		0152	
		0153	
		0154	
		0155	
		0156	
		0157	
		0158	
		0159	
016	016	0161	
		0162	
		0163	
		0164	
		0165	
		0166	
		0167	
		0168	
		0169	
017	017	0171	
		0172	
		0173	
		0174	
		0175	
		0176	
		0177	
		0178	
		0179	
018	018	0181	
		0182	
		0183	
		0184	
		0185	
		0186	
		0187	
		0188	
		0189	
019	019	0191	
		0192	
		0193	
		0194	
		0195	
		0196	
		0197	
		0198	
		0199	
02	Same divisions and sections as above for each class.		
03			
04			
05			
06			
07			
08			
09			
Etc.			

An excellent illustration of how these code numbers are used is here taken from a printed copy of a paper read by Mr. W. E. Freeman before the National Electric Light Association at its thirty-eighth convention:

MAIN CLASSES

- 00 to 09 General and Miscellaneous Expenses
- 10 to 19 Commercial Expenses
- 20 to 29 Production Expenses
- 30 to 39 Production Expenses—Repairs etc. to 90-99

Several examples of the divisions and sections of accounts which are self-explanatory follow:

- 00-09 GENERAL AND MISCELLANEOUS EXPENSES
- 01 Salaries and Expenses of General Office Clerks
  - 011 Fiscal Department
    - 0111 Cashiers
    - 0112 Paymasters
    - 0113 Bookkeepers and Clerks
    - 0114 Payroll Clerks etc. to 0119
  - 012 Accounting Department
    - 0121 Abstract Clerks
    - 0122 Work Order Clerks
- 03 General Stationery and Printing
  - 032 General Office Stationery
    - 0321 Fiscal Department
    - 0322 Accounting Department
- 10 TO 19 COMMERCIAL EXPENSES
- 16 Commercial Administration
  - 161 Commercial Department Indexing
    - 1611 Meter Clerks
    - 1612 Meter Reading

- 30 TO 39 PRODUCTION EXPENSES—REPAIRS
  - 34 Repairs to Boiler Apparatus
  - 341 Feed Pump Repairs
  - 342 Boiler and Boiler Engine

There are other illustrated examples giving still finer divisions but the above answers our purpose. It might be well to state that the sections may be divided and

classifications may be made beyond the needs of the average business.

The practicability of a method providing for so many classifications cannot be understood until one learns of the speed at which the cards are sorted to classification. This will be explained later.

The method has probably been most successfully used on pay-rolls and labor distributions, distributions of materials, purchases, sales and disbursements. It enables one to obtain valuable results that would be too slow and costly by ordinary clerical methods.

When considering such a machine method it would be advisable to prepare a graphic chart in squares and assign the code numbers to the account classifications. The success of the installation of the system depends entirely on the accuracy and skill with which the coding and the designing of the card is done.

As a further description of the method and the machine equipment we reprint extracts from a booklet published by The Tabulating Machine Company.

"The purpose of the Hollerith System is to classify and analyze statistics and accounts more rapidly, accurately and in greater detail than is possible by any other method.

"The system is composed of the card, the key punch, the gang punch, the sorter, and the tabulator, and may be supplemented by such accessories as sorting racks, sorting needles, statistical forms, filing cases, etc.

"The initial step in using the Hollerith System is to transfer the original information of which analysis is desired to cards by punching or perforating. The location of the holes in the cards determines the classification and value of the items.

"The sorter automatically arranges the cards into any desired groups at a speed of 250 cards per minute, per column.

"The tabulator operates simultaneously from two to five adding counters at a speed of 150 cards per minute. Each counter may be arranged to add from one to seven columns.

An illustration of the card follows:

Day	Dept.	Clock No.	Order No.	Drawing No.	Machine or Assembly No.	No. of Pieces	Operation No.	Hours	Eurdz.	Amount	X	
												X
00	10	00	00	00	00	00	00	00	00	00	00	X
01	11	01	11	11	11	11	11	11	11	11	11	X
22	22	22	22	22	22	22	22	22	22	22	22	X
33	33	33	33	33	33	33	33	33	33	33	33	X
44	44	44	44	44	44	44	44	44	44	44	44	X
55	55	55	55	55	55	55	55	55	55	55	55	X
66	66	66	66	66	66	66	66	66	66	66	66	X
77	77	77	77	77	77	77	77	77	77	77	77	X
88	88	88	88	88	88	88	88	88	88	88	88	X
99	99	99	99	99	99	99	99	99	99	99	99	X

While the usual card is a transcription of original data, it is often possible to make the Hollerith card the original record. Such a card is called a "Dual Card." Part is used for written information, which is later punched in the Hollerith columns. At present, this card is principally used in cost

accounting for labor and material analysis, serving as job ticket or requisition, but there are many other possible uses for such a card. When it can be used, the "Dual Card" offers ease of reference to original records, and a possible increase in the accuracy of punching.

(To be continued)

## Division of Mechanical Devices

### Punching—Sorting—Tabulating Machines (Continued)

THE "Dual Card" was briefly described in the August edition of the Bulletin and we reprint below an illustration of the

"A 'Field' consists of one or more vertical columns of numerals (0 to 9), arranged according to the classifications desired for

DEPT. 15	MAN No. 1401	NAME Jim Brady	DATE 9/14/17					
ORDER No. HTS	PIECE No. 3267	OPER. No. 2						
OPERATION NAME Drill								
MACHINE No. 0122	TIME FINISHED 10							
QUANTITY 50	TIME STARTED 8							
RATE 35	HOURS 2							
APPROVE	WAGES 70	BONUS						
Man No.	Order No.	Piece No.	Oper.	Machine	Quantity	Hours	Wages	Bonus
0110	1111	1111	11	11	11111	11	11	11
2222	2222	2022	20	200	22222	20	22	2222
3333	3333	0333	33	333	33333	33	33	3333
4044	4044	4444	44	444	44444	44	44	4444
5555	5555	5555	55	555	55555	55	55	5555
6666	6666	6666	66	666	66666	66	66	6666
7777	7777	7777	77	777	77777	77	70	7777
8888	8888	8888	88	888	88888	88	88	8888
9999	9999	9999	99	999	99999	99	99	9999

card to present its advantages over the regular card on particular classes of work which are self evident.

Further extracts from the Tabulating Machine Company's booklet follow:

"The methods of operating the Hollerith Machines, described in subsequent paragraphs, are given after careful study and are believed to be the most efficient.

#### THE CARD

"The Hollerith Card is furnished in seven colors, and in two sizes, each size having two capacities, as follows:

Short card wide spacing, size 5 5/8" x 3 1/4", 3/16" between columns, 27 columns.

Short card narrow spacing, size 5 5/8" x 3 1/4", 5/32" between columns, 34 columns.

Long card wide spacing, size 7 3/8" x 3 1/4", 3/16" between columns, 37 columns.

Long card narrow spacing, size 7 3/8" x 3 1/4", 5/32" between columns, 45 columns.

The card is divided into what are termed 'Fields.'

the particular business under consideration. The heading of a 'Field' denotes the nature of the information which it contains, as 'Year,' 'State,' 'Customer,' 'Department,' 'Value,' etc.

"Great care should be exercised in designing the card. A well designed card facilitates the punching, sorting and tabulating. The field of the Hollerith card should follow, so far as possible, the sequence of the items on the original record. It is desirable that the sorting or classification fields should be at the left and the adding fields at the right end of the card. When several forms of cards are to be used in the same machine, the tabulating will be facilitated if the fields to be added occupy the same relative position on the various cards.

"The number of columns in an adding field is determined by the largest individual item to be recorded. An item of \$10.50 would require four columns. The number of columns in a sorting field is determined by the

number of items to be provided for, as States of the Union (49), which would require two columns. When the number of items in a sorting field does not exceed twelve, they can be confined to one column by utilizing the two spaces or position above the '0', commonly designated as the 'X' or '11' position, and '12' position. This arrangement is not possible, however, in an adding field.

"Where due to the requirements of the work the capacity of the card is insufficient to accommodate the full number of classifications desired, resort may be had to what is termed a 'Split Column,' by which as many as four different classifications can be provided for in one column.

"It is desirable, however, that this be confined either to the gang punched portion of the card or to the last key punched column of the card, due to the fact that this is the only point where the rack of the key punch does not move forward after a hole has been punched.

"Information to be transferred to a Hollerith card should first be codified. Numerical codes are practically essential to obtain the best results from the system. Composite codes are often easily memorized, and translated, as for example: '1001', the first two figures indicating State, the last two Town.

Verification: "As the punched card is the material from which the analysis is made, great care should be taken to assure its correctness. There are several methods of so doing:

1. Verification by calling back.
2. Verification by thumbing (dual card).
3. Verification by addition.
4. Verification by duplicate punching and matching cards.
5. Verification by punch verifying machine.
6. Verification by use of the C-E-Z Verifier.

"Regardless of the method adopted, the verification of punched cards is greatly sim-

plified by keeping the cards and the original data in the same order.

Thumbing: "Dual cards may be verified as follows: Sort the cards to the field to be verified, then take the cards of each classification number, ruff them, bend them between thumb and fingers, and with thumb, release one card at a time, examining the written part to be sure that it has the right classification number. This examination can be made at the rate of about 100 cards per minute.

"Verification by Addition: When this plan is followed, cards should be proved in blocks of 50 or 100. The method is to take each block, total the various fields on the tabulator, then compare these totals with totals of the same items secured from the original records by an adding machine. If the totals agree, the cards may be considered correct. If they do not agree, it is an easy matter to locate the error by individual checking.

"Verification by Duplicate Punching: Duplicate sets of cards of different colors are punched from the same data by different operators. Two cards bearing the same data are then placed one on the other; if the holes in one correspond with the holes in the other, both are considered correct. If they do not correspond, the error is easily found by comparing them with the original data.

"Verification by Punch Verifying Machine: The Punch Verifying Machine in appearance and operation is similar to the Key Punch. The card to be verified is placed in the machine, and the operator, referring to the original data, proceeds as though punching a new card. If when a key is struck, the carriage fails to advance, the Verifier immediately knows that the Operator either of the Punch or Verifier has made an error. A comparison of the card with the original record immediately locates the error.

"Verification by 'C-E-Z' Verifier: This is an electrically lighted device, made in Art Metal, to facilitate reading of punched tabu-

lating cards. Cards are dropped into place and removed with ease. The punched out holes are shown as green windows and the numbers representing the 'cut-outs' come brilliantly into view. The numbers and fields are so distinct they can be easily read from a distance. The handling and reading of cards is greatly facilitated by this device and verification with original matter is accomplished with celerity and accuracy.

"Verification by Calling Back: This is accomplished by two clerks, preferably by others than those who punched the particular cards being checked, one reading aloud from the punched card while the other checks it against the original data."

Space does not permit of a description in detail of the various machines such as the key punch, the gang punch, the sorter, and the tabulator. This information in printed form has been placed on file and is readily available for the use of the members of the staff.

The most desirable method of filing cards is in special cabinets, wood or steel. These are made by several manufacturers of office furniture.

A serviceable and fairly presentable cabinet may be made from the small boxes in which cards are shipped; attach a pull handle and label holder to the front, and fit them in a rack placed against the wall.

Whatever method is adopted, means should be taken to pack the cards tightly to prevent them from being affected by the atmospheric conditions. They should be filed in a dry place.

In filing, it is always desirable to separate groups by index cards which show the group number and perhaps other identifying symbols. Unfinished work in files or trays should always have index cards stating how far the work has progressed.

Care should be taken in handling all cards as injured cards do not feed readily in the machines.

Where information on the original data must be coded before being punched code

holders, of which there are several on the market, are of valuable assistance.

### Additions to the Library, Sept., 1918:

**Connecticut. General Assembly.** Laws concerning local and state revenue passed by the General Assembly, Session of 1917. Hartford, Conn., Tax Commissioner, July, 1917. 30 p.

— Taxation of miscellaneous corporations, in effect August 1, 1915. Hartford, Conn., 1915. 6 p.

**Guaranty Trust Company of New York.** Federal Capital Stock Tax (Revenue Act of September 8, 1916) and Treasury Department Regulations No. 38, revised 1918. New York, Guaranty Trust Company, (1918.) 36 p.

**National Foreign Trade Council.** Official report of the fifth National Foreign Trade Convention held at Cincinnati, Ohio, April 18-20, 1918. New York, National Foreign Trade Council, (c1918.) 667 p.

**Standard clauses for the contracts between the government and the railroads; final draft, September 5, 1918.** (Form A, for companies without subsidiaries.) 21 p.

**United States. Federal Trade Commission.** Detailed instructions covering the preparation of textile schedule, pertaining to F. T. C. Textile Schedule "A." Washington, Federal Trade Commission, (1918.) 6 p.

— Textile report, Schedule A. Washington, Federal Trade Commission, (1918.) 22 p.

**United States. Treasury Department.** Regulations No. 38 (revised) relating to the Capital Stock Tax under the Revenue Act of September 8, 1916. August 9, 1918. Washington, Government Printing Office, 1918. 31 p.

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## (SIMPLE FORM OF PRESENTATION)

January 15, 1919.

A. & B. Company,  
New York.

Dear Sirs:

Pursuant to engagement, we have made an audit of your books and accounts for the year ended December 31, 1918, and submit herewith our certificate, four pages of comments, and the following described exhibits:

## Exhibit

"A"—General Balance Sheet, December 31, 1918 and 1917, and comparison.

"B"—Statement of Income and Profit and Loss for the years ended December 31, 1918 and 1917, and comparison.

Yours truly,

\* \* \* \* \*

If very little text (comment) is to be rendered, it may be embodied in the presentation, between the description of the statements and the signature. In fact, there are cases when it is especially desired to have comments over our signature.

2. Certificate. When rendered separately in this way, a certificate is sometimes addressed as in the presentation; usually, however, whether rendered separately or appended to the Balance Sheet, it is not so addressed but bears the caption "Certificate of Audit."

(Form of Separate Certificate, with Particular Reference to the Verification of Certain Assets.)

A. &amp; B. COMPANY

## CERTIFICATE OF AUDIT

We have audited the books and accounts of the A. & B. Company for the year ended

December 31, 1918, including confirmation of accounts representing cash and securities either by physical examination of such assets or by obtaining certifications of depositaries and trustees as to their custody, and

We hereby certify that, in our opinion, the accompanying General Balance Sheet as of December 31, 1918, and Statement of Income and Profit & Loss for the year ended that date are correct.

New York,

January 15, 1919.

\* \* \* \* \*

(Form of Certificate Appended to Balance Sheet)

## CERTIFICATE OF AUDIT

We have audited the books and accounts of the A. & B. Company for the year ended December 31, 1918, and, subject to the accuracy of the merchandise inventory, which was verified by us only as to prices and computations,

We hereby certify that, in our opinion, the above General Balance Sheet is correct.

New York,

January 15, 1919.

\* \* \* \* \*

(To be continued)

## Division of Mechanical Devices

Punching—Sorting—Tabulating Machines—  
(Concluded)

The operation of tabulating machines, particularly the Hollerith machine, was described at length in the August and October numbers of the *Bulletin*.

It seems unnecessary to print a similar description of the method and machines of the Powers type because for the purpose for which this article is intended they are strikingly alike. If they were to be



treated from a mechanical point of view a more detailed description of both types of machines would be necessary. The main feature to be considered here is the printing of items and totals.

When estimating the value of the printing device one must consider how frequently totals or sub-totals are taken off. The more frequently the items must be copied the more valuable becomes the printing device, for two reasons: it prints faster than one can write, and it eliminates the possibility of incorrectly transcribing figures.

The tabulating printing machine can be set to print non-add figures used for designation purposes. This offers a means of easily detecting items included under the wrong classification.

The Hollerith Company claims about 150 unlisted items a minute on its tabulat-

ing machine, while the Powers Company claims only about 55 printed items. On short runs it is possible that the Powers printing machine will finish work faster because the Hollerith machine operation is held up to enable the operator to transcribe totals and sub-totals.

The Powers Tabulator Printer automatically and legibly prints an original and four carbon copies on plain sheets, or on printed and ruled sheets conforming with the machine spacings.

When drafting forms there should be no horizontal rulings and care must be taken to provide 5/32 of an inch for each figure in the totals. The machine is so constructed that 1-1/16 inch blank space is needed between each of the five normal adding fields.

The following is a printed form as produced by the Powers Printing-Tabulating machine.

DESIGNATIONS		X. Y. Z. RAILROAD							TOTALS WITH DETAIL ←
		ANALYSIS OF FREIGHT TRAFFIC							
		FOR THE MONTH OF MARCH 1915							
Waybill Number	Receiv- ing Station	Forward- ing Station	Com- modity	Weight	Freight	Advance	Prepaid		
10000	4390	1765	3451	19 538	1459 12	538 12	921 00		
22001	4390	1765	3451	29 100	1825 25	925 00	900 25		
25789	4390	1765	3451	31 016	1733 89	850 00	883 89		
28091	4390	1765	3451	23 115	1211 23	320 25	890 98		
28091	4390	1765	3451	31 016	1733 89	850 00	883 89		
31927	4390	1765	3451	55 139	1116 21	216 21	900 00		
				188 924	9079 59	3699 58	5380 01		
10043	4390	1765	3452	29 333	1310 00	530 00	780 00		
10072	4390	1765	3452	71 900	1234 15	780 00	254 15		
10111	4390	1765	3452	55 600	1327 75	701 31	626 44		
10225	4390	1765	3452	17 000	1122 00	320 50	801 50		
10760	4390	1765	3452	51 701	1428 55	528 00	900 55		
12763	4390	1765	3425	17 592	1515 82	805 00	710 80		
14609	4390	1765	3452	44 298	1411 10	710 00	781 10		
15384	4390	1765	3452	38 431	1321 05	720 50	600 55		
16107	4390	1765	3452	17 165	1510 25	805 00	705 25		
				343 020	12180 67	5900 31	6160 34		
10048	4390	1765	5617	17 555	1315 66	410 50	905 16		
10536	4390	1765	5617	56 347	1573 78	870 00	703 78		
10681	4390	1765	5617	12 751	1713 60	825 50	888 10		
10690	4390	1765	5617	51 980	1214 23	404 00	810 20		
11354	4390	1765	5617	83 500	1521 00	620 00	901 00		
11403	4390	1765	5617	43 753	1622 77	730 20	892 57		
				265 886	8961 04	3860 20	5100 81		

The minimum width of the sheet or form when using the full capacity of the machine is 11-9/32 inches.

There are three types of this kind of tabulating machine: the Hollerith, Powers, and Pierce, of which the Hollerith and Powers are the best known. The main difference between the Hollerith and Powers is that the Powers tabulator prints items and totals and the Hollerith does not. The latter operates considerably faster, however. With the Powers tabulator one can insert ruled forms and print items and totals in their respective columns, printing one or several items simultaneously.

The manufacturers support service departments for the purpose of aiding in the planning of the system and the designing of the cards.

The cards can be bought only from the manufacturers of the machines and the

machines can be rented only on a monthly basis, excepting the Hollerith Key Punching machines, which are sold outright for \$75.00 each. It would appear that inasmuch as the machines are rented on a monthly basis, the manufacturers would assure themselves of the success of an installation before renting the machine and avoid the loss to them incurred on a one month's rental.

The members of the staff who have need for a thorough study of the subject will find trade literature, detailed descriptive matter, and forms on file in the Department for Professional Training.

#### New Orleans Office

The firm announces the opening, under date of February 1, 1919, of an office in the Maison Blanche Building, New Orleans, Louisiana. Mr. Henry Jumonville has been appointed manager.

## Trust Company Auditing (Continued)

Bonds and mortgages, as investments, are frequently found in trust companies, especially where the trust and banking functions are combined with that of selling guaranteed mortgages.

A bond and mortgage does not differ in principle from the registered and the coupon bonds previously discussed. In each instance the bond is the promise to pay. Each is likewise secured by a mortgage.

The registered and coupon bonds are issued in series and in various denominations in order to facilitate the distribution, sometimes of a large amount, among a large number of persons. Each person holding a bond has an equity in the mortgage which secures the whole issue. As a matter of convenience the mortgage is made in favor of a common trustee who represents the collective interests of the bondholders. The bonds exist as various separate physical instruments; the mortgage as one document.

The bond and mortgage, so called, is

usually made in a relatively small amount. They are two distinct physical instruments, or forms. One is the bond; the other the mortgage. One recites the obligation to pay; the other secures the obligation.

The instruments are on paper usually 8½x14 inches and fold twice to the size of 8½x3½ inches. When so folded they present on one face the essentials of their content. One bears on the face the word "Bond" printed in large heavy letters. The other is similarly marked "Mortgage."

The bond should be examined and a record made on analysis paper of the date, name of the maker, amount, date of maturity, rate of interest, and the interest dates. The bond should also be scrutinized to see if any payments in reduction of the original principal have been noted.

Alarm need not be felt if in the case of bonds which have been in existence for some time the bond is made in twice the amount of the mortgage. The practice formerly was to regard the mortgage as