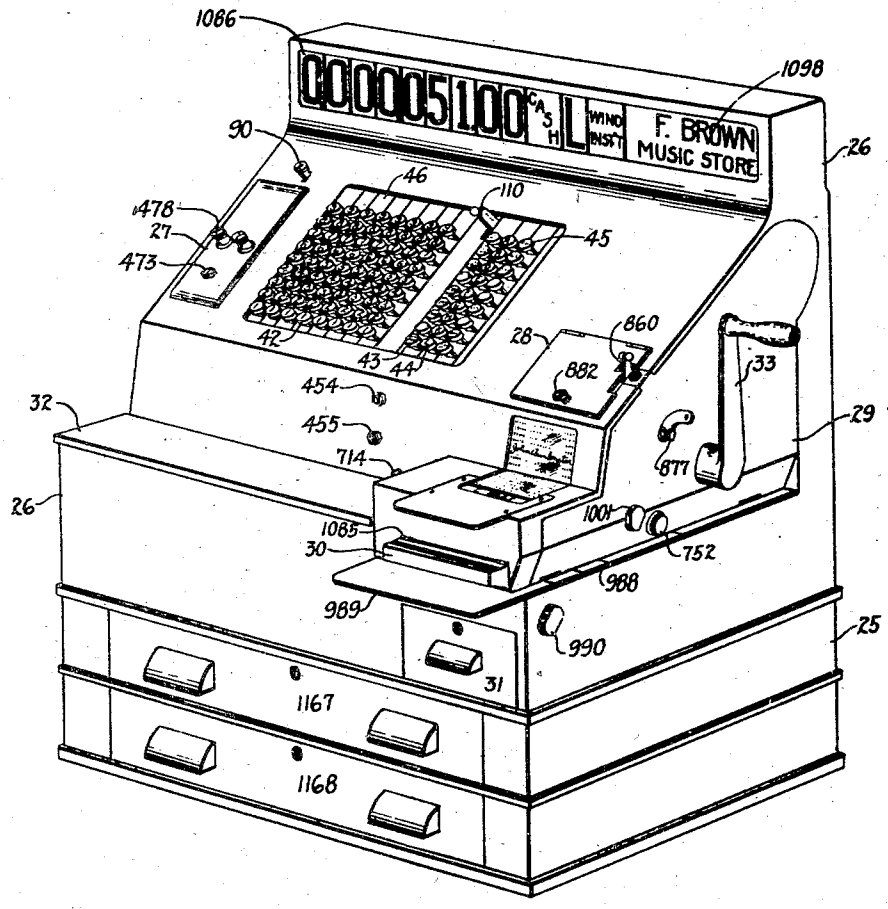
March 25, 1947. W. S. GUBELMANN 2,418,027

PRINTING AND FEEDING MEANS FOR CASH REGISTERS

Original Filed Jan. 22, 1929 26 Sheets-Sheet 1

FIG. 1



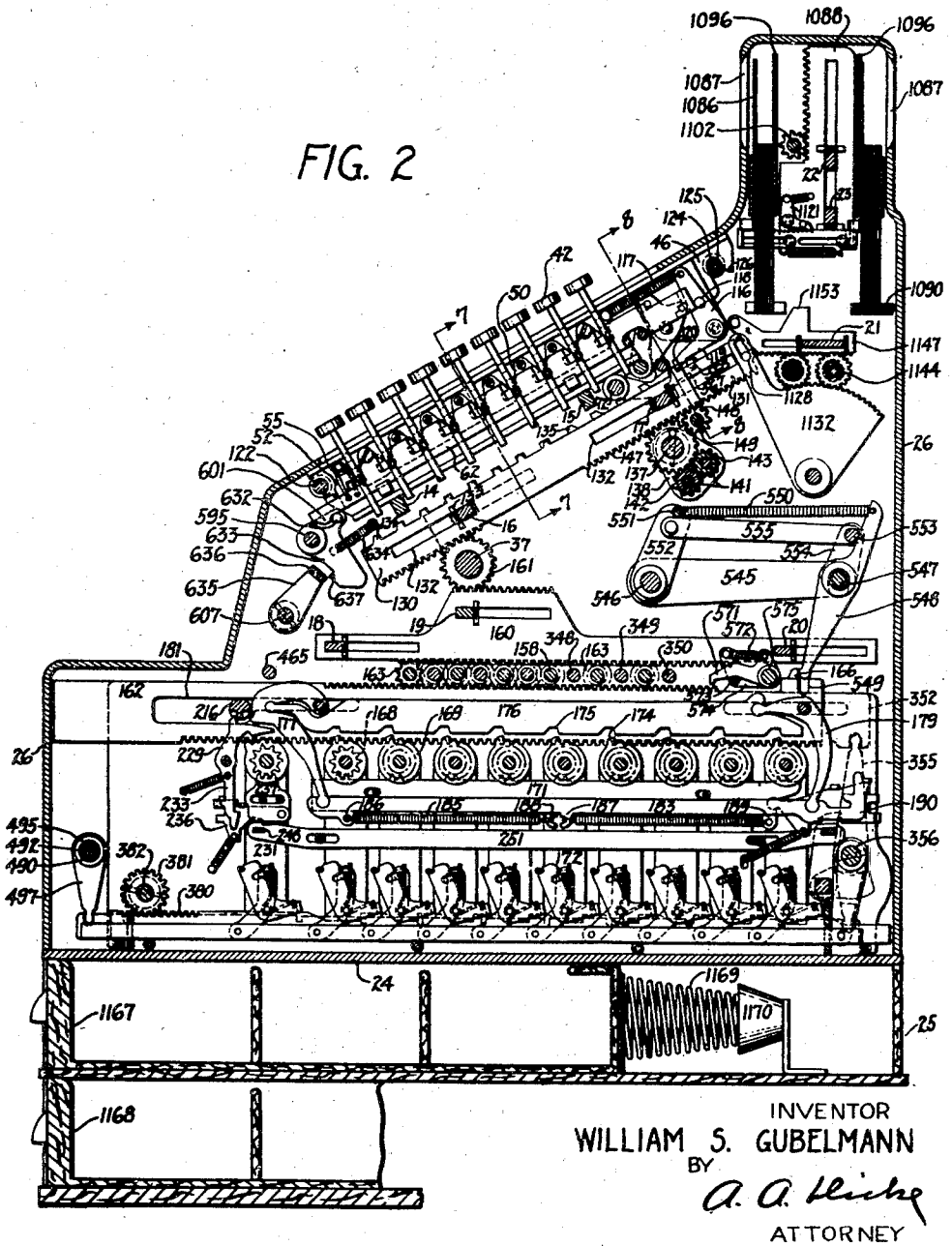
INVENTOR
WILLIAM S. GUBELMANN
BY A. A. Ulrich
ATTORNEYS

March 25, 1947. W. S. GUBELMANN 2,418,027

PRINTING AND FEEDING MEANS FOR CASH REGISTERS

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FIG. 2

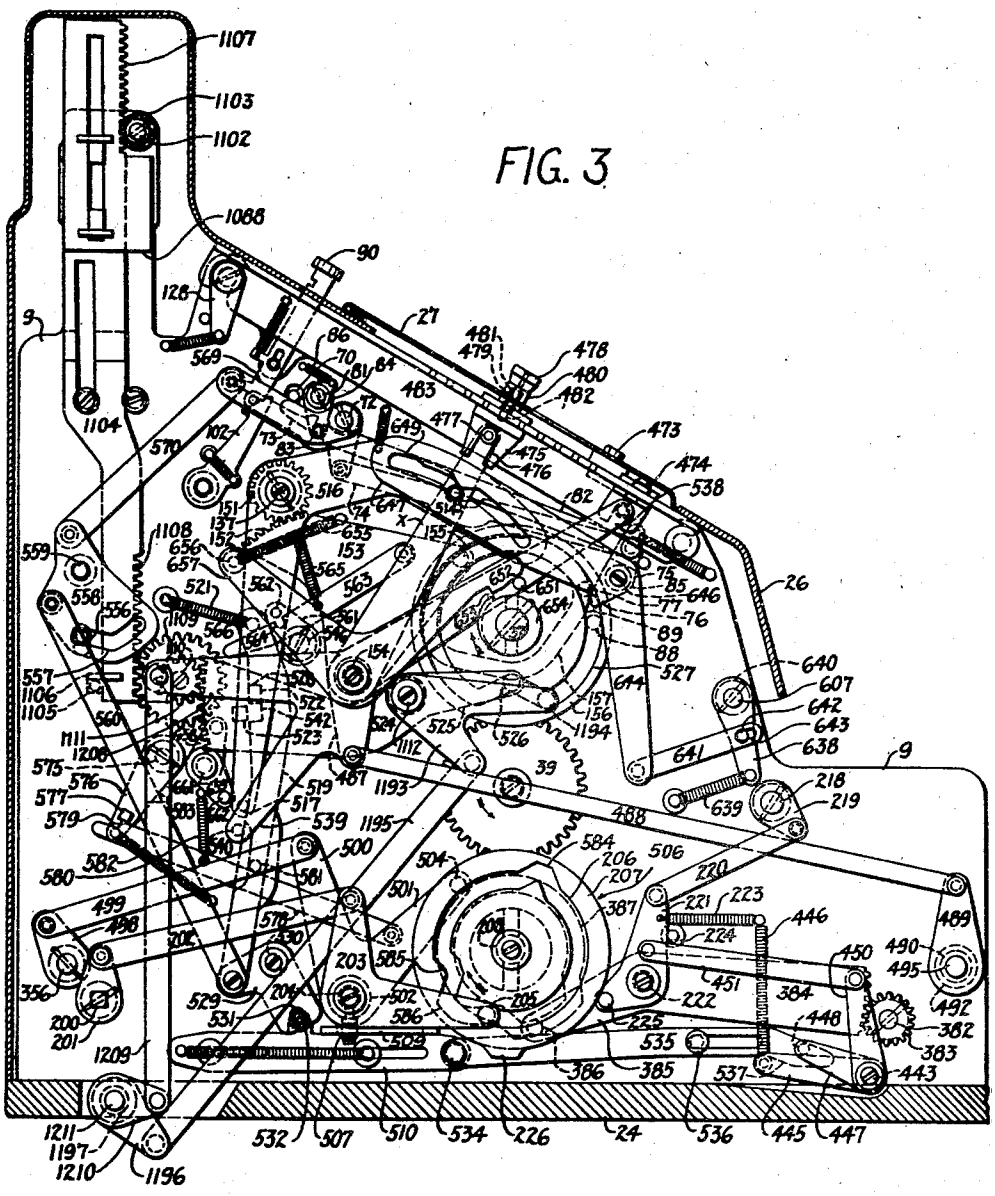


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FIG. 3



INVENTOR
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A. A. Hirsch
ATTORNEYS

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PRINTING AND FEEDING MEANS FOR CASH REGISTERS

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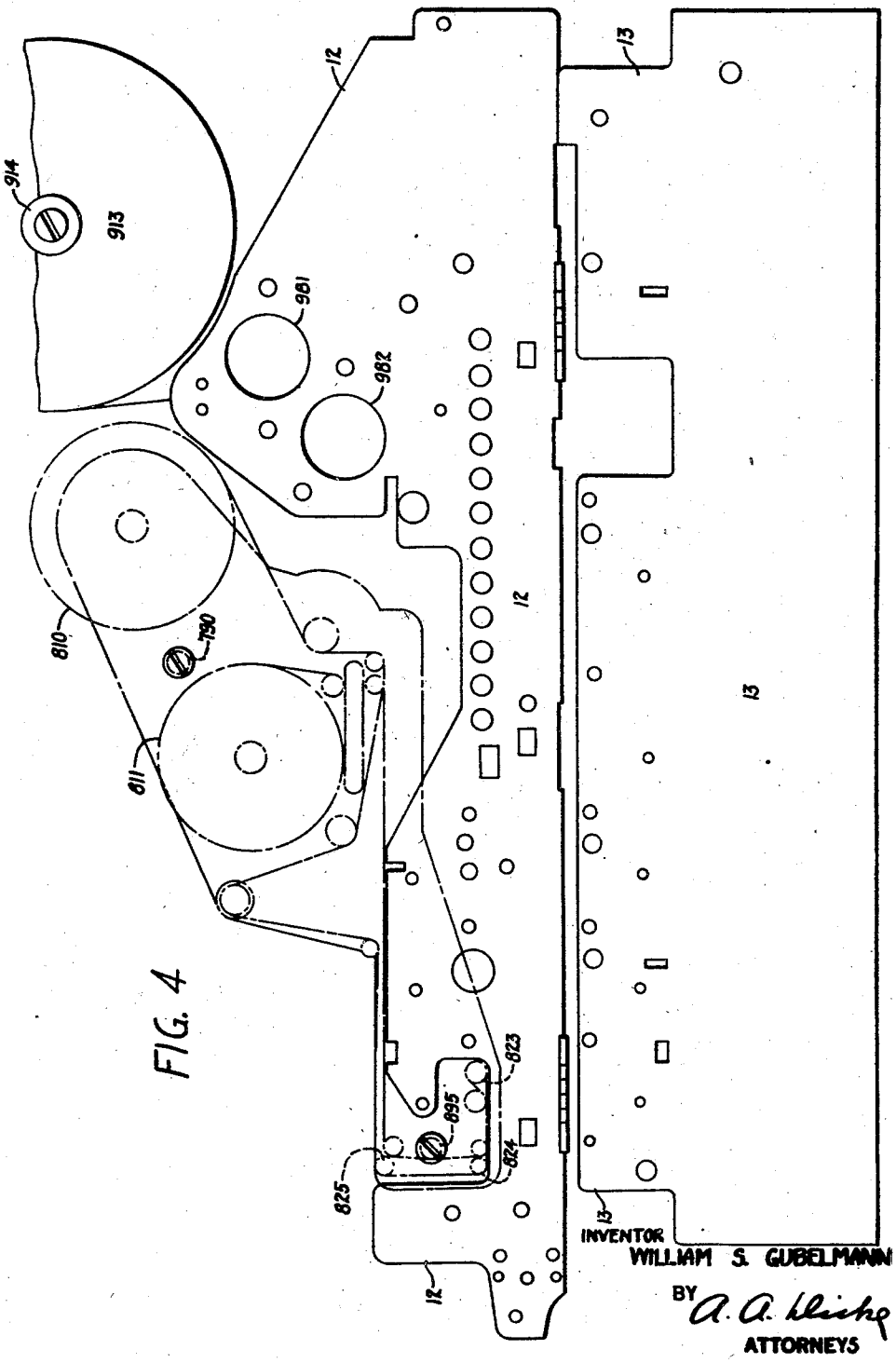


FIG. 4

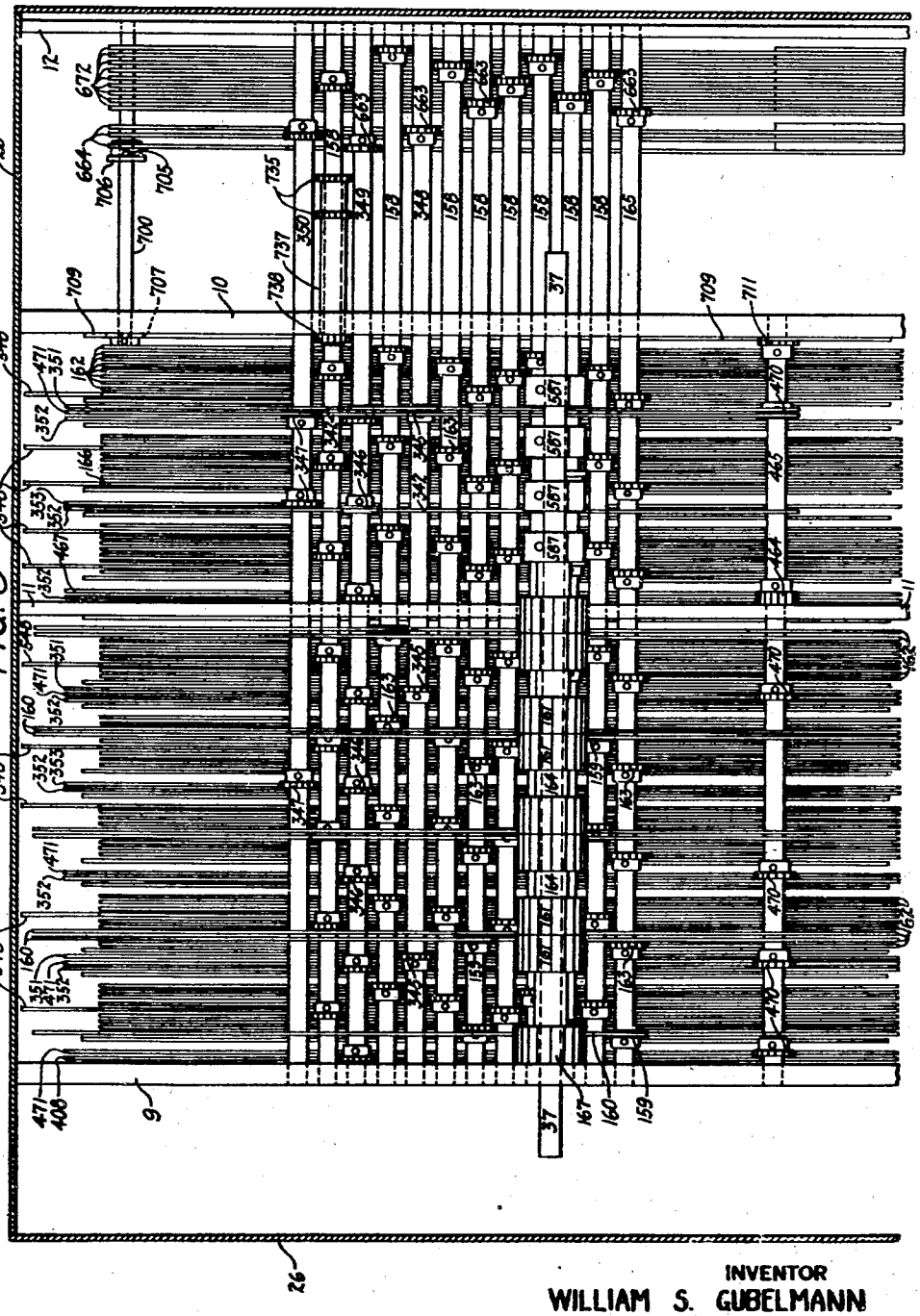
INVENTOR
WILLIAM S. GUBELMANN
BY A. A. Hirke
ATTORNEYS

March 25, 1947. W. S. GUBELMANN 2,418,027

PRINTING AND FEEDING MEANS FOR CASH REGISTERS

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FIG. 5



INVENTOR
WILLIAM S. GUBELMANN
BY
ATTORNEYS

March 25, 1947. W. S. GUBELMANN 2,418,027

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FIG. 6

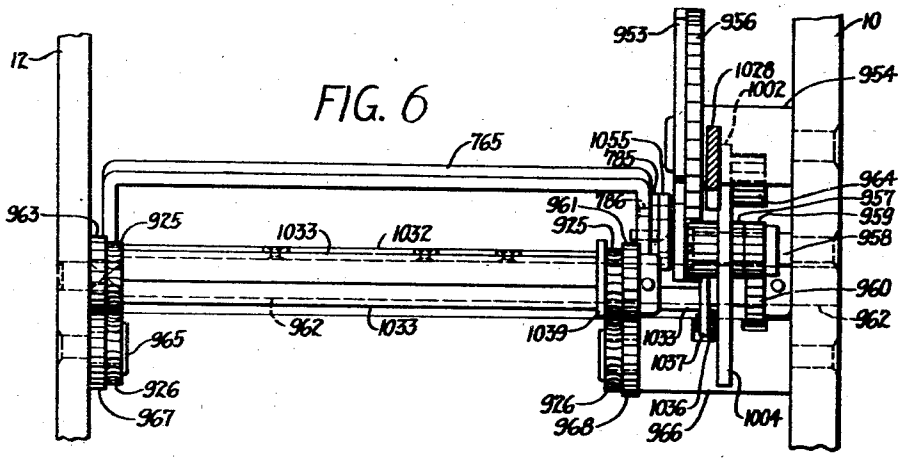


FIG. 7

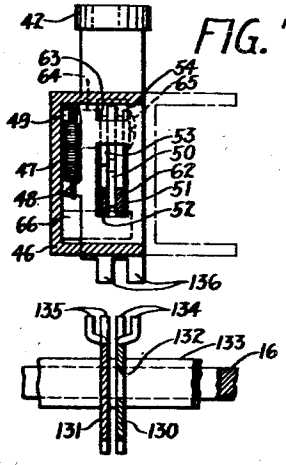


FIG. 8

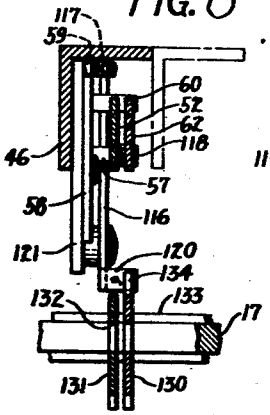
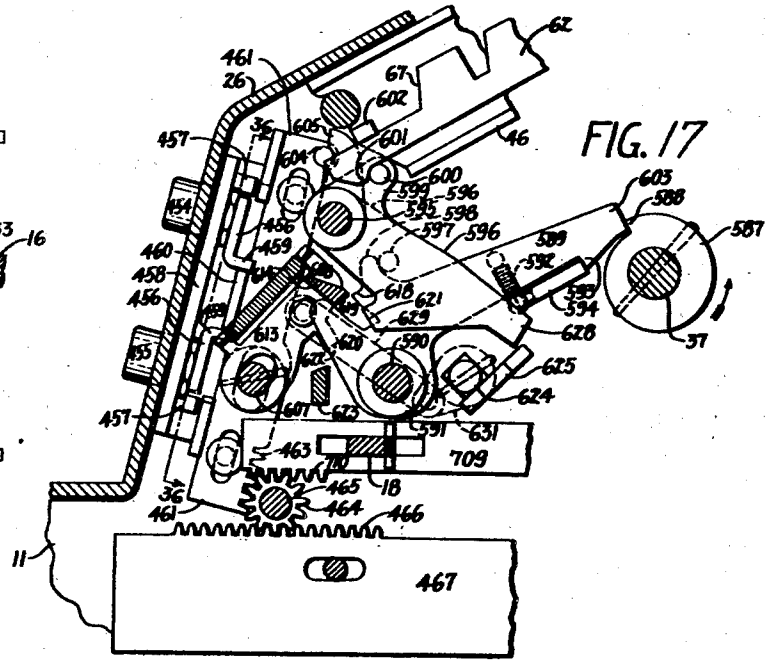


FIG. 17



INVENTOR
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BY a. a. Hirsch
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PRINTING AND FEEDING MEANS FOR CASH REGISTERS

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FIG. 9

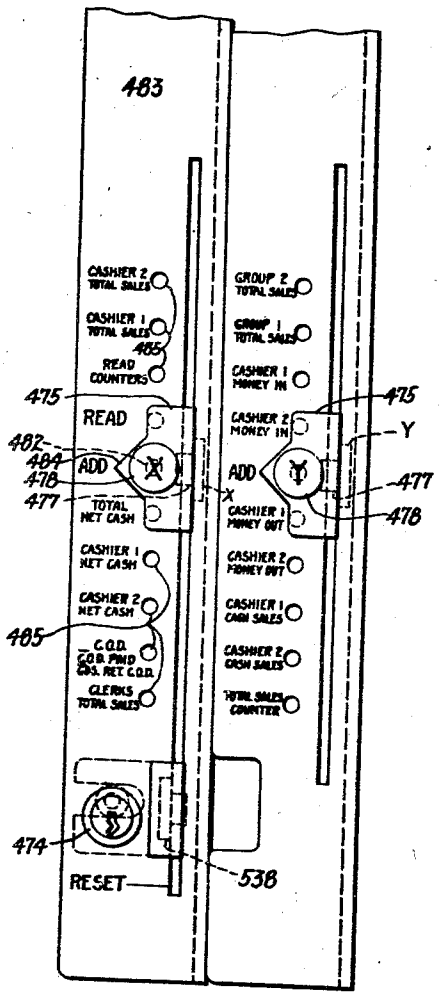
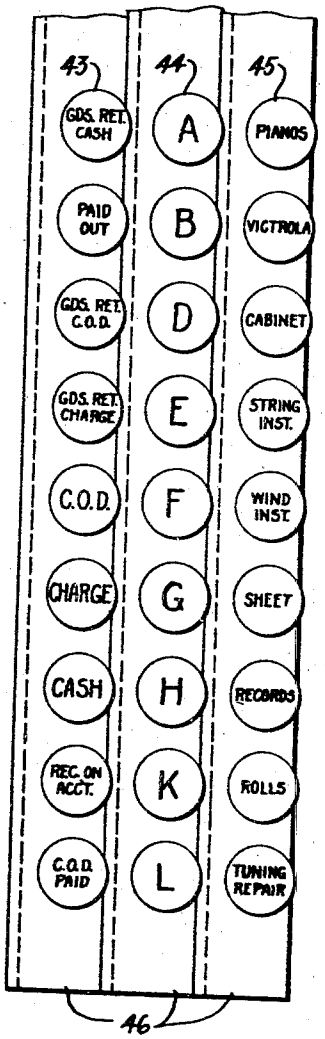


FIG. 10



INVENTOR
WILLIAM S. GUBELMANN
BY
A. A. Ulrich
ATTORNEYS

March 25, 1947. W. S. GUBELMANN 2,418,027

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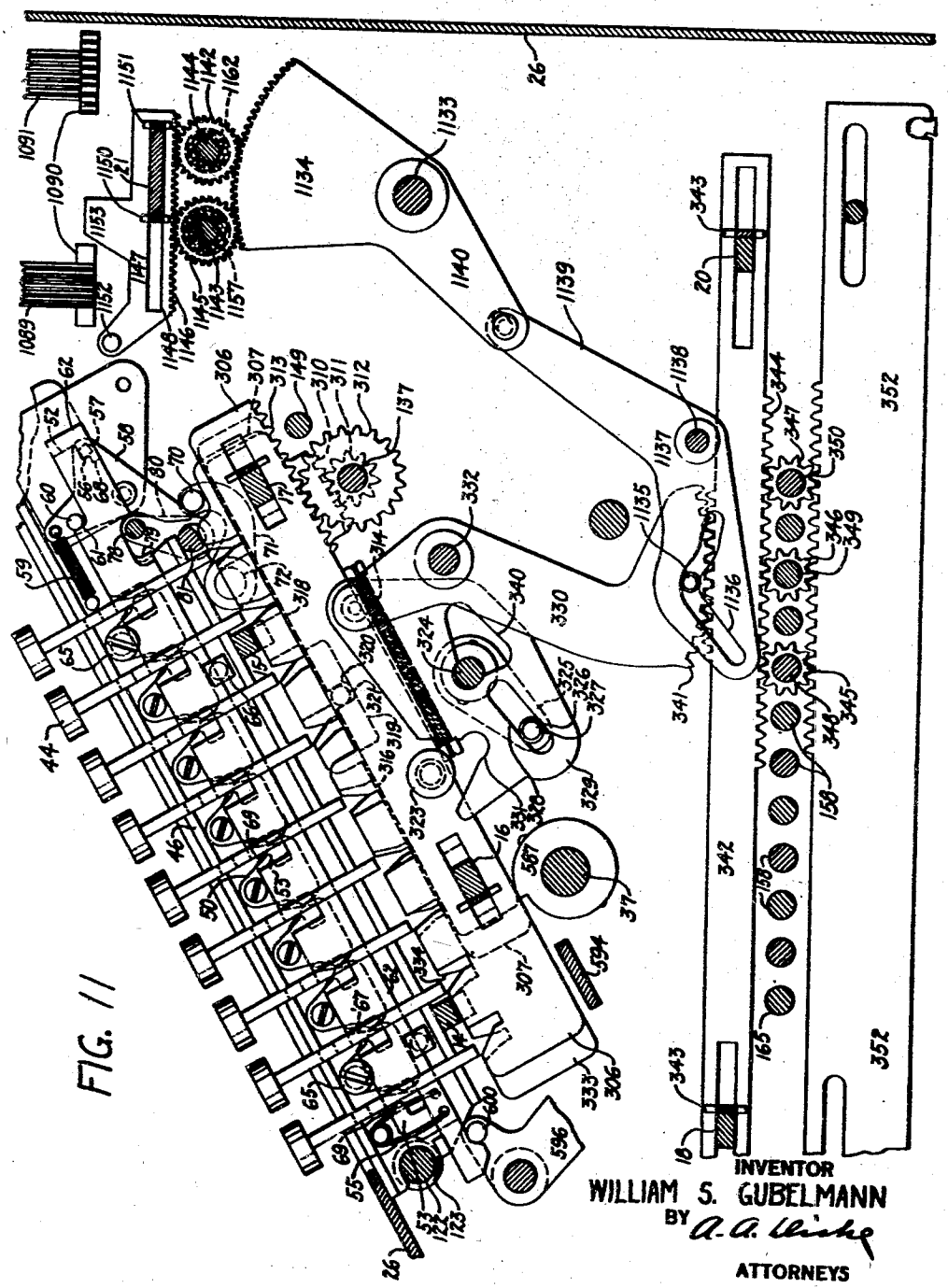


FIG. 11

INVENTOR
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BY A. A. Wiske
ATTORNEYS

March 25, 1947. W. S. GUBELMANN 2,418,027

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FIG. 12

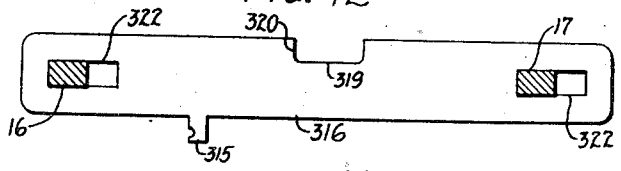


FIG. 13

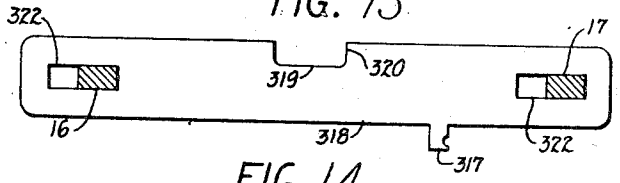


FIG. 14

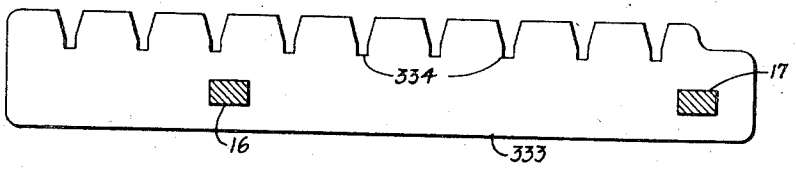


FIG. 15

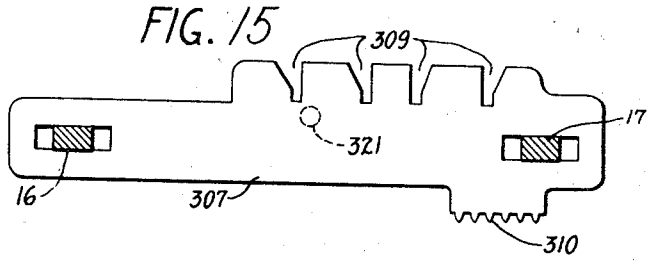
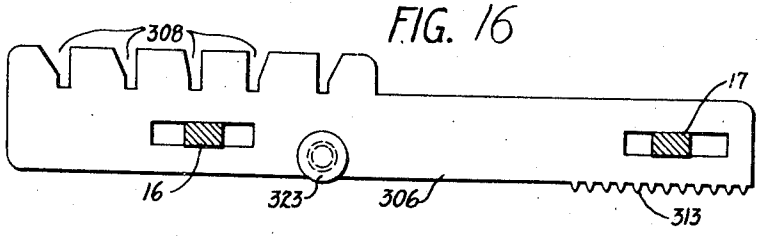


FIG. 16

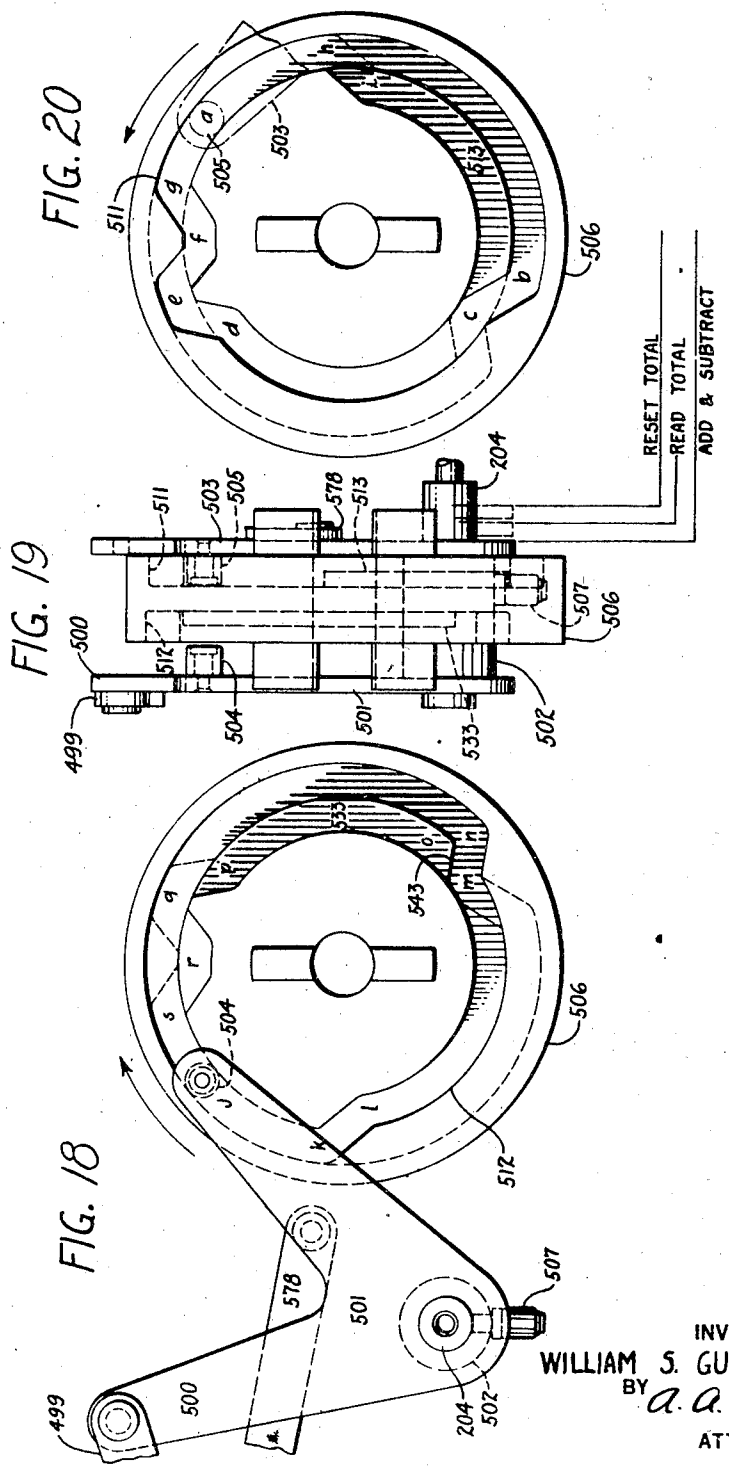


INVENTOR
WILLIAM S. GUBELMANN
BY A. A. Hirsch
ATTORNEYS

March 25, 1947. W. S. GUBELMANN 2,418,027

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INVENTOR
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BY A. A. Hirke
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March 25, 1947. W. S. GUBELMANN 2,418,027

PRINTING AND FEEDING MEANS FOR CASH REGISTERS

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FIG. 21

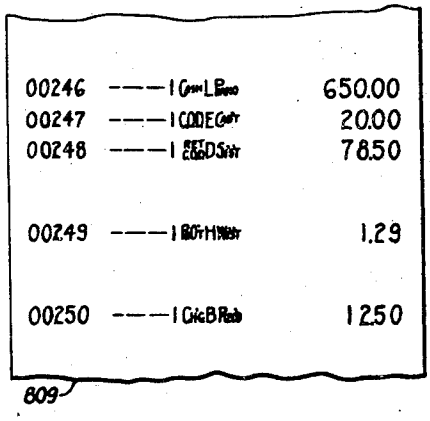


FIG. 22

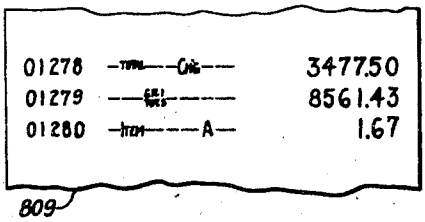


FIG. 23

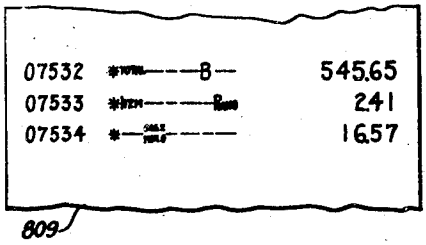


FIG. 24

NAME Mrs E. White
ADDRESS 649 Woodhurst Ave. Glendale L.I.

INSTALLMENT SHEET

SELLING PRICE $100.00 NO. INSTALLMENTS 10 EACH $7.50

DATE	SALE NO.	TRANS-CLERK-DEPT.	AMOUNT	INSTALL NO.
JAN 30 15	00087	——Z Bl Mcr	25.00	X
MAR 1 15	00009	——Z Bl Mcr	7.50	1
				2
				3
				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
				29
				30

RECEIPT

THE FRED. BROWN MUSIC STORE

DATE	SALE NO.	TRANS-CLERK-DEPT	AMOUNT	INSTALL NO.
JAN 30 15	00087	——Z Bl Mcr	25.00	X
MAR 1 15	00009	——Z Bl Mcr	7.50	1
				2
				3
				4
				5
				6
				7
				8
				9
				10
				11
				12
				13
				14
				15
				16
				17
				18
				19
				20

INVENTOR
WILLIAM S. GUBELMANN
BY A. A. Hicks
ATTORNEYS

March 25, 1947. W. S. GUBELMANN 2,418,027

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FIG. 25

DATE	SALE NO	TRANS-CLERK-DEPT	AMOUNT
MAR 15, 14	00168	——— 1 CashKRoll	7.00

THE FRED BROWN MUSIC STORE

RECEIPT

DATE	SALE NO.	TRANS-CLERK-DEPT	AMOUNT
MAR 15, 14	00168	——— 1 CashKRoll	7.00

THE FRED BROWN MUSIC STORE

EVERYTHING FOR THE BAND

SEE OTHER SIDE FOR LATEST SONG HITS ON ROLL & RECORD

912

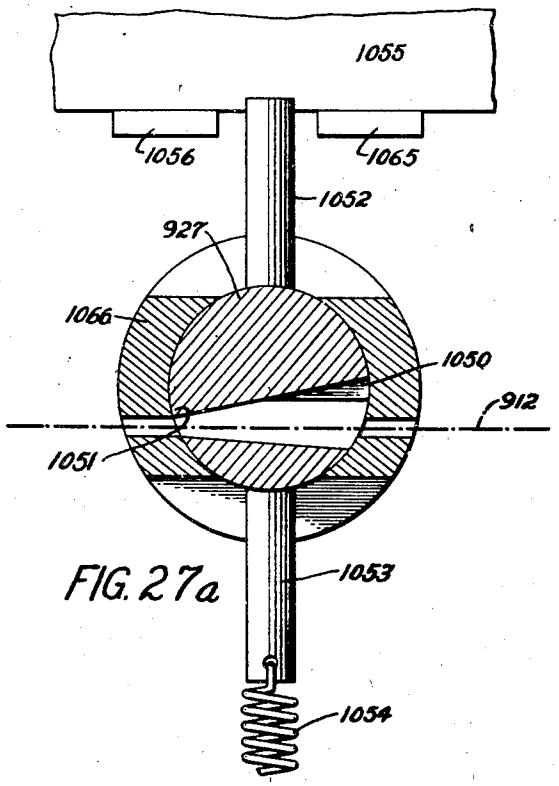


FIG. 27a

FIG. 26

SATISFIED PURCHASERS ARE OUR ONLY AGENTS

THE FRED. BROWN MUSIC STORE

EVERY INSTRUMENT GUARANTEED

DATE	SALE NO	TRANS-CLERK-DEPT	AMOUNT
AUG 28 14	05763	——— 1 Cash K Roll	12650

DATE	SALE NO.	TRANS-CLERK-DEPT	AMOUNT
AUG 28 14	05763	——— 1 Cash K Roll	12650

DATE	SALE NO.	TRANS-CLERK-DEPT	AMOU
AUG 28 14	05763	——— 1 Cash K Roll	12

PURCHASER John W Armbruster

ADDRESS 125 Forest Ave Brkyn NY

NO.	ITEMS	PRICE
2	Model 10 Saxophones	110 00
2	Mg 14 Mutes	12 00
1	Saxophone manuel	4 50
		126 50

INVENTOR

WILLIAM S. GUBELMANN

BY A. A. Ulrich

ATTORNEYS

March 25, 1947. W. S. GUBELMANN 2,418,027

PRINTING AND FEEDING MEANS FOR CASH REGISTERS

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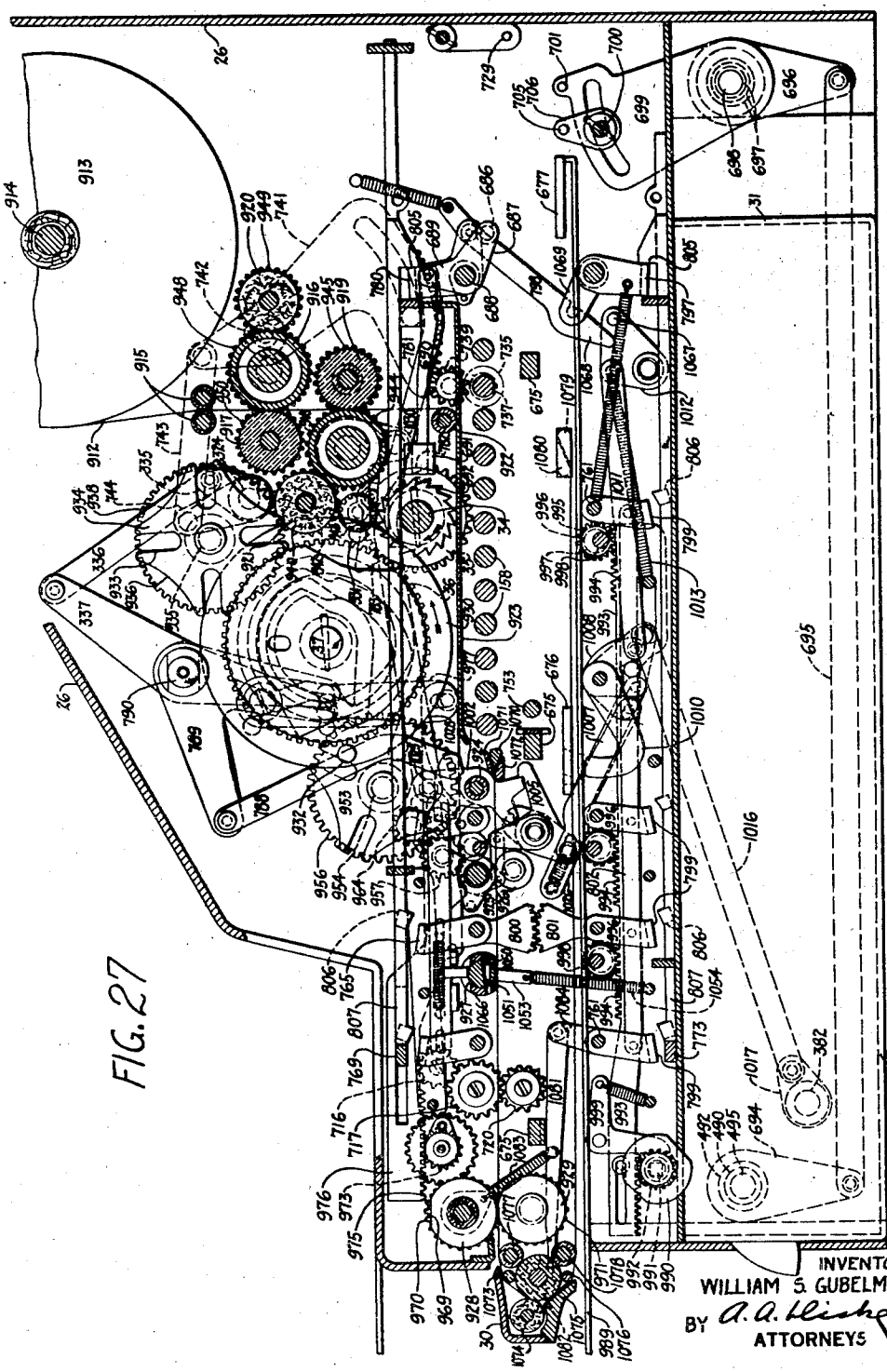


FIG. 27

INVENTOR
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BY A. A. Hirsch
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March 25, 1947. W. S. GUBELMANN 2,418,027

PRINTING AND FEEDING MEANS FOR CASH REGISTERS

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FIG. 28

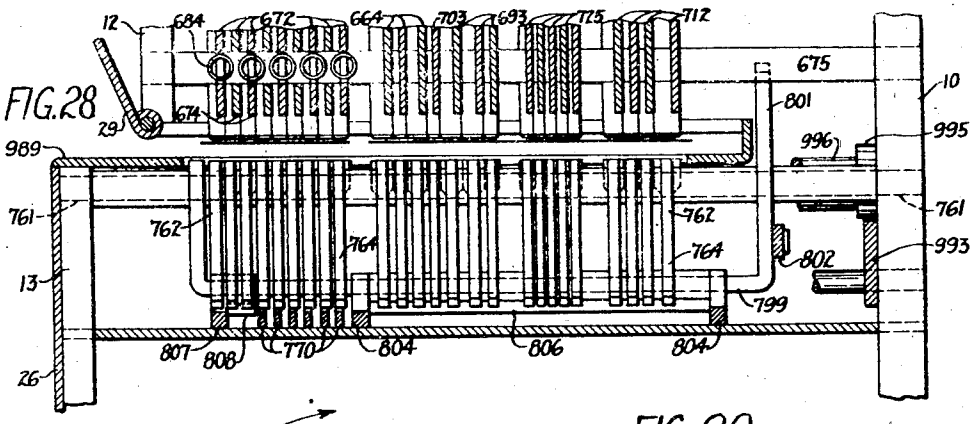


FIG. 29

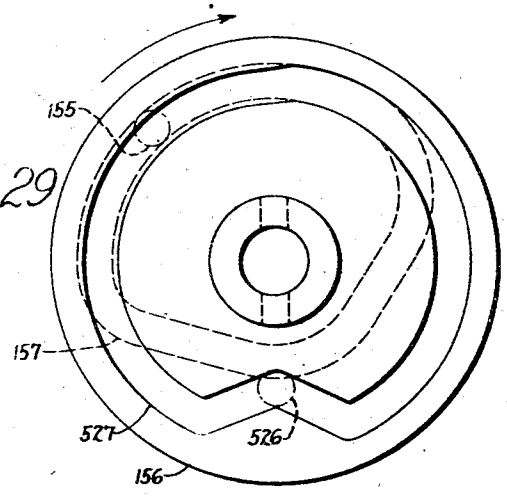


FIG. 30

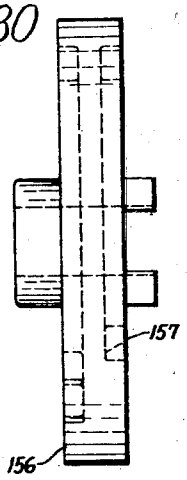
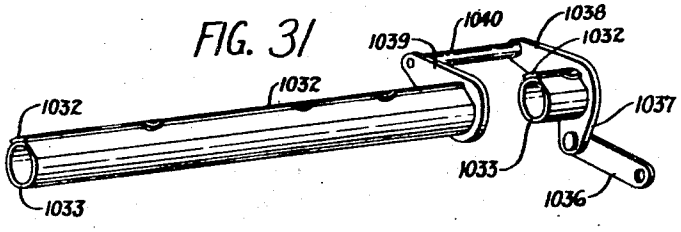


FIG. 31



INVENTOR
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ATTORNEYS

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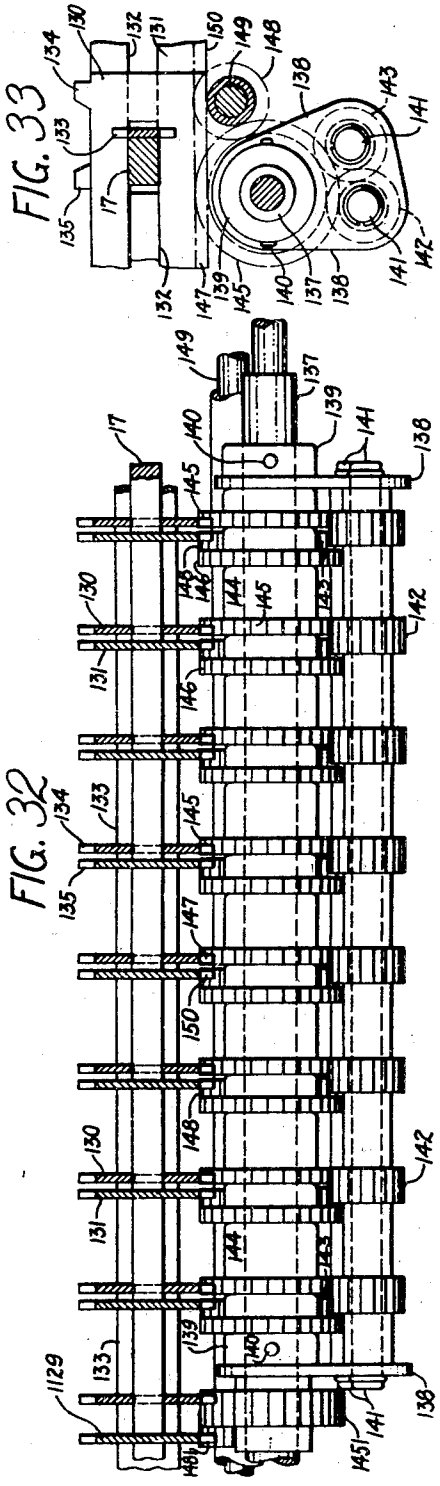


FIG. 33

FIG. 32

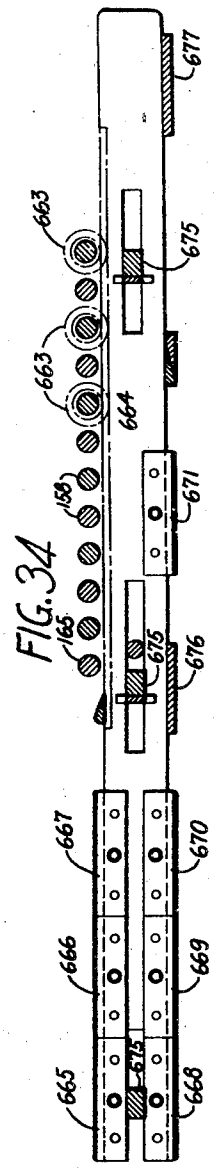


FIG. 34

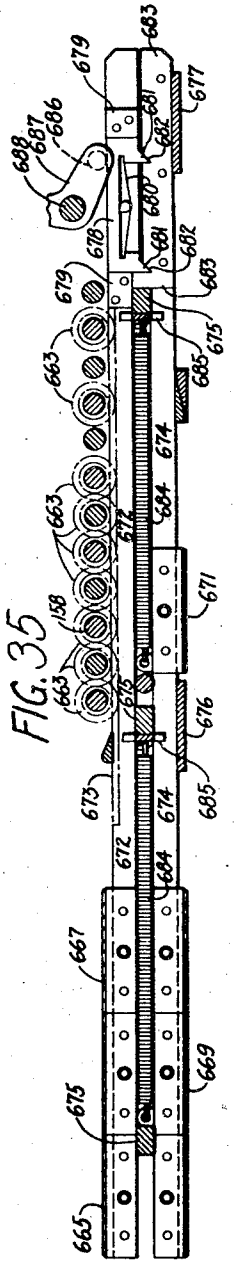


FIG. 35

INVENTOR
WILLIAM S. GUBELMANN
BY A. A. Hirsch
ATTORNEYS

March 25, 1947. W. S. GUBELMANN 2,418,027

PRINTING AND FEEDING MEANS FOR CASH REGISTERS

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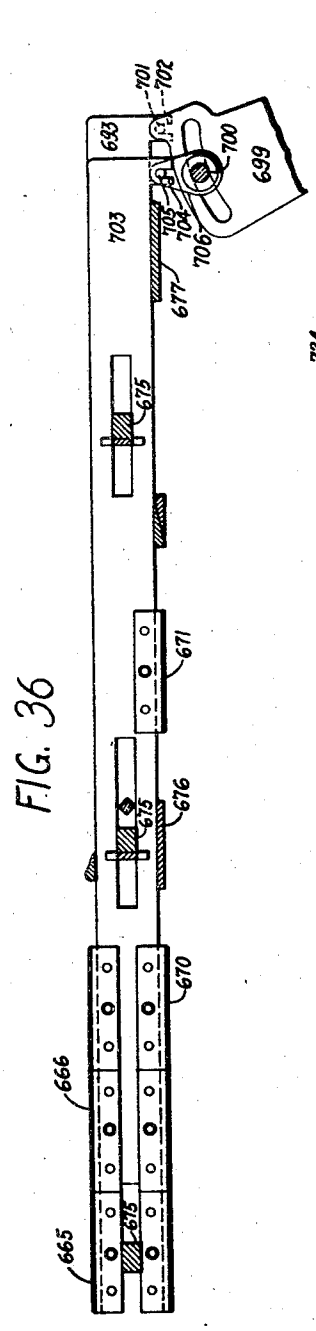


FIG. 36

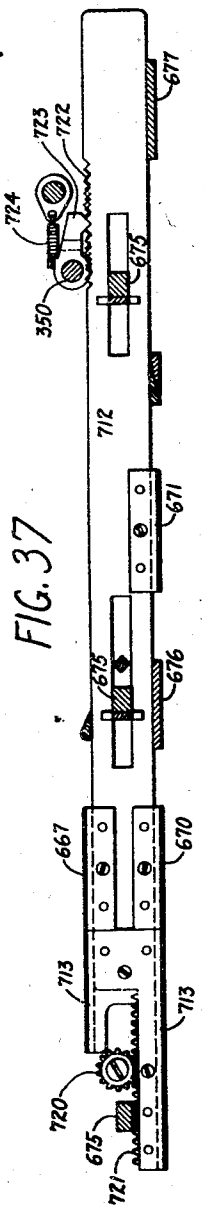


FIG. 37

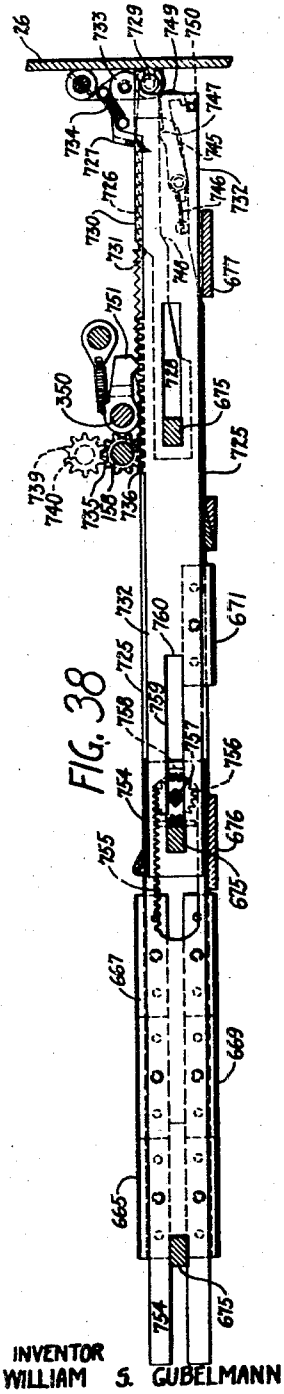


FIG. 38

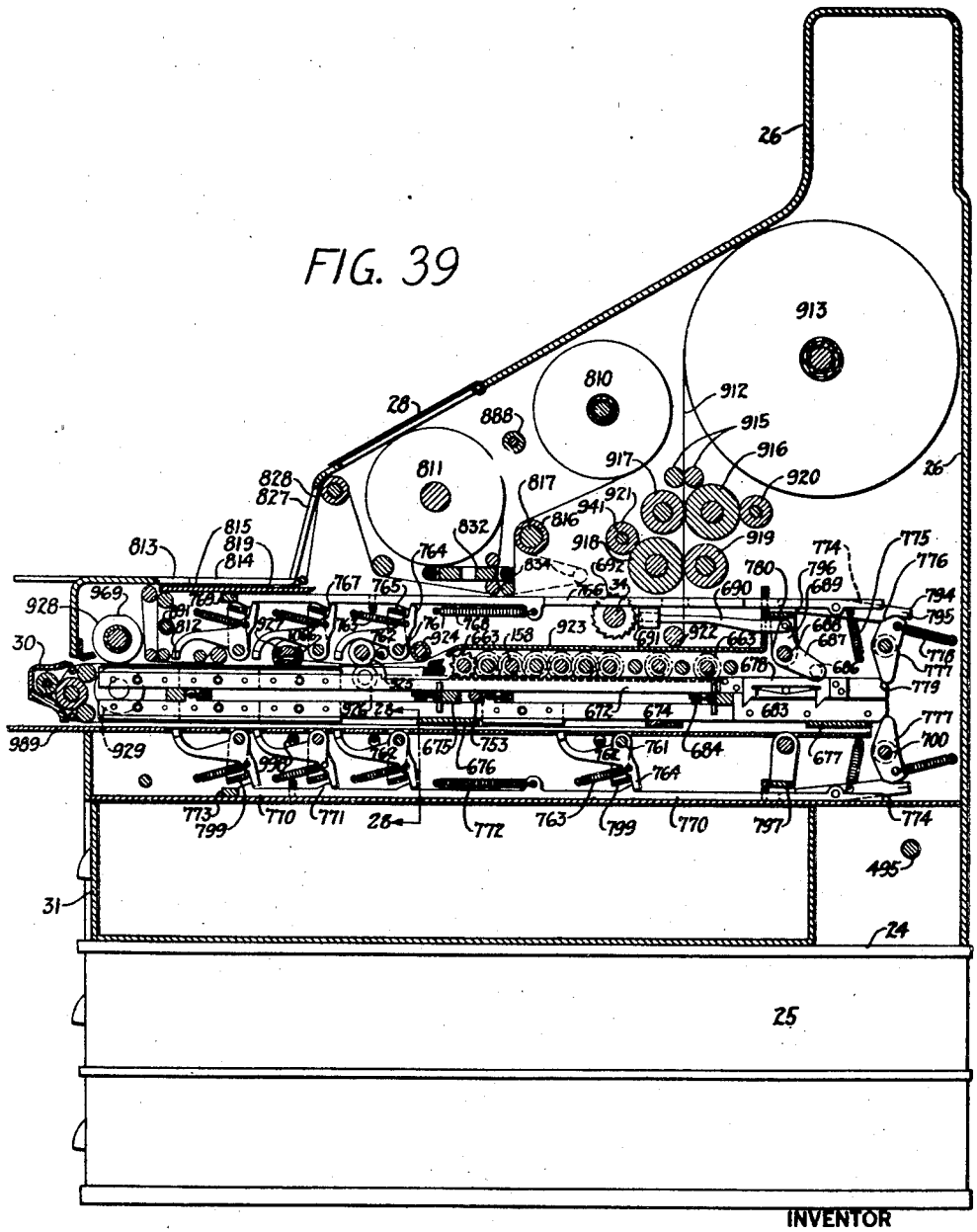
INVENTOR
WILLIAM S. GUBELMANN
BY A. A. Hiske
ATTORNEYS

March 25, 1947. W. S. GUBELMANN 2,418,027

PRINTING AND FEEDING MEANS FOR CASH REGISTERS

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FIG. 39



INVENTOR
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ATTORNEYS

March 25, 1947. W. S. GUBELMANN 2,418,027

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FIG. 40

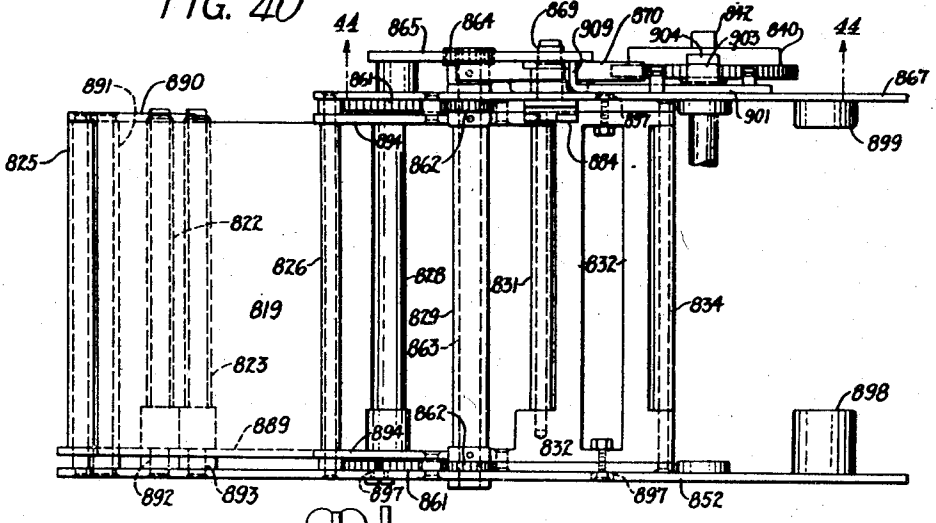


FIG. 42

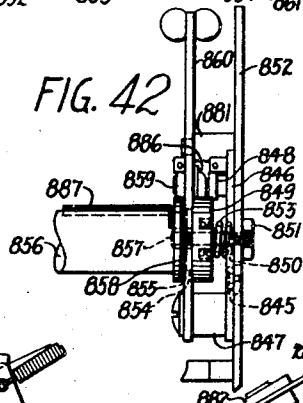


FIG. 41

FIG. 43

INVENTOR
WILLIAM S. GUBELMANN
BY
A. A. Hicks
ATTORNEYS

March 25, 1947. W. S. GUBELMANN 2,418,027

PRINTING AND FEEDING MEANS FOR CASH REGISTERS

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FIG. 44

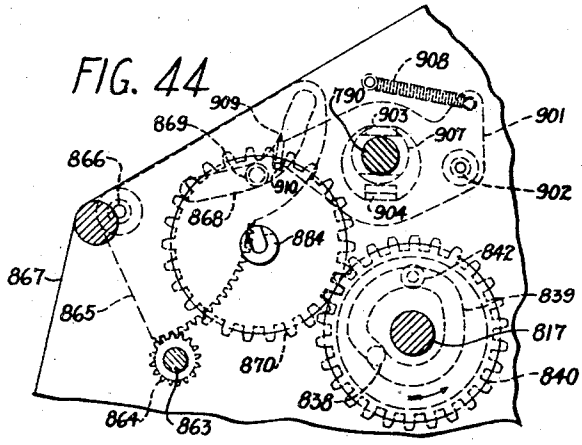
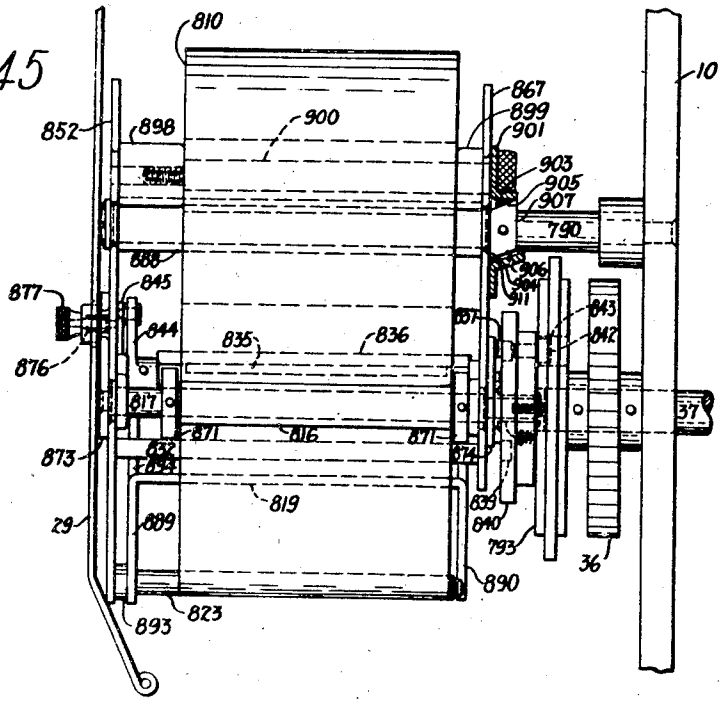


FIG. 45



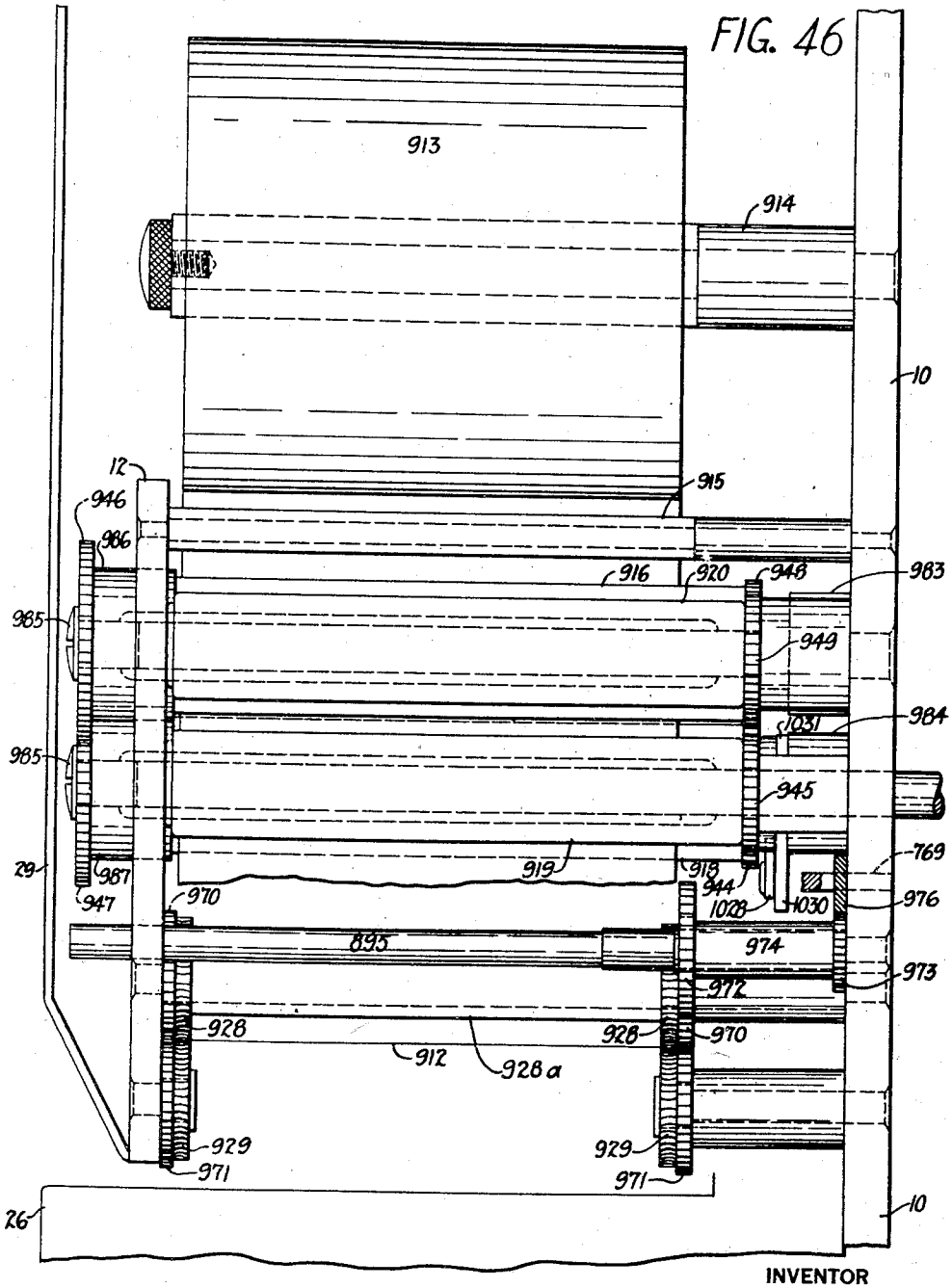
INVENTOR
WILLIAM S. GUBELMANN
BY A. A. Hicks
ATTORNEYS

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PRINTING AND FEEDING MEANS FOR CASH REGISTERS

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FIG. 46



INVENTOR
WILLIAM S. GUBELMANN
BY A. A. Hicks
ATTORNEYS

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FIG. 49

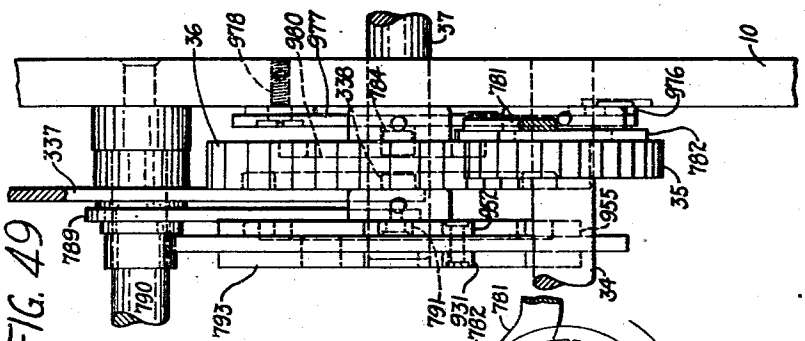


FIG. 48

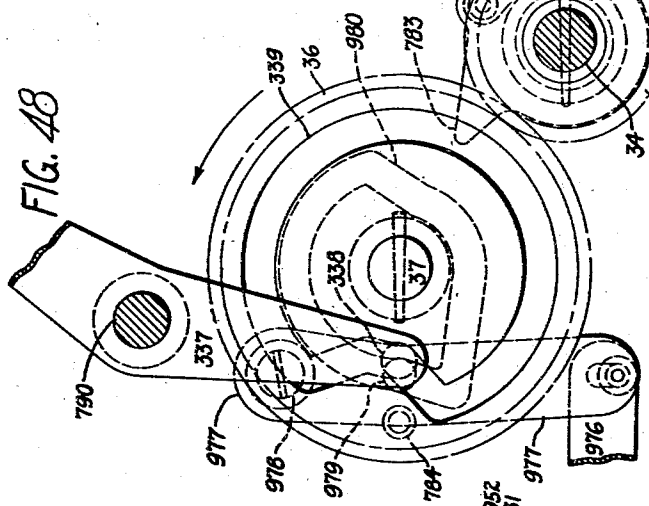
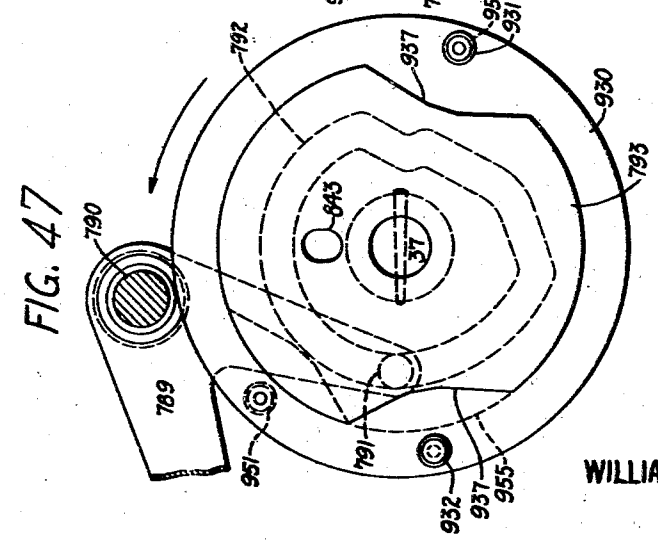


FIG. 47



INVENTOR
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March 25, 1947. W. S. GUBELMANN 2,418,027

PRINTING AND FEEDING MEANS FOR CASH REGISTERS

Original Filed Jan. 22, 1929 26 Sheets-Sheet 22

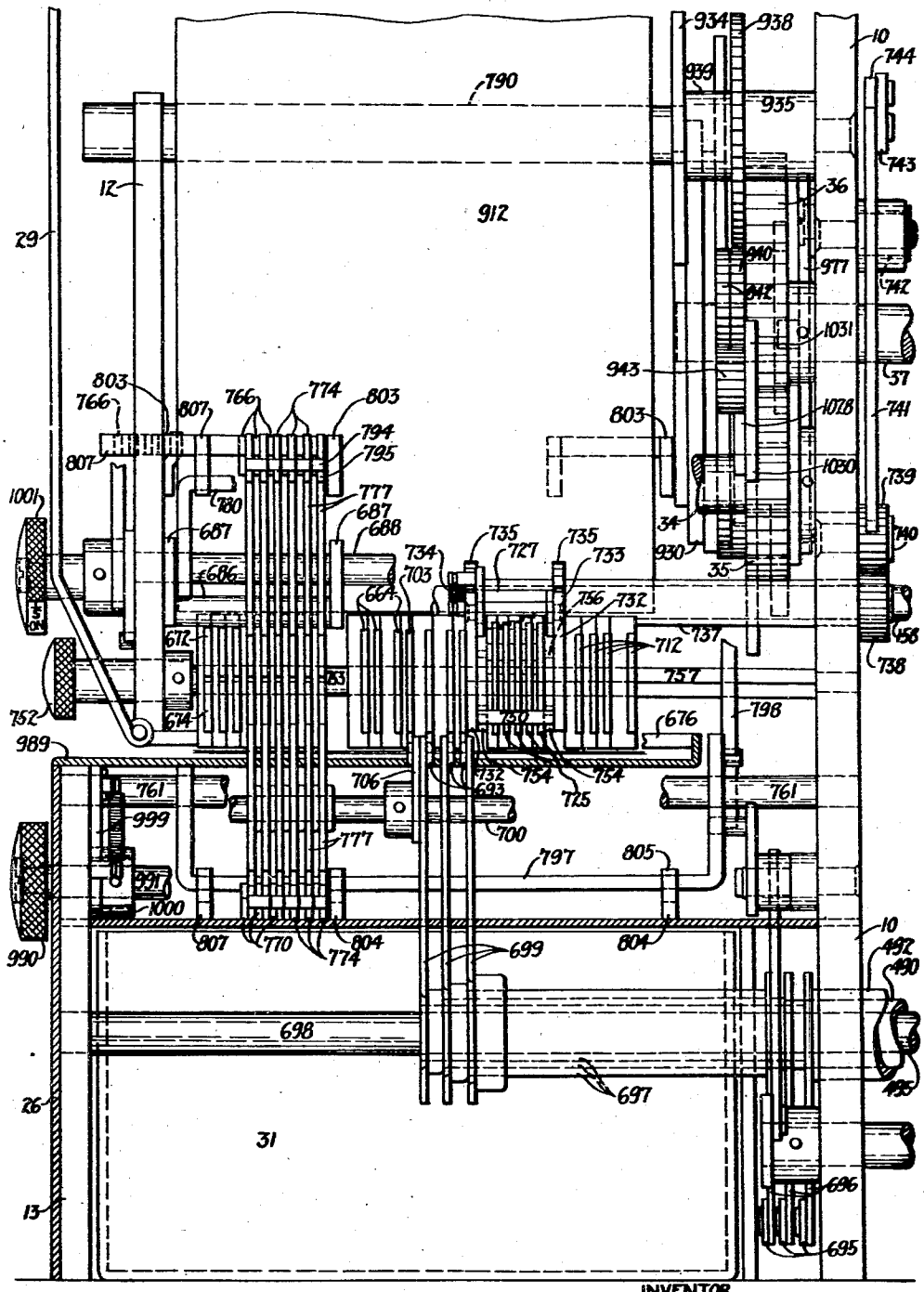


FIG. 50

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Original Filed Jan. 22, 1929 26 Sheets-Sheet 23

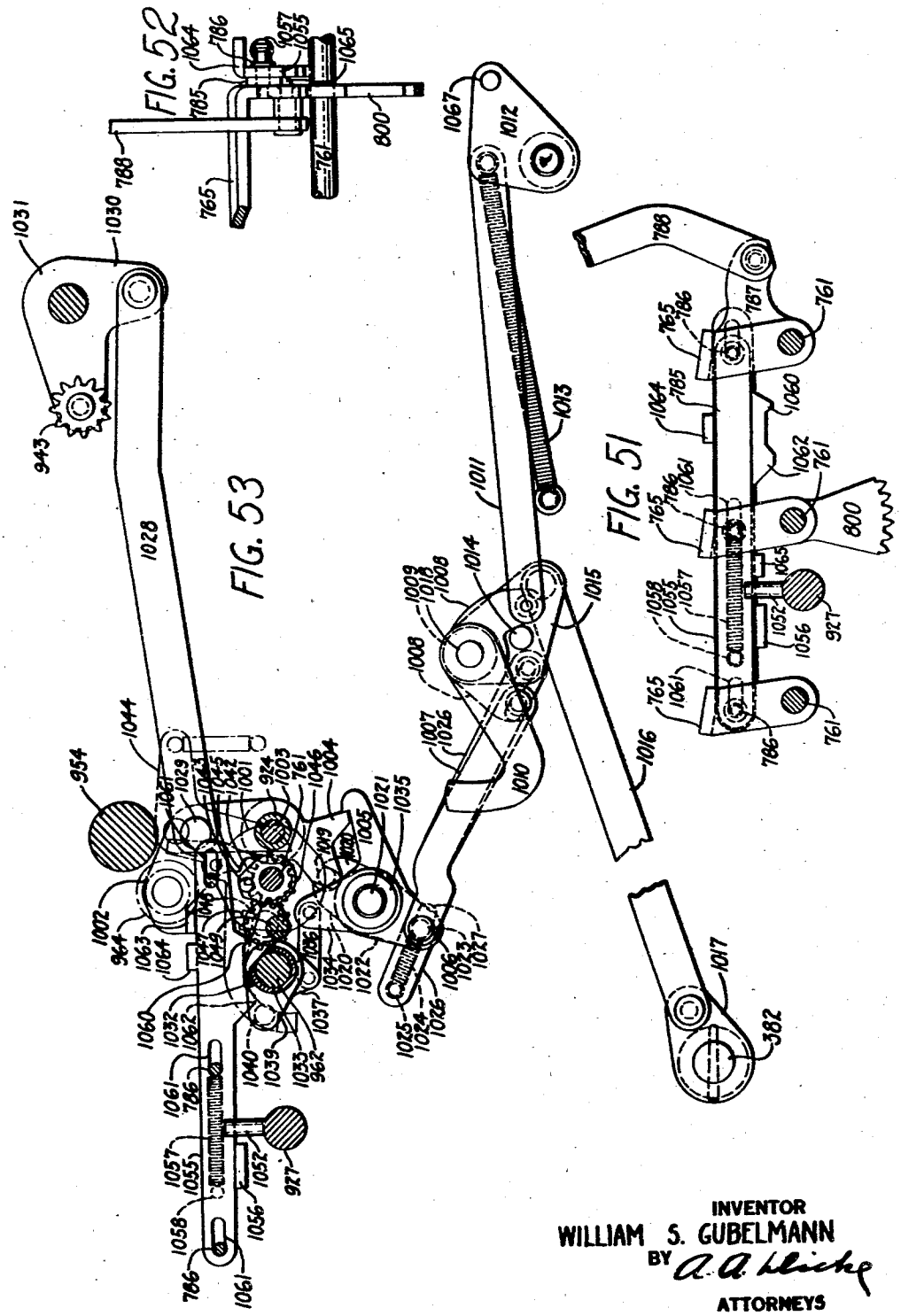


FIG. 52

FIG. 53

FIG. 51

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PRINTING AND FEEDING MEANS FOR CASH REGISTERS

Original Filed Jan. 22, 1929 26 Sheets-Sheet 24

FIG. 54

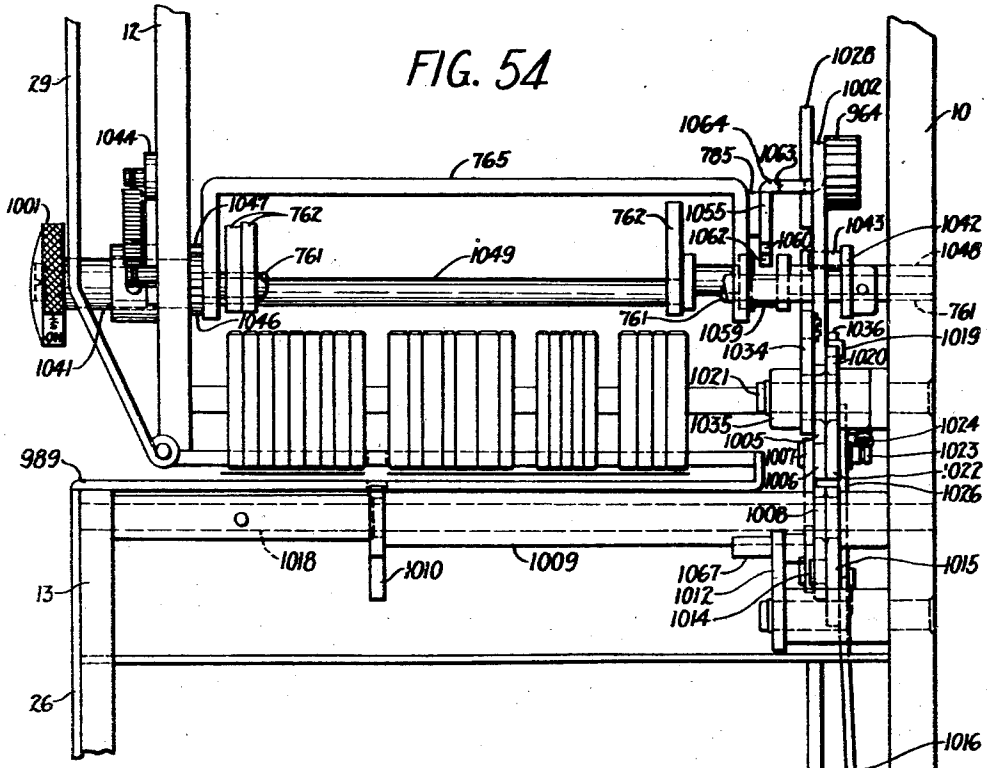
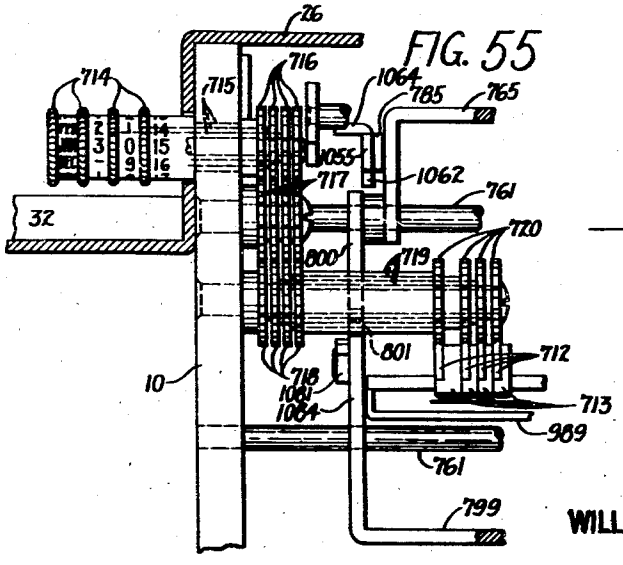


FIG. 55



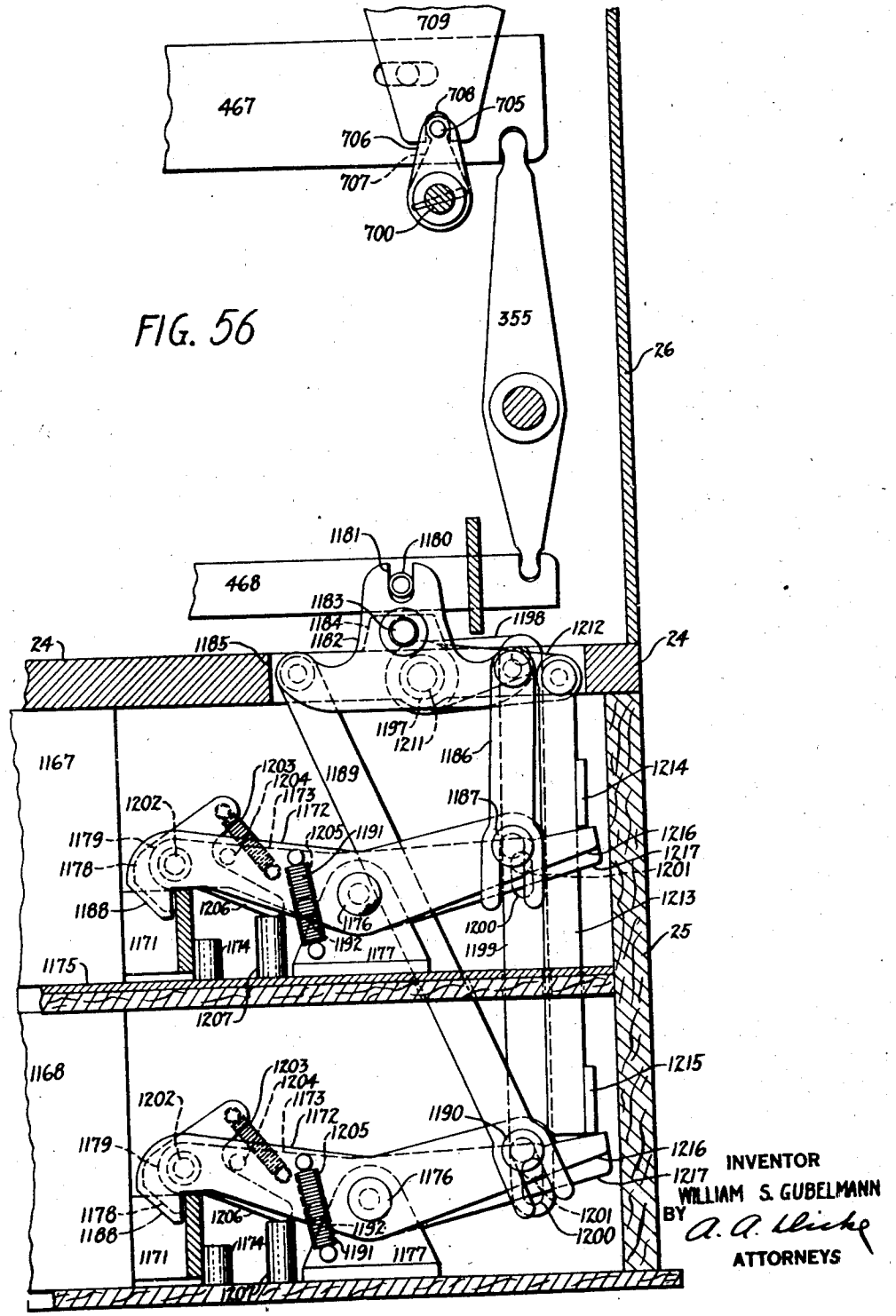
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PRINTING AND FEEDING MEANS FOR CASH REGISTERS

Original Filed Jan. 22, 1929 26 Sheets-Sheet 25

FIG. 56



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PRINTING AND FEEDING MEANS FOR CASH REGISTERS

Original Filed Jan. 22, 1929 26 Sheets-Sheet 26

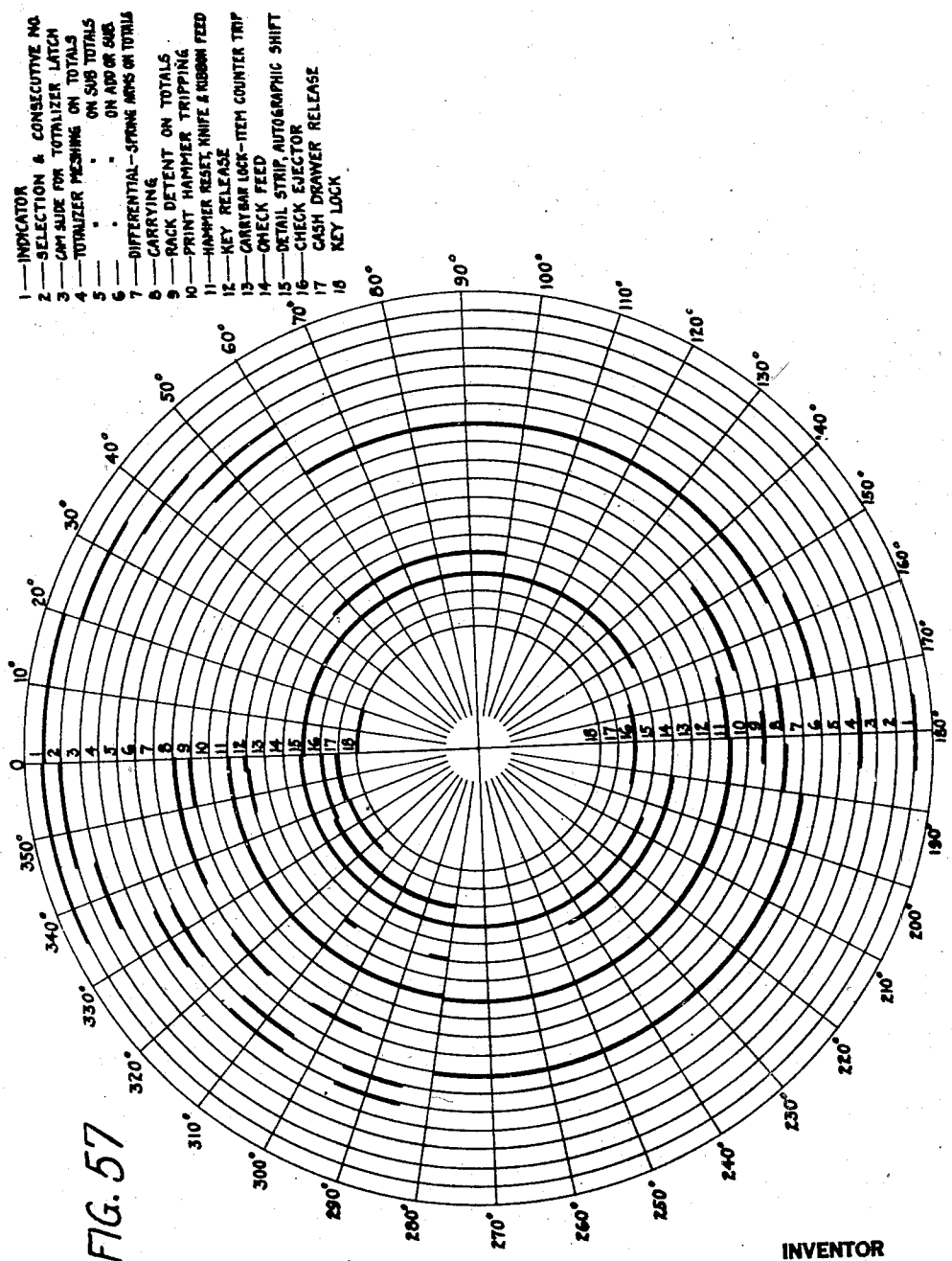


FIG. 57

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Patented Mar. 25, 1947 2,418,027

UNITED STATES PATENT OFFICE

2,418,027

PRINTING AND FEEDING MEANS FOR CASH REGISTERS

William S. Gubelmann, Convent, N. J.

Original application January 22, 1929, Serial No. 334,160. Divided and this application June 11, 1940, Serial No. 339,952

16 Claims. (Cl. 101—93)

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This invention relates to cash registers and particularly to printing mechanisms for such machines, this application being a division of applicant's application S. N. 334,160, filed January 22, 1929, Patent 2,226,919, December 31, 1940.

A primary object of the present invention is to improve the mechanism which is adapted to record the various items which are entered in the machine, as well as the totals of these items. While the present invention may be employed with various types of cash registers and any other machines in which printing is useful it has been illustrated as applied to the machine forming the illustrative embodiment of the invention of said application S. N. 334,160 to which reference is made for a more complete understanding of the machine as a whole.

An important feature of the machine is the provision of a large number of item counters, one or more of which may be selected for operation upon each operation of the machine. These counters are intended primarily to indicate the number of operations of the machine in accordance with one or more classifications, corresponding in general to the classifications of a part or all of the totalizers. An improved feature of the system of item counters is in the provision of suitable mechanism for controlling the recording devices to print the totals standing upon the individual counters at any desired time. Preferably the printing of the total from a counter will be effected at a time immediately preceding or following the printing of a total from the corresponding totalizer although if desired the totals from all counters may be printed in a series of successive operations either preceding or following a similar series of totaling operations with relation to the totalizers.

An object of the present invention is to provide improved and novel features in the recording mechanism. This recording mechanism is designed in such a way that it is extremely flexible in the matter of controlling the number of impressions taken upon various record media. Provision has been made for the recording of items upon a detail strip, a check strip and an inserted slip; impressions upon all three media may be made during a single operation if desired, although in the practical use of the machine it will usually be found sufficient to record on a detail strip and either the check strip which is issued from the machine, or upon an inserted sales slip, or record card taken from a file.

The impression to be taken upon the detail strip need only be single and will suitably include

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information as to the amount of an item, the special selecting keys active during an operation, the cashier instrumental in handling the transaction, and a consecutive number. According to the invention the impression upon the issued check strip may be made either single or double at the will of the proprietor or manager of the store in which the machine is used. If desired, the nature of the impression may be varied from time to time, or in accordance with the transaction handled, so that during certain operations a stub check may be issued whereas during others only a single check may be issued. Still greater flexibility is provided in connection with the impressions to be taken on the inserted slip.

The construction of the slip printing mechanism is such that duplicate impressions may be taken if desired upon separate portions of a statement sheet so that an original and a copy may be kept of a monthly statement having daily entries, or an account having line for line entries corresponding to transactions of a particular customer during a given period. This system of impressions will be particularly suited to the making of a hotel or bank statement or to the entry of payments on instalments due in connection with sales of articles sold on such a basis. At other times when it may be desired to handle, for example, a charge sale involving the use of an ordinary sales slip, the machine is designed to record full information upon each of the three sections of a triplicate slip. The impressions made upon a slip of this sort will be closer together than the duplicate impressions made upon a statement sheet, and will preferably be placed on the main body of the slip, on a detachable section adapted to be folded over the main body, and on a stub portion extending from the opposite end of the main body of the slip. This type of record will be found extremely useful in systems where it is customary to hand to a customer one copy of the sales slip, send another copy to the bookkeeper, and send a third copy or stub to the cashier.

For the purpose of determining the nature of the impressions which will be effected upon inserted material, the present invention contemplates the use of a single knob which may be turned to either of two positions. In one position of the knob the double form of impression will be effected, while in the other the triplicate form will be effected. Since it will not be necessary to print upon inserted material on all operations of the machine, the present invention further contemplates the provision of a feeler mechanism

for completely disabling the slip printing mechanism whenever no slip or record card is inserted to receive an impression. In other words, the absence of an inserted slip will completely disable the impression devices cooperating with the inserted slip printing type regardless of the position of the control knob.

On either an issued check or an inserted slip the machine herein disclosed will record the amounts of items entered, the dates thereof, special characters designating the special keys depressed, cashier's designations, and, in the case of the issued check, the consecutive number. The consecutive numbering mechanism is of a novel form. The type elements are mounted on sliding type bars which are fed consecutively by the main operating mechanism any of the bars being restored automatically to zero when it has been shifted ten steps.

For the purpose of effecting the plural impressions on the various record media, a plurality of sets of type are provided so that only a single impression is required from each set of type during a single operation of the machine. A particular advantage of this construction is in the reduction of the time element required for the recording operation. In this connection it should be pointed out that the general construction of the machine which applicant has invented is such that the desired multiple sets of type may be provided with facility.

Individual hammers are provided at each printing point for effecting impressions from the positioned type on the several carriers or type bars, a separate hammer being provided for each of the bars. In this way applicant is enabled to effect zero elimination as well as the filling in of zeros in a simple and automatic manner.

Many novel features will be found to be present in the various phases of the recording mechanism, and only a few of these have been generally alluded to at this point. It may be mentioned as a further feature that the detail strip is designed to provide for the insertion of autographic notations and for this purpose novel means have been provided for shifting the paper from visible writing position to printing position and back to visible position. This mechanism also includes novel line spacing provisions. Another important feature of the recording mechanism which may be mentioned is the provision of means for locking up the machine whenever any attempt is made to tamper with the setting of the type elements during a totaling operation. It will be recalled that at this time the action of the differential mechanism is only semi-positive and it is important that any attempts to print an incorrect total should be prevented. For other objects carried out and advantages present in the recording mechanism reference may be had to the detailed description to be given hereinafter.

While an attempt has been made in the foregoing section to enumerate a number of the outstanding improved and novel features embodied in the printing mechanism of the present invention, it will be understood that many other features, too numerous to specifically mention at this point, are present and will become more apparent as the description of the illustrative machine progresses.

General outline of illustrative machine

In order that the relation between the various parts, which will be described hereinafter in detail, may be more readily understood a general

outline will first be given of the component parts of the machine illustrated in the drawings. While this machine serves admirably to illustrate the important features of the invention it will be understood that the specific application of these features herein given is not intended to be restrictive but various modifications may be made to adapt the machine for innumerable other uses.

It has been found convenient for the purpose of explaining the extreme flexibility in application of the novel features of the invention to disclose them in connection with a machine adapted for use in a large musical instrument store which handles not only a variety of such instruments but a number of accessory items as well. It will be assumed that such a store is divided into a number of departments which may themselves be assigned to one of two groups as for example an instrument group and a miscellaneous group including accessories or miscellaneous items, such as sheet music, player rolls, phonograph records, and repairs. The instrument group may embrace such departments as piano, wind instrument, string instrument, phonograph, and so on.

Each department may have assigned to it a number of clerks although for the sake of avoiding duplication of parts in the disclosure only one clerk will be assumed to be associated with each department. The store may be of such size and conduct its business in such a way that a wide variety of transactions are encountered such as the usual cash, charge, paid out, received on account, and C. O. D. transactions. These types of transactions will necessitate extreme flexibility in the printing feature of the machine in order to enable its coordination with a suitable bookkeeping system. Thus, for cash transactions it may be desired to issue a printed check which may be handed to the customer as a receipt covering his purchase. A charge sale will preferably call for printing upon an inserted sales slip which for convenience should be separable into three units, each bearing the printed amount of the sale and other data such as the date, clerk's initial, department, etc. For received on account transactions it will be found desirable to print upon an inserted statement sheet the amount of and other information regarding the money received. This as contemplated by the present invention may be effected upon duplicate sections of a statement sheet or card adapted to receive successive entries upon successive lines. Other transactions may require still other printing conditions, for example a paid out amount may not call for printing upon any form of inserted material or even upon a check. All amounts, however, regardless of the nature of the transaction should be entered upon a detail strip which may at the same time identify the transaction as to type, department, clerk involved, consecutive number, cashier operating the machine, and any desired additional matter which may be entered through an autographic opening.

As intimated in the foregoing the present machine is intended to be operated by either of a pair of cashiers who may be responsible for all transactions occurring during their respective terms of duty. Each cashier, furthermore, may be enabled to control certain identifying and totalizing devices related only to himself in such a way as to prevent any one else from using these devices to produce a false or erroneous entry.

In order that instantaneous totals may be obtainable of a wide variety of items a large number of totalizers are provided and these are related

not only to the individual keys assigned to the department, clerks and transactions, but are related as well to combinations of these classes. Thus, for the nine departments, nine clerks, and nine transactions, there are provided twenty-seven totalizers arranged in three groups or banks, each containing the nine falling under a particular classification. Each of these groups are shown provided with what may be termed a universal carrying mechanism which has certain parts common to all of the nine totalizers in the group. In addition each of these three banks of totalizers includes a tenth totalizer which is adapted to carry the grand total of the amounts on all of the nine universal type of totalizers in the group, or if desired it may carry some entirely independent total. These grand totalizers are provided with what may be termed individual carrying mechanism since each must be capable of operation without regard to any other totalizer. Those totalizers related to the departments and the clerks are adapted in the present disclosure to accumulate only those transactions which represent actual sales, that is, cash, charge, and C. O. D. items, while the transaction group of totalizers will of course accumulate all items of each particular type of transaction. Since the grand total of the clerks' group of totalizers will be the same as the grand total of the department totalizers under the arrangement assumed above only one of the individual totalizers will be used for this purpose. The remaining individual totalizer associated with these groups has, in the illustrative machine, been assigned to one of the cashiers to accumulate the total sales registered by him. Similarly, the second cashier's sales will be entered upon the individual totalizer of the transaction group, since a grand total of all transactions would be meaningless.

A fourth group of totalizers is provided in the machine and this group is of such construction that as many of the totalizers in the group as desired may be operated at the same time. Thus in the group illustrated there are eight totalizers all of which might be operated during an operation of the machine if occasion required it since the transfer mechanisms, while provided with certain common operating devices, are sufficiently independent to permit the proper action for each individual totalizer of the group. In the particular layout adopted for illustration these totalizers are devoted to such items as the total sales registered in each of the two groups of departments, the money taken in by each cashier, the money paid out by each cashier, and the cash sales registered by each cashier. From these designations it will be seen that it will not actually be necessary to operate more than two or at most three of these units upon a single operation of the machine. It will be apparent that the determination as to whether any one of these totalizers shall be rendered effective upon a particular operation is dependent upon the particular keys operated either in the department or the transaction banks as well as upon the state of the pair of cashiers' locks.

A fifth bank of totalizers is further provided for the purpose of handling such combinations of items as may require both addition and subtraction. This bank, as shown, is made to include four totalizers, one of which is devoted to the total cash on hand, while two others are devoted to the cash for which each cashier is to be held responsible, and the fourth is devoted to "C. O. D." items in such a way as to indicate at all times the amount of "C. O. D." business for which collections have not been made. The first of this group of totalizers will be so arranged and operated that it will receive as positive entries all "cash," "received on account," and "C. O. D. paid" amounts, while it will receive as negative or subtractive entries all "paid out" amounts. The selection of this totalizer for effective operation will therefore be dependent upon the particular transaction key depressed and if this key renders the totalizer effective it must at the same time determine its state, that is as to whether it is to be operated additively or subtractively. Substantially the same mode of control must be provided for the two totalizers devoted to the cash of the individual cashiers with the additional requirement that the selection of these totalizers must also be governed by the cashiers' locks. The remaining totalizer of this group will of course be rendered active only when one of the three C. O. D. keys happens to be depressed. Thus if the ordinary C. O. D. key is depressed this totalizer will be selected for additive operation whereas if the "C. O. D. paid" key or the "Goods returned C. O. D." key is depressed the selection of this totalizer will be for subtractive operation. From what has been said it may be noted that as to this fifth bank of totalizers it may be necessary under certain conditions to operate one of them additively and at the same time operate another of them subtractively to the same extent. Thus when a "C. O. D. paid" amount is reported and registered it must be added to the general cash totalizer as well as to one of the cashiers' cash totalizers but it must at the same time be subtracted from the C. O. D. totalizer in order that the latter may represent only outstanding items of this character.

In addition to the foregoing banks of totalizers capable of receiving the variable amounts of the various transactions and some of them either additively or substractively the machine illustrated is provided with some thirty item counters which are arranged in three banks and are adapted to receive only unitary actuation upon operations of the machine. These counters are of substantially the same construction as the totalizers of the first three banks mentioned but, as stated, are adapted to receive only unit actuation upon operations of the machine. Twenty-seven of these counters are of the universal carry type and are directly related to corresponding ones of the keys in the three special key banks so that upon normal operations three counters will have a unit added to their registrations. The remaining three counters which are of the individual transfer construction are devoted to the counting of the total number of operations performed by each cashier and the counting of the number of sales made by all of the clerks.

From the foregoing brief outline of the general character of the totalizers and item counters provided in the machine illustrated herein, it will be found that this machine is capable of operating a maximum of eighteen totalizers and six item counters upon a single operation of the machine although due to the particular designation assigned to the totalizers and counters the actual number which will be selected during any normal operation will probably not exceed ten totalizers and five counters.

From time to time it may be desired to take the totals standing upon one or another or possibly all of the totalizers either with or without re-

setting. For this purpose certain lock controlled devices are provided through the adjustment of which it is made possible for an authorized person to condition the machine for the printing of totals from any of the totalizers and the returning of the same amounts to the wheels, i. e., subtotaling, while the same person or another specially delegated party may so condition the machine as to effect the resetting of the totalizers coincidently with the printing of totals. Now since there are a large number of totalizers provided in the illustrative machine for which there are no single selecting keys and which are engaged with the actuators under the joint control of a plurality of keys it has been found necessary or desirable to provide a plurality of total controlling levers each of which may be moved to any one of several totaling positions. These levers are normally locked, but when the manager of the store, for example, releases them by the use of a special removable key they may be moved to any desired position. Now for the three banks of what have been termed the universal totalizers, comprising twenty-seven in all, the selection of any one for totaling may be aided by the depression of the corresponding key in one of the three special banks, just as for item entering operations. The invention, therefore, contemplates the movement of one of the totaling levers to a certain position, which is one step removed from the normal adding position, and in which any one of the twenty-seven universal totalizers may be selected for sub-totaling by depression of the related key. A similar arrangement is made possible with respect to the twenty-seven item counters having the universal transfer construction, but in order to distinguish between the totalizer and the item counter related to a particular key during total taking there is provided a separate position of the same total lever for item counter totals. This position may, for example, be two steps away from normal. However, this arrangement alone does not take care of the three individual transfer type of totalizers located one in each of the three banks discussed above nor the three individual transfer item counters. Separate positions of the same total lever are accordingly provided for determining the selection of each of these individual totalizers during totaling. This control is necessarily without the aid of any special keys since no keys correspond directly to these totalizers. Substantially the same construction is provided for that item counter which represents a grand total of the number of all sales entered, the only difference being that a definite position of the other total lever is provided for this purpose. As for the remaining individual transfer item counters the aid of the cashiers' locks may be relied upon to effect a selection so that the total lever first mentioned is merely placed in the second position specified and the appropriate cashier's lock turned.

For the remaining twelve totalizers, namely the bank of eight individual transfer totalizers and the four adding and subtracting totalizers, there must be provided four additional positions for the first mentioned lever, as well as some eight positions other than the normal and "total sales counter" positions of the second lever. By the arrangement specified it is thus made possible to select for total printing any one of the forty-two totalizers or of the thirty item counters by the selective movement of one of two levers to one of nine positions away from normal, the selection of

certain of the totalizers and counters being aided by the depression of certain keys or the turning of the cashiers' locks.

The resetting control is precisely the same for all totalizers and is effected by the mere turning of a lock in addition to the appropriate adjustment of the levers mentioned. Thus, in order to condition the machine for a reset or grand total operation it is necessary that the party operating the machine should have not only the key to unlock the pair of adjustable levers but a special key to turn the resetting control lock.

One feature of the invention which should probably be mentioned at this point is the general mode of operation of the differential mechanism. During normal adding operations this mechanism is entirely positive in its action and is of the type involving complementally movable elements which move in opposite directions until a shoulder on each engages a stop set by the depressed key in the particular bank involved. During totaling operations it has been found desirable to introduce a spring for operating that one of the complemental elements for each bank which is connected at the time through gearing to the totalizer actuator. On operations of this kind it is desired to have the totalizer elements, in being turned back to zero positions, to control the extent of movement of the actuators and hence the complemental elements. For this reason, the special springs are rendered effective for totaling to insure the movement of the actuators and connected ones of the complemental members prior to any movement of the remaining complemental members; in this way the latter will then subsequently be shifted, after the totalizer wheels have reached zero, to take up the balance of the full complement which each pair of members must receive. Since the type carriers are therefore positioned under only spring control in totaling, certain precautionary devices have been provided to lock up the machine in the event of any interference with the free movement of the type carriers through tampering as by the insertion of a wire.

An important phase of the machine is the provision of suitable machine release and key interlocking devices. The arrangement adopted for purposes of illustration contemplates compelling the operation of a key in each of the special key banks as well as the turning of one of the cashiers' locks into active position as an incident to the operation of the machine. Four separate locking arms are therefore provided to normally block the operation of the main shaft. However, when totals are being taken from any of the twenty-seven totalizers of the universal transfer type, or when totaling from the corresponding item counters, the machine should be releasable by the depression of a single key. Furthermore, it should be impossible at such times to depress more than a single key. To this end the movement of one of the total control levers to the position wherein it predetermines either of the two conditions mentioned it automatically serves to couple up the four locking arms in such a way that movement of one will cause releasing movement of all four. Again, when the machine is conditioned for taking totals from other totalizers or counters which are not directly related to one of the special keys or a cashier's lock the machine should be releasable without the need of depressing any key or the turning of either of the cashiers' locks. To this end movement of either of the total controlling levers to any

position, other than the two above specified, away from normal is adapted to automatically withdraw all of the four locking arms mentioned so that the machine may be operated directly or may be released by a motor bus bar.

In addition to the foregoing machine locking and releasing mechanisms there are provided interlocking means which prevent movement away from normal of more than one of the total control levers at a time; there are also means for preventing depression of more than a single key in any bank and means for compelling proper coordination between the total levers and special keys for all positions of the levers.

With this brief general outline the features of the machine and particularly the printing mechanism will now be described in detail with reference to the drawings which accompany and form part of the specification.

In the drawings:

Figure 1 is a perspective view of the entire machine.

Figure 2 is a vertical sectional view thru the machine showing the differential mechanism, the indicators, a bank of universal totalizers, and the cash drawers.

Figure 3 is a side elevation of the machine showing the control mechanism mounted on the left side frame of the machine.

Figure 4 is a view in side elevation showing the two auxiliary side frames on the right side of the machine for supporting portions of the printing mechanism. The outlines of the detail strip unit are shown also.

Figure 5 is a plan view showing particularly the actuators for the totalizers and counters and showing the denominational shafts for driving the same.

Figure 6 is a sectional view through the printing mechanism looking toward the front and showing the forward check feeding devices.

Figure 7 is a vertical sectional view thru an amount key bank showing the complemental slides. This section is taken along the line 7—7 of Figure 2, looking in the direction of the arrows.

Figure 8 is a vertical sectional view taken toward the rear of an amount key bank along the line 8—8 of Figure 2 and shows the zero stop and complemental slides.

Figure 9 is a plan view of the total controlling levers, with their designating plates, and also showing the reset lever and lock.

Figure 10 is a plan view of the groups of special keys, namely, the transaction, clerk, and department keys.

Figure 11 is a vertical sectional view of a special key bank showing also the selection mechanism operated under control of the special keys.

Figure 12 is a detail view of the rearwardly tensioned centralizing slide for a special key bank.

Figure 13 is a detail view of the forwardly tensioned centralizing slide for a special key bank.

Figure 14 is a detail view of a fixed plate used to guide and strengthen the ends of the special keys.

Figure 15 is detail view of a positioning slide acted upon by the four rear special keys of a bank.

Figure 16 is a detail view of a positioning slide acted upon by the five front special keys of a bank.

Figure 17 is a view in side elevation of a portion of the interlocking mechanism and the cashiers' locks.

Figure 18 is a detail view in elevation of the totalizer engaging cam disk and its associated bell cranks.

Figure 19 is a front elevation of the parts shown in Figure 18.

Figure 20 is a detail view of the opposite side of the totalizer engaging cam disk from that shown in Figure 18.

Figure 21 is a view showing in full size a portion of the detail strip which the machine is adapted to print, illustrating the entry of ordinary transactions having both autographic and narrow spacing.

Figure 22 is a detail view showing in full size a portion of the detail strip having a read total printed thereon.

Figure 23 is a detail view showing in full size a portion of the detail strip having a reset total printed thereon.

Figure 24 is a detail view showing in reduced size a portion of a duplicate installment sheet adapted to be inserted and printed by the machine.

Figure 25 is a detail view showing a form of stub check in full size.

Figure 26 is a detail view in reduced size of a portion of a triplicate record adapted to be printed on a sales slip inserted in the machine.

Figure 27 is a view in sectional elevation of the mechanism outside of the right side frame. This mechanism includes the printing controlling and operating parts, as well as the check feeding, check severing, and ribbon feeding devices. For clearness, the type bars and type hammers have been omitted.

Fig. 27a is a fragmentary view, partly in section, of the check paper perforating and severing means.

Figure 28 is a transverse sectional view through the type bars, hammers, and hammer release mechanism for the inserted slip printing elements. This view is taken along the line 28—28 of Fig. 39, looking in the direction of the arrows.

Figure 29 is a detail side view of the cam used to operate the differential mechanism, indicating mechanism, and cash drawer release.

Figure 30 is a front view of the cam shown in Fig. 29.

Figure 31 is a perspective view of the no-printing tube and bail for blocking the stub check hammers.

Figure 32 is a front view, partly in section, of a portion of the differential mechanism.

Figure 33 is a side view of the differential mechanism shown in Figure 32.

Figure 34 is a detail view of one of the type bars controlled by the clerk, department, and transaction banks of keys.

Figure 35 is a detail view of one of the amount type bars showing its sectional construction and also the locking feature between the sections.

Figure 36 is a detail view of one of the special total character type bars and the connections for operating the cashier's type bar.

Figure 37 is a detail view of one of the dating type bars.

Figure 38 is a detail view of one of the consecutive numbering type bars and the actuating mechanism therefor.

Figure 39 is a sectional elevational view thru the machine taken at a point outside the right side frame and showing the printing mechanism, also the check and detail strip rolls.

Figure 40 is a plan view of the detail strip unit with the paper rolls and certain connections removed.

Figure 41 is a view in side elevation of the detail strip unit showing also a portion of the casing of the machine.

Figure 42 is a detail view in front elevation of a portion of the mechanism used to feed the detail strip and showing also the paper roll releasing mechanism.

Figure 43 is a detail view of the paper roll latch.

Figure 44 is a vertical sectional view of the operating mechanism for the detail strip shifting devices, taken along the line 44—44 of Figure 40 and looking in the direction of the arrows.

Figure 45 is a view in rear elevation of the detail strip unit as assembled in the machine.

Figure 46 is a view in rear elevation of the check feeding and ejecting mechanism showing the removable electros.

Figure 47 is a detail view of the cam disk which operates the printing and check feeding and severing mechanisms.

Figure 48 is a view in side elevation showing the spindle on which the operating handle is mounted and the gear connections to the main operating shaft. The cam grooves in the gear which is shown operate the check ejecting mechanism, the actuating means for the totalizer selection mechanism, and the consecutive numbering mechanism.

Figure 49 is a view in rear elevation of the mechanism shown in Figures 47 and 48.

Figure 50 is a view in sectional elevation taken from the rear behind the type bars and showing other mechanism outside the right side frame.

Figure 51 is a view in side elevation of the hammer resetting bails and showing also the connecting and operating links.

Figure 52 is a view in rear elevation of the mechanism shown in Figure 51.

Figure 53 is a view in side elevation of the no check and no print mechanism showing both the automatic feeler finger mechanism and the manually operated connections.

Figure 54 is a view in front elevation of the mechanism shown in Figure 53 including an end view of the type carriers.

Figure 55 is a view in front elevation of the date printing controlling knobs and the tubular connections operated thereby.

Figure 56 is a side elevation, partly in section, showing the cash drawer releasing mechanism.

Figure 57 is a chart showing graphically the timing of the major functions performed by the machine.

Framework and casing

As best shown in Fig. 5, the main frame of the machine which serves to support all of the various mechanisms to be described, comprises a pair of side frames 9 and 10, the first situated toward the left side of the machine and the second toward the right. An intermediate frame 11, which need not be as thick as the side frames, is located toward the center of the machine to break up the otherwise unsupported span of certain through shafts which serve in a measure to aid in holding these vertical frame elements together and in their proper relations. Also on the right side two auxiliary frames 12 and 13 (Fig. 4) are provided for supporting parts of the printing mechanism. Various means in the form of cross bars 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23, as illustrated in Fig. 2, are primarily relied upon for maintaining the proper positioning and rigidity of the frame structure aided, as before explained, by a number of through shafts. All of the vertical frames are secured to and supported by a base plate 24 which rests on a drawer unit generally designated by the character 25.

The arrangement is such that the bulk of the operating parts are located between the two outside frame members 9 and 10, although at each side there is an overhang of certain portions of the mechanism including a number of the main through shafts. It will be understood as the description progresses that wherever possible the various distinct features of the machine have been constructed as individual units having their own supporting structures which are separably mounted and secured in place on an appropriate portion of the main supporting structure.

A casing 26 (Figs. 1 2 and 3) is adapted to surround all of the frame work as well as the great majority of operative parts including those which extend beyond the main side frames. Suitable openings are provided in this casing for permitting the indicators to be viewed and permitting the necessary access to various portions of the printing mechanism. The casing, Fig. 1, has a hinged cover 27 for normally concealing the parts related to the total levers, covers 28 and 29 for permitting access to the roll containing the printed detail strip, a cover 29 for permitting removal of the entire detail strip unit and access to the check strip and electros, and for giving access to the printer 30 for the purpose of inking the ribbon. A drawer 31 may be provided below the printer unit and may be used for filing away installment sheets, charge account sheets, or similar slips. Openings are also provided in the casing for the key units and operating handle, as well as for other operative elements which must be accessible from the outside of the machine. A marble slab 32 may be provided on a front shelf on the case for retaining money, sales slips and the like, during the course of operation of the machine.

Operating mechanism

The machine illustrated is adapted to be driven by means of a hand crank 33, Fig. 1, although it will be understood that a motor may readily be provided to supply the motive power if desired. In actual use it will no doubt be advisable to employ a motor, since the machine will necessarily require a fair amount of power for its operation. The crank 33 is suitably connected for driving the main shaft 37 which extends across the entire machine and serves to transmit the power to certain operating parts at intermediate points within the machine as well as to certain mechanism at the left hand side of the machine on the outer side of the left side frame. It is on this side of the machine that a gear thereon serves to drive an idler gear 39 which then transmits the power to a gear 40 which is coupled by means of a hub to a camming unit 506 to be described in greater detail hereinafter.

Keyboard

As has already been mentioned, the machine disclosed is provided, as best shown in Fig. 1, with a number of banks of amount keys 42 which are sufficient to set up an amount up to $999,999.99. There are also provided three banks of special keys such as transaction keys 43, clerks' keys 44, and department keys 45.

Since all of the amount key banks are of the same construction and serve to control related differential devices in the same way, it will be

necessary to describe only one bank in detail. As best shown in Fig. 2, each bank of keys is constructed and arranged as a separate unit removable as an entity together with certain associated latching and locking devices. For this purpose the main supporting structure for each bank comprises a channel memer 46 (Figs. 1, 2, and 7) which is suitably slotted in its upper and lower overturned portions to receive the stems of the nine keys in the bank. Springs 47 (Fig. 7) connected between hooks 48 on the keys and studs 49 extending from the inner side of the web of the channel serve to hold the keys normally elevated. Usual or suitable means are provided to lock depressed keys down, to release them at will or when they have performed their function, to prevent the depression of more than one amount key in a bank. A zero stop 119, 120 is provided, releasable by any amount key and other usual and necessary means are provided.

Differential Mechanism

The differential mechanism which is controlled by the amount keys is of the type employing members which are complementally movable in opposite directions and which thereby are permitted to be positively driven in both directions.

Again considering only a single representative order of the differential mechanism there is provided a pair of slide members 130 and 131 (Figs. 2 and 32) the first of which is movable upwardly and the scond downwardly from the normal positions shown. These slide members are provided with suitable elongated slots 132 adapted to cooperate with the supporting bars 16 and 17 which are secured at their opposite ends to the side frames 9 and 10.

Comb plates 133 secured to the supporting bars serve to maintain the members in true vertical planes and also to hold them in the desired spaced relation. Each slide member is adapted to receive a variable movement up to nine steps and the two are so inter-related that if one receives the full nine steps of movement the other will be held stationary and at all times the sum of the movements of the two members, disregarding the direction of movement, will be nine steps. For the purpose of controlling the extent of movement of the members by the depression of a key the member 130 is provided with a series of nine projections 134 each having a square shoulder facing upwardly in the direction of movement of the member while the opposite face of each projection may be inclined to provide greater strength. Similarly the member 131 is provided with nine projections 135 having square shoulders facing downwardly and toward the front. Alternate ones of the projections 134 (Fig. 7) are offset or bent into a different plan from that of the member 130 itself and the remaining projections. So also alternate ones of the projections 135 are offset or bent out of the plane of the member 131 and in both instances the offset projections are bent away from the opposite member from the one on which they are formed. In this way the projections 134 and 135 are arranged in four separate rows. The lower end of the stem of each of the keys 42 is provided with a pair of projections 136 one of which projections is adapted to cooperate with a projection 134 on the member 130 and the other of which is adapted to cooperate with a projection 135 on member 131. In order to take care of the four positions, which the projections on the members may assume, the ends of the keys may be regarded as divided into four sections. The pair of projections on one key may be in the first and third sections while the pair of projections on the next key in the bank will be in the second and fourth sections and so on for alternate keys. This permits alternate keys to cooperate with say a straight projection on one member and a bent projection on the other while the remaining keys have just the opposite relation. In this way the members are allowed to travel a maximum extent equal to almost double the key spacing.

Normally the member 130 is prevented from movement by the downwardly extending arm of the previously mentioned member 116 (Fig. 2) whose lug 120 cooperates with the uppermost projection 134. When some key in the bank is depressed, however, this pivoted member is rocked, as explained, and its lug is withdrawn from the projection at the upper end of member 130. Upon subsequent operation of the machine, as will be explained, the member 130 is shifted up and to the rear until stopped by engagement of one of its projections with the depressed key or by engagement of the lower ends of the slots 132 with the supports 16 and 17. The extent of movement of the member will be directly proportional to the value of the key depressed. Member 131 on the other hand is normally free to move downwardly upon operations of the machine and if no key in the bank has been depressed this member will move an extent equal to nine steps. At all times it will move an extent which is the nine's complement of the distance through which the member 130 is moved upwardly. This means that when the upper or nine key is depressed member 131 will be locked against any downward movement.

The means for driving the members 130 and 131 in the way explained comprises a differential gear construction (Figs. 2, 32 and 33) operated by a rock shaft 137. For this purpose there is secured to this shaft a pair of frames 138, one located to the right and the other beyond the left of the group of members 130 and 131. The frames consist preferably of a pair of plates the hubs 139 of which will be secured to the shaft as by pins 140. A pair of shafts 141 supported at opposite ends in these frame plates is provided and one of these carries a series of broad toothed pinions 142 loosely mounted thereon while the other carries a similar series of pinions 143 in such a way that a pinion of each series is intergeared with a pinion of the other series through the engagement of only a portion of the width of the teeth. Loosely mounted on the operating shaft 137 by means of hubs 144 are a plurality of pairs of adiacent gears 145 and 146, each of the gears 145 being adapted to mesh with one of the pinions 142 and each of the gears 146 being adapted to mesh with one of the pinions 143. Each gear 145 is adapted to mesh directly with teeth 147 formed on the underside of a corresponding member 130 while each gear 146 meshes with an idler 148 on a shaft 149 fixed in the side frames, each idler in turn meshing with teeth 150 formed on the underside of a corresponding member 131.

Upon operations of the machine the shaft 137 is rocked first clockwise (Figs. 2 and 33) and then counter-clockwise. It will be apparent that clockwise movement of this shaft will tend to cause the pinions 142 and 143 to carry the two sets of gears 145 and 146 clockwise about the shaft so that each gear 145 will tend to move its member 130 upwardly while each gear 146 through idler

148 will tend to move its member 131 downwardly. Now when one of the members is stopped as by engagement of one of the projections thereon with a depressed key its corresponding gear 145 or 146 will be arrested and the inter-meshed pinion, either 142 or 143, will be made to planetate about this gear and will cause a double movement of the remaining gear and member until the full clockwise movement of the shaft 137 is completed. Thus assuming that the 1 key were depressed in a particular bank both of the members 130 and 131 will be shifted a single step during the initial movement of shaft 137 while continued movement of the latter will cause pinion 142 to planetate about the gear 145 which has by this time become fixed. The remaining pinion 143 will then be rotated counter-clockwise on its shaft 141 in addition to partaking of the bodily movement of the latter so the gear 146, idler 148 and member 131 will be shifted at double speed to take up the remaining clockwise movement of shaft 137. On the return movement of shaft 137 it will be obvious that the parts will be restored to the normal position shown in Fig. 2.

The means for rocking the shaft 137 as explained, as best shown in Fig. 3, comprises a pinion 151 secure to this shaft toward its left end and adapted to be engaged by segment teeth 152 carried by a plate 153 pivoted on a stud 154. This plate is provided with a roller 155 which cooperates with a cam 156 (Fig. 29) that forms a part of a unit that is secured to the drive shaft 37. The groove 157 in the cam 156 is so formed as to rock the plate 153 and shaft as required it being noted that a considerable dwell portion is provided before, intermediate and after the two movements of the plate in order to allow time for the performance of other necessary functions.

Control of actuators

As has already been briefly explained, the present machine is provided with a large number of totalizers and these are arranged in banks each extending from front to rear of the machine and the several banks being horizontally arranged across a considerable portion of the width of the machine. This means that a set of actuators must be provided for each bank of totalizers and each set must contain an actuator corresponding to each denomination order of the key-board. Due to the necessity of using these actuators in connection with the printing of totals, as will be explained more fully hereinafter, one set must be provided for each bank of item counters as well. In the illustrative machine this calls for eight actuators corresponding to each denomination of the keyboard, each actuator being capable of operating a particular order of any of the totalizers or counters in a particular bank. As a convenient means of coordinating the eight actuators which must partake of the same movement under the control of one of the banks of keys a shaft 158 (Fig. 5) is provided for each denominational order. There are, therefore, as many of these shafts extending across the machine between the pair of side frames as there are banks of amount keys on the keyboard and as shown there is one additional similar shaft 165, making nine in all, for the purpose of taking totals from an extra or overflow order provided in each totalizer as will be explained.

The connections for driving the shafts 158 to differential extents comprise pinions 159 secured one to each shaft and each meshing with a rack 160 (Fig. 2) supported by suitable cross bars 18, 19, and 20, each in turn meshing with a gear 161 loosely mounted on the shaft 37. These gears 161 are of extra width and are adapted to transmit the movement of the members 130 to the racks 160. For the purpose of driving the actuators 162 of which, as stated, there are eight for each denominational order, each shaft 158 is provided with seven pinions 163 secured thereto. The eighth actuator is driven directly by the pinion 159 which, as before mentioned, serves to transmit the movement of the rack 160 to the shaft.

For printing and indicating totals from the extra or overflow order of the totalizers and counters, eight actuators are also provided. One of these actuators has an extra shoulder 166 (Figs. 2 and 5) which is adapted to cooperate with an element that is stationary on item operations and thus confines the entire inter-connected group of actuators in normal position when not taking totals, as will later be explained. The actuators for this denominational order mesh with related pinions 159 and 163 secured to the shaft 165, the pinion 159 meshing with the corresponding rack 160. This rack cooperates with a gear 167 loose on the shaft 37 (Fig. 5) similar to gears 161; this gear then drives a member 130 not associated with any key bank. This member 130 then meshes with a gear 1451 (Fig. 32) similar to those related to the banks of keys and loose on shaft 137. The gear 1451 then meshes with a gear 1481 similar to the idler gears 148 related to the key banks and mounted on fixed shaft 149. That portion of gear 1481 which is out of the plane of gear 1451 then drives a slide 1129 similar to the slides 131, the resultant movement being in the proper downward and forward direction as required for the indicator positioning mechanism to be hereinafter described.

As will be more fully explained in connection with the construction of the totalizers each order of each of the latter is restricted to two thicknesses of relatively thin metal, say fifty thousandths of an inch thick. The actuators which are of the same thickness are spaced an amount substantially equal to their thickness. That is to say the group of actuators 162 that are related to one bank of totalizers will be separated from each other by only about fifty thousandths of an inch. The groups of actuators related to different banks of totalizers are spaced a greater distance, as best shown in Fig. 5.

Totalizers

As has been stated hereinbefore the illustrative machine is equipped with forty-two totalizers of various constructions. A detailed description thereof is not deemed necessary for the purposes of this application. Their construction and that of the means for their selection may be of any known or suitable type, it being understood that in total taking the totalizers serve to control at least a part of the differential mechanism in accordance with a function of the amount on the totalizer, which mechanism serves to set the printing mechanism to print said total.

Special key banks

In addition to the banks of amount keys the machine, as already suggested, is provided with several banks of special keys, there being three such banks shown (Fig. 10). These are devoted to the designation of clerks, transactions and de-

partments and are indicated respectively by the characters 44, 43, and 45.

The construction and arrangement of these keys in each bank are substantially the same as for the amount keys. Thus, there is provided for each bank a detent bar 52 (Fig. 11) carrying hooks or beaks 53 to engage openings in the several keys to hold them depressed or elevated and there is also a release bar 62 which upon depression of a key serves to release the detent bar 52 for one step of movement to latch the key. Single key pendants 50 adapted to permit the full depression of only a single key in a bank are also provided. The parts, furthermore, are mounted in a channel frame 46 which serves to establish a unit assembly of these parts. Upon operation of the main operating mechanism the plate 58 will be rocked an additional step by means of the rod 70 carried by arms 71 secured to the shaft 72 to permit the detent bar 52 to move still further toward the rear so that the beaks 53 may completely lock the keys in whatever position they may happen to be. Toward the end of an operation of the machine the cross rod 76 engages a shoulder 79 on the detent bar and restores it to normal thereby releasing the keys.

The differential mechanism controlled by the special banks of keys is required to take effect much sooner than the amount differentials due to the control of the special keys over the totalizer selecting mechanism, as will be explained in a later section. On account of the form of differential mechanism adopted the special keys are not provided with the projections and cut out portions to be found at the ends of the amount keys but are preferably flat across the bottom ends. Another feature of distinction between these banks and the amount banks is that no zero stops are provided for the special keys. This is due to the fact that certain springs are provided to maintain the parts in normal and the depression of some key in each of these banks is always required to release the machine, except in totaling operations, as will be explained.

Each of the special key banks (Fig. 11) is provided with a pair of slides 306 (Fig. 16) and 307 (Fig. 15) having a series of slots 308 and 309, respectively. The five lowermost keys (Fig. 11) are adapted to cooperate directly with the slots 308 in the slide 306 and these slots have one edge of graded inclination and one edge straight. The construction is such that the lowermost key will shift the slide three steps downwardly while the next key will shift it two steps downwardly and the third key from the bottom will shift the slide only one step downwardly. On the other hand the fourth and fifth keys will move the slide upwardly one and two steps respectively.

The four uppermost keys in the bank cooperate with the slots 309 in the slide 307, and these slots are so arranged that the slide is moved upwardly two steps by the uppermost key, and one and one-half steps by the next key, while the third key from the top shifts the slide downwardly two steps and the fourth key moves it two and one-half steps in this direction. A rack portion 310 on the slide 307 meshes with a pinion 311 mounted loosely on a reduced portion of the shaft 137. Secured to this pinion is a larger gear 312 of twice the diameter of the pinion and this gear meshes with rack teeth 313 formed on the slide 306. It will be understood therefore that any movement of the slide 307 will be transmitted to the slide 306 and in such a way as to cause twice as great a movement of the latter slide. Considering the movements of the slides, as already mentioned, it will be apparent that the slide 306 may be shifted to any one of five different extents downwardly or any one of four different extents upwardly depending upon the key depressed, the greater movements in either direction being brought about indirectly through the slide 307 and the gear and pinion connection. A spring 314 extending between a lug 315 depending from a slide 316 (Fig. 12) and a lug 317 depending from a slide 318 (Fig. 13) serves to maintain these parts normally in the position shown in Fig. 23. For this purpose the two centralizing slides are provided with cut-out portions 319 forming shoulders 320 which engage opposite sides of a pin 321 on the slide 307. The supporting slots 322 cooperating with the bars 16 serve to limit the movement of the slides under influence of the spring 314. Due to the two to one relation between the movements of the two slides any movement of the slides from normal will tend to stretch the spring 314 and this will be opposed by the spring itself.

A stud 323 is mounted on the slide 306 and is carried thereby to any one of nine different positions, five down and four up from the normal. This positioning of the stud takes place at once upon the depression of one of the special keys and prior to any movement of the main operating mechanism. Now as the operating mechanism begins to operate the shaft 324 will be rocked by connections which will presently be described. Arms 325 secured to this shaft carry a rod 326 and rollers 327 which cooperate with a slot 328 in a plate 329 pivoted to the upper end of a bell-crank member 330. A V notch 331 in the plate is adapted to cooperate with the stud 323 as the plate is rocked and since the stud is held firmly in one of its nine positions of adjustment the V camming notch will force the plate together with its own pivot either to the right or left an amount corresponding to the key depressed. This means that the bell-crank member 330 will be rocked about the fixed pivot 332 to an extent depending upon the key which has been depressed.

A special plate 333 (Fig. 14) having a series of slots 334 which are in direct alinement with the several keys of a bank serves to guide the lower ends of the keys as they are depressed and holds them steady. These slots are wide at their upper ends but taper down to the width of the keys at their lower ends. The slots in the slides 306 and 307 likewise converge toward the bottom into a narrower straight sided alining portion and a similar construction is provided for the V notch 331.

The means for operating the rock shaft 324 to rock the plates 329 at the beginning of an operation of the machine comprises an arm 335 secured to the shaft toward its right hand end (Fig. 27) and a link 336 extending between the arm and a lever 337, carrying a roller 338 (Fig. 48) adapted to cooperate with a cam groove 339 formed in the side of gear 36 on the previously mentioned operating shaft 37. The groove 339 is so formed that after a slight idle movement of the operating shaft the lever 337 will be rocked and will be held in operated position until near the end of the operation of the machine. As will be noted in Fig. 23 the plates 329 are provided with openings 340 surrounding the shaft 324 and so shaped as to insure proper return of the plates to normal upon restoration of the shaft.

Teeth 341 formed on an extension at the lower end of the bell-crank member 330 (Fig. 11) mesh with a rack slide 342 which is mounted on the cross-bars 18 and 19 that support the amount racks 160. Comb plates 343 serve to maintain the proper position and alinement of these racks. Rack teeth 344 on the undersides of the rack slides 342 are adapted to mesh with a pinion 345, 346 or 347, secured respectively to shafts 348, 349 and 350, similar to the amount denominational shafts 158. It will be understood, therefore, that a shaft is provided for each bank of special keys so that thereby totalizers in as many of the banks of totalizers as desired, may be selected for item entry and total printing.

Item counters

Mention has already been made of the fact that the present machine has, for purposes of illustration, been provided with a number of item counters which are adapted to segregate the entries and keep an accurate count of the number of entries of certain specified types, i. e., those representing actual sales, related to each of the special keys in the three banks. For this purpose twenty-seven counters are required and these are arranged in three banks of nine each. Three additional counters are also provided for the purpose of keeping count of the grand total number of sales made by the entire group of clerks and the total number of operations of the machine effected under control of cashiers 1 and 2 respectively.

It is only necessary to operate one of the nine counters of a group during an operation of the machine and this may be done by any suitable means.

Totaling controls

In the foregoing the operation of the totalizers and counters has been considered only from the standpoint of item entering which, as explained, may involve either adding or subtracting upon certain selected ones. Provision is also made for the taking of totals from any one of the totalizers or counters in such a way that the amount standing thereon may be determined by means of both indicating and recording mechanism and furthermore the operation may or may not involve resetting as desired.

For the purpose of determining the condition of the machine as between item entering and total taking a pair of levers X and Y (Figs. 3 and 9) are provided and these are normally locked in their item entering or adding positions by passing thru openings in the cover 27 which is provided with a lock 473 so that only authorized persons carrying the necessary key may determine totals. Movement of one of the levers X or Y will only condition the machine for what is commonly known as a sub-total or read total and will not bring about resetting of the selected totalizer or counter. Whenever it is desired to reset the totalizer or counter selected for totaling it is necessary also to turn the reset lock 474 (Fig. 9) prior to an operation of the main operating mechanism. In order to restrict resetting operations to special parties such as auditors or the like the lock 474 is preferably designed to receive a key different from that required to unlock the levers X and Y. Thus while a manager or perhaps a cashier may be permitted to take sub-totals the operation of resetting is under the control of only the proprietor or a trusted auditor.

The necessity for a large number of totaling positions and hence the desirability of employing a plurality of levers will be apparent when it is considered that there are a large number of totalizers as to which there is no direct means of selection. For example, the selection of any one of the adding and subtracting totalizers depends upon several controlling factors, each of which tends to control the selection of other totalizers as well so that the mere conditioning of the machine for totals is not enough when these totalizers are to be selected. Within the purview of the present invention any suitable means for this purpose may be utilized.

Printing mechanism

The printing mechanism forming the subject of this application in addition to providing a record strip, which after receiving an impression of all pertinent data regarding a particular transaction, is wound upon a storage roll within the machine, is adapted to issue a printed check with either one or two impressions of desirable information, and is also adapted to print at one, two or three points on an inserted slip. The inserted slip, furthermore, may be printed upon in duplicate in either of two ways, i. e., either with the two impressions relatively close together on the slip or with these impressions widely separated. For the purpose of providing this large number of possible impressions seven distinct sets of type are provided, all of the sets being substantially alike, and a separate set of individual printing hammers is employed for each set of type in order to permit printing from only the desired set of type and to enable the elimination of zeros to the left of the first significant number.

All of the printing units are located on the right hand side of the machine between the main frame 10 and the auxiliary side frames 12 and 13 which are at the extreme right adjacent the side of the casing. Those type carriers which are controlled by the keyboard to represent amounts and to designate the special keys depressed are adjusted by means of the shafts 158, 165, 348, 349 and 350 (Fig. 5) each of which is related to a particular denomination or bank of keys. These shafts are extended to the auxiliary frame 12 and at the appropriate point each has secured thereto a pinion 663 which meshes with a rack bar 664 or 673, the former being related to the special keys and the latter to the amount keys. It will be understood that the racks 664 and 673 are arranged in adjacent planes much as the actuating racks for the several banks of totalizers. Each of these racks is provided on its upper forward edge with three similar sets of type, 665, 666, and 667 (Figs. 34 and 35) the amount racks having in each set the numerals 0 to 9 inclusive and the special key racks having in each set a type element for each key in the related rows. Furthermore, on the lower edges of these racks there are four such sets of type 668, 669, 670 and 671. These type may be secured to the rack in any suitable way but are preferably formed as separate elements which are riveted to the rack; if desired they could be formed integral with the rack.

While in the foregoing passage the seven sets of type for each key bank have been referred to as mounted on a single rack member this is true only of the racks 664 related to the special keys in the machine disclosed. A special construction is provided for the amount type bearing racks 673 in order to prevent a fraudulent manipulation of the latter during total taking. It will be recalled that during totaling operations the differ-

ential mechanism including the shafts, 158, 165, 348, 349 and 350 will merely be spring driven under influence of the springs 550 (Fig. 2). Obviously if it were possible to positively arrest the movement of the shafts 158, etc., against the action of the springs as by the insertion of a wire through an opening adjacent the printing elements an incorrect total could be produced. As will be more apparent from the subsequent sections the insertion of a wire for this purpose is only possible at a point adjacent the lower sets of type. For this reason it has been found desirable to split the amount type carriers (Fig. 35) into an upper section 672 integral with the rack 673, and a lower section 674. The upper sections are supported by cross bars 675 extending between the frames 10 and 12 while the lower sections are supported by cross pieces 676 and 677. A coupling between the two sections of each type carrier normally serves to bring about a movement of the sections in unison. This coupling consists of a vertically slidable element 678 (Fig. 35) mounted on the upper section between shoulders which as shown may be provided by plates 679 riveted to the rack. A spring 680 serves to urge the element 678 downwardly to force the pointed ends 681 into notches 682 formed in a plate 683 secured to the lower section of the type carrier. The pointed ends 681 and the notches 682 are so formed that movement of the upper section toward the left (Fig. 35) will be transmitted positively, through the square shoulders then active, to the lower section whereas movement of the upper section toward the right may take place independently of the lower section with the result that the element 678 will merely be cammed upwardly against the action of spring 680. Normally a spring 684 connected at its forward end to the lower section 674 and at its other end to a comb plate 685 on the fixed cross bar 675 serves to shift the lower section to the right in response to any movement of the upper section in this direction while movements of the upper section toward the left will, as explained, be transmitted positively to the lower section through the square shoulders of 681 and 683. In order to permit of the use of relatively large springs 684 the latter are alternately located toward the front and toward the rear portions of the type carriers. Thus for the units order the spring may be located toward the front, and for the tens order toward the rear, etc.

It will be apparent from the foregoing that if the lower section 674 of a rack should be held by a wire or other obstruction from following the differential movement imparted to the upper section by the related shaft 158 the element 678 would be cammed upwardly. The upper surface of this element is engaged by a rod 686 which extends across all of the amount type carriers and is carried by a pair of arms 687 loosely mounted on a shaft 688. An arm 689 (Fig. 39) integral with one of the arms 687 has connected thereto one end of a pawl 690 the other end of which is slidably mounted in a block 691. Now if any one of the elements 678 is raised due to relative movement between the sections of its type carrier the arms 687 and 689 will be rocked and the end of pawl 690 will be forced into the teeth of a ratchet 692 secured to the driving spindle 34 thereby locking the machine against further operation until the lower section of the carrier is released and assumes its normal position with respect to the upper section. It will be clear that this construction is only necessary or particularly desired during totaling when the differential mechanism is only spring controlled. The same construction may be effective during item operations as well, although it is not essential then since there is at this time a positive driving of the differential shafts. Therefore during item operations the sections 672 (Fig 35) and 674 may be positively coupled if desired by merely positively holding the rod 686 in engagement with the upper edges of the elements 678 and thus preventing any lifting of the latter. When the carriers are so coupled any interference with the movement of the latter will interfere with the positive driving connections and therefore effectively lock up the machine.

It will be clear that the locking feature could be dispensed with if desired and the connection between the upper and lower sections of a carrier might be through cooperating lugs or square shoulders on the section and through springs 684. The correct item or total would always be correctly printed by the three upper sets of type even should the lower section be obstructed.

The springs 684 will aid the springs 550 in taking totals and if desired the latter could be dispensed with altogether under normal operations in which no attempt is made to interfere with the movement of the racks.

However, the springs 684 are preferably designed to be merely part of the safety devices described and are made to merely supplement the action of the spring actuated members 548. In order that there will be no tendency for the coupling member 678 to hold the upper section by friction between the surfaces 682 and the element 683 when a lower section is positively obstructed the spring 680 is made quite weak with relation to the force of spring 550.

The type carriers 664 which are controlled by the banks of special keys are best illustrated in Fig. 34 and as there shown are formed of single integral members to which the seven sets of type are riveted or otherwise secured.

Three separate type carriers 693, such as illustrated in Fig. 36, are also provided, one for the purpose of indicating whether a printed amount represents an item, a sub-total or a reset total, and the two others for indicating the position of the two total levers. For this purpose the two sleeves 490 and 492 (Figs. 27 and 50), as well as the shaft 495, which are turned upon movement of the two total levers and the reset lock, respectively, are provided with depending arms 694 (Fig. 27) toward the right hand side of the machine. These arms in turn are connected by a plurality of links 695 to downwardly extending arms 696 secured to a series of nested sleeves 697 carried by a shaft 698 at the rear of the machine. At the appropriate point, which as shown in Fig. 50 is at about the middle of the printing unit, these sleeves are provided with upstanding arms 699, which are accurately slotted to surround a shaft 700 in such a way as not to interfere with the necessary free movement of the arms. Each arm carries a pin 701 which is adapted to engage a notch 702 (Fig. 36) on the underside of a related type bar 693. The three type bars 693 for this purpose are of construction similar to the bars controlled by the three banks of special keys, i. e., the top and bottom sections are integral and each bar has riveted thereto the seven sets of type, as best shown in Fig. 36. It will be understood that these bars are provided with type suitable for the designation of the different positions which the total levers and the reset lock may assume. In

Figs. 22 and 23 some of the characters adapted to be printed by these type carriers may be noted.

Cashier's type

A type carrier **703** is also provided for the purpose of designating which, if any, of the cashiers' locks is effective during an operation of the machine. This carrier, which is substantially the same as the bar **693** in construction, is provided with a notch or fork **704** toward its rear end which is adapted to engage a pin **705** carried by an arm **706** secured to the shaft **700**. This shaft, as shown in Fig. 56, has also secured thereto an arm **707** which has a rounded end fitting into a socket **708** of a downward extension of a slide bar **709**. At its forward end this slide bar is provided with rack teeth **710** (Fig. 17) which mesh with the pinion **711** (Fig. 5). This pinion is on the shaft **465** which, it will be recalled, is turned by means of the slide **461** and pinion **464** whose position is governed by the pair of cashiers' locks. The type bar **703** will be provided with two type in each of the seven sets to designate the two locks and, if desired, a third type may be provided to designate an intermediate position, thus indicating that neither lock is active.

Date printing type

Another group of type carriers **712** (Figs. 37 and 55) is provided for printing, in conjunction with the other matter mentioned, the date on which each transaction is made. These type carriers are of integral construction but differ from others that have been described in that only six sets of type are provided on each member. This is due to the fact that it is not regarded as essential to print the date in connection with each item on the detail strip. On account of the necessity of cutting away the forward ends of these carriers to accommodate the adjusting means, which will be presently described, the sets of type at this end, two on the underside and one set on the upper side, are formed as a single unit **713** riveted or screwed to the sides of the members **712**. Referring to Figs. 1 and 55, it will be noted that at the forward end, the printing section is somewhat higher than the regular coin slab **32** to the left, so that a portion of the left side of the printer is exposed. This affords a convenient position for locating the date controlling or adjusting knobs **714**. These knobs are secured to the left hand ends of a series of nested sleeves **715** (Fig. 55) which carry at their opposite ends a series of pinions **716**. A set of idlers **717** meshing with the pinions **716** and also with a series of pinions **718** secured to another set of nested sleeves **719** serve to transmit the movement of knobs **714** to these sleeves. At their right ends the sleeves **719** carry pinions **720** which mesh with rack teeth **721** (Fig. 37) formed on the type carriers **712**. It will be clear that by means of the sleeves and pinions mentioned it is possible to adjust the carriers **712** to any positions desired. Four type carriers are provided for this purpose, one having abbreviations thereon indicative of the months of the year, the next two carrying numerals to designate days of the month and the fourth bearing the year designations. In view of the fact that the carrier having the month's designations must be provided with twelve distinct characters in the space normally provided for ten ciphers the height of the characters is slightly reduced. Toward the rear of the carriers **712** they have formed on their upper edges a series of serrations or notches **722** (Fig. 37) which are adapted to be engaged by spring pressed aligning pawls **723**. The latter are loosely mounted on a shaft **350** and are urged into the notches **722** by springs **724** to hold the carriers in any proper position to which they may be adjusted.

Consecutive numbering type

A final group of type carriers included in the printing unit is the set **725** (Fig. 38) adapted to record consecutive numbers upon the various record media. These carriers are of the integral construction and each is provided with seven sets of type so that an item or other printed amount may be identified in a sequence at all points where it is recorded. The means for automatically adjusting these carriers to represent a consecutively increasing number of each operation of the machine is constructed as follows. Each carrier has formed on its upper edge a series of ratchet teeth **726**, there being nine such teeth of similar form and a single final tooth having one side of greater depth than the others. This final tooth or the notch to the right of it, Fig. 38, is progressively deeper in the successive members **725** as their denominational values increase, or from left to right as viewed from the front of the machine. A multitined operating pawl **727** in the form of a bail is adapted to cooperate with the notches **726** on the several type carriers. The pawl is operated longitudinally through slightly more than ten full steps, i. e., the length of the ten notches or teeth on a carrier, during each operation of the machine, but it is normally held out of engagement with all of the teeth during nine of the ten steps of movement by means of one of a plurality of plates **728**. These plates, as shown, are mounted at their forward ends on the cross bar **675** and at their rear ends are forked to engage a fixed rod **729**; the one mentioned has an upper edge **730** which cooperates with the pawl **727** to hold it out of the teeth **726** for nine steps. For the tenth step of movement, however, the drop **731** in the upper edge of the plate permits the pawl to rock until arrested in some way as when the units tine of the pawl engages the tooth **726** of the units carrier bar **725**. The remaining tines of the pawl are still out of active position by virtue of the fact that the units tine will engage the bottom of the notch of an ordinary tooth before any of the other tines becomes effective. However, after the units type carrier has been shifted nine steps, the deep notch of this carrier is in position to be engaged by the pawl during its tenth step of movement and this time the pawl is dropped low enough to engage its tens tine with a tooth on the tens carrier so as to advance it a unit. A similar mode of operation brings about an advance of the higher order carriers also, the pawl dropping further as more of the deep notches of successive orders, from the units up, are brought into line much as in the case of the usual deep notch transfer devices.

The means for operating the pawl **727** to reciprocate it through ten steps on each operation of the machine comprises a pair of rack bars or plates **732** supported by the cross bars **675** and each having an ear **733** supporting the pivot of the pawl. A spring **734** connected between a pin on the pawl and a pin on one of the rack bars serves to hold the pawl in engagement with the plate **728** or the ratchet teeth **726**. It will be clear that the pawl **727** will be reciprocated whenever the rack bars **732** are reciprocated. For this purpose a pinion **735** meshes with teeth

736 on the upper edge of each of the rack bars 732 and both of these pinions are secured to a sleeve 737 (Figs. 27 and 50) which has secured at its other end another pinion 738 which is engaged by an idler pinion 739 mounted on a stud 740. This idler is driven by a segment 741 which is pivoted at 742 on a stud extending from the frame 10. A link 743 serves to connect an upwardly extending arm of the segment to an arm 744 secured to the shaft 324 which, as has been explained in a previous section, is rocked to cause the positioning of the differential elements controlled by the special banks of keys. It will be seen therefore that quite early in the operation of the machine, the pawl carrying frame formed by the racks 732 will be shifted toward the left (Fig. 38) by means of the connections just described and it will remain there until near the end of the operation when it will be returned to normal again. On each reciprocation of the actuating pawl the units type carrier will be shifted one step and on its tenth step of movement the tens carrier will be shifted one step, and so on.

After any of the type carriers 725 has been shifted ten steps or some other definite number of steps it will be apparent that some means must be provided to restore it to its initial position otherwise these carriers would have to be of indefinite length. For this purpose each type carrier 725 is provided with a pawl 745 (Fig. 38) which is pivotally mounted thereon and normally urged by a spring 746 in a counter-clockwise direction. A projection 747 on each of these pawls is adapted to cooperate with the under surface of the related plate 728, a series of which are provided as spacers between the carriers, and the upper surface of one of which as already explained, serves to hold the actuating pawl 727 inactive during nine steps of movement. After any one of the carriers has been shifted nine steps the corresponding projecting 747 will engage a cam surface 748 on the under side of the related plate 728 and this will serve to cam the pawl 745 clockwise upon movement of the carrier into the tenth position. Rocking of the pawl 745 in this way will carry a hooked portion 749 into the path of a square crossbar 750, extending between the plates 732 which as explained are reciprocated ten steps on each operation of the machine. Since the movement of the type carrier can only take place during the last or tenth forward step of movement of the actuating plates 732 it is always insured that the cross-bar 750 will be to the left (Fig. 38) of the hook 749 at the time the latter is cammed downwardly. In order to provide a slight clearance between the hook and cross-bar at this time, furthermore, the relation of the actuating pawl 727 to the ratchet teeth is such that a slight movement of the pawl in addition to the nine full steps is required before the exposed ratchet tooth will be engaged. Therefore the cross-bar 750 will have been carried slightly more than nine steps before the type carrier can begin its movement from the ninth to the tenth position. Assuming now that one of the pawls has been rocked clockwise by the cam surface 748 the plates 732 on their return movement toward the right will carry the square cross-bar 750 into the hook of the pawl and after this slight idle movement will serve to draw the pawl and hence the connected type carrier ten steps to the normal zero position. Due to the hook formation of the end of the pawl the latter will not be disengaged from the cross-bar even though the projection 747 is carried free of the cam surface 748 during the first return step. The normal relation between the cross-bar and hook, as shown in Fig. 38, will not be restored until the next operation of the plates 732 toward the left during the first part of which the hook will be freed to permit the spring 746 to rock the pawl counter-clockwise. It will be understood that the slight extra movement of the plates 732, in addition to the ten effective steps, as represented by the normal clearance between the actuating pawl 727 and the first ratchet tooth is a trifle greater than the normal overlap shown between the cross-bar 750 and the under portion of hook 749.

A series of spring operated detents 751 similar to the detents 732 for the date type carriers serves to hold the consecutive number carriers in their adjusted positions but offers only frictional resistance to the movement of the carriers in either direction.

In order to permit resetting of the consecutive numbering carriers when desired to start counting a new series of operations, a knob 752 is provided on the right side of the machine as viewed from the front (Fig. 1) or the left side as viewed in Fig. 50. Preferably some suitable means under control of a lock will be provided to prevent turning of the knob and resetting of these type carriers except by authorized parties. The knob 752 is secured to a shaft 753 which passes through suitable openings in the entire group of type carriers, including the amount, special and date carriers, and is supported by the frame members 10 and 12. On each side of the consecutive number carriers and in close proximity thereto there is provided a slide 754 (Figs. 38 and 50) which is formed with internal rack teeth 755. These are adapted to mesh with pinions 756 carried by a squared portion 757 of the shaft 753. A cross bar 758 is mounted between the slides 754 at a point just in rear of the pinions 756 and extends through the openings 759 in the consecutive number type carriers 725. It will be apparent that as the knob 752 is rotated to turn the pinions 756 clockwise (Fig. 38), the slides 754 and hence the cross bar 758 will be shifted toward the rear or to the right (Fig. 38). The construction is such that the cross-bar will be shifted ten steps upon turning of the knob through one revolution and in the course of its movement it will engage the ends 760 of the openings in the carriers 725 and will force the latter toward the right into their normal zero positions. The knob should then be restored to its original position to withdraw the cross-bar 758 and permit subsequent free movement of the number carriers.

If desired, a numbered wheel or indicator could be provided to cooperate with each type carrier 725. They could be placed either in the front or the rear of the type carrier, and cooperate with suitable rack teeth on the latter near an opening in the case, so that a reading of the number printed on the previous operation could be had at all times.

Hammer operating mechanism

As already stated the printing from the various sets of type is effected by means of groups of individual type hammers. This necessitates seven groups of such hammers, one group being provided at each of the seven possible printing points. The forward, upper group is for the detail strip and the two remaining upper groups are for

printing on the check and stub, while all four of the lower groups are for printing on the inserted slips. All of the groups are substantially alike except for the fact that no date printing hammers are provided in the group at the printing point for the detail strip. If desired, each type carrier, regardless of its character, may be provided with an individual hammer in each group, or the construction may be simplified somewhat by employing broader hammers for certain groups of carriers such as the date group or the special character group since these always require a full impression. For the amount carriers, however, it is desirable to have individual hammers for all with the possible exception of the three lower orders. This is in order to permit the elimination of zeros to the left of the highest significant figure above the third or dollar's order. It has been found desirable, however, to always print from the three lower order amount carriers whether they should stand at zero and be unaccompanied by any higher significant figure or otherwise. While it would be possible to employ broad plates to print from those groups of carriers which do not require zero elimination such as the date carriers, the special character carriers, the consecutive number carriers, etc., the machine as disclosed herein is provided with individual hammers for each of the carriers of these types as well as for the amount carriers.

In Fig. 39 there is disclosed a set of seven hammers, one for each of the seven printing points, related to one of the higher order amount carriers. It will be understood that a similar arrangement of hammers is provided for each type carrier. A rod 761 near each printing point is adapted to support the group of hammers 762 (Fig. 39) related to all of the type carriers at such printing point. A spring 763 attached to each hammer tends to rock the latter counter-clockwise (referring to the three upper sets of hammers) until an upwardly extending tail 764 engages a stop shoulder 767 on 766 or a cross bail 765 which serves at times to hold all of the hammers of the group away from the type faces. The three hammers which print from the upper type of a carrier have related thereto a slide bar 766 which has a series of three shoulders 767 engaging the extending tails 764 of the hammers. This bar 766 is offset or bent into another plane at an intermediate section so as to permit it to pass to the left of the check strip (Fig. 50). Connected between an ear on the bar 766 and a fixed rod extending from the frame 12 is a spring 768 which urges the bar toward the left until its end engages a fixed cross bar 769. A slide bar 770 similar to bar 766 is provided for the four lower sets of hammers. This bar has four shoulders 771 for engaging the tails 764 of the lower hammers. A spring 772 urges bar 770 to the left (Fig. 39) until it is stopped by a fixed cross bar 773. Toward the rear end of each of the slide bars 766 and 770 there is pivotally mounted a pawl 774 which is urged in a clockwise direction (referring to the upper set) by a spring 775, until the cam surface 776 of the pawl engages a corresponding surface on a cam plate 777. This cam plate is rocked by a spring until a downwardly extending tail of the plate, considering the upper plate, engages a cam surface 779 on the rear upper edge of the type carrier 672. It will be apparent that when the type carrier is shifted toward the rear, it will rock the plate 777 counter-clockwise and rock the pawl 774 in the same direction, thereby placing the forward end of the latter in rear of a cross bail 780. Normally the forward end of the pawl is above the cross bail so that it will not be operated upon rocking of the bail in a clockwise direction. This is the condition which obtains when the type carrier stands at zero.

Referring now to Figs. 27 and 48, it will be seen that one of the arms of the cross bail 780 has connected thereto a link 781 which at its forward end is connected to a disk 782 loosely mounted on spindle 34. This disk has a projection 783 which is in the path of a stud 784 on the gear 36. This gear makes one complete revolution on each operation of the machine. The form of the projection on the disk is such that the bail 780 will be rocked clockwise after the type carriers have been positioned and before the latter begin their return toward normal. Rocking of the bail will serve to shift to the right all of the slide bars 766 (Fig. 39) whose pawls 774 have been rocked counterclockwise to carry their forward ends into the path of the bail by movement of the related type bars. As the bars 766 are shifted the shoulder 767 will draw the tails 764 of the hammers toward the rear thus rocking the latter clockwise until the shoulders 767 clear the upper ends of the tails 764 and permit the springs 763 to rock the hammers counter-clockwise to make an impression. In the meantime the bails 765 have been moved to a position clear of the hammers, so as not to interfere with the necessary full movement of the latter. For this purpose all of the upper bails are connected together by means of a link 785 (Figs. 51 and 52) held by studs 786 on an arm of each bail. The rearmost bail has an extension 787 (Fig. 51) from which a link 788 (Fig. 27) extends to a bell crank 789 pivoted on the stud 790 carried by the right side frame 10. The vertical arm of this crank has at its end a roller 791 which extends into a cam groove 792 (Fig. 47) formed in a disk 793 secured to the main shaft 37. The form of the cam groove is such that the series of bails 765 will be held normally clear of the tails 764 (Fig. 39) to avoid interference with the hammers when the latter are released by the slides 766. After printing has been effected the bails are rocked, due to the formation of the groove 792, to restore the hammers and if desired this movement may be made with sufficient promptness to prevent rebound action of the hammers. The slide bars 766 will meanwhile be spring urged toward the left until the forward cam slopes of the projections forming the shoulders 767 are held against the rear faces of the tails of the hammers so that when these tails are forced by the bails to clear the shoulders of the slides the latter will be shifted by their springs into their normal position against the fixed bars 769. The bails 765 are then given a quick movement in the opposite direction away from the tails of the hammers due to the fact that the groove 792 is designed to also operate the check knife, as will be explained, and the restoring movement of the bails is utilized to operate the check perforating means. The quick opposite movement just mentioned is for the purpose of withdrawing the perforating blade from the check to allow feeding of the latter. A gradual movement of the bails in the same direction as the quick movement then continues past normal position to cause severing of the check as will be explained, and then the bails are brought back to their normal positions.

In the foregoing explanation it has been men-

tioned that those hammers related to type carriers which have been shifted from the zero position are operated by virtue of their slides **766** being operated by the bail **780**. In addition any type carriers which may be at zero but which are to the right of a carrier which has been shifted will have their hammers operated also. For this purpose, commonly known as filling in of ciphers, the pawls **774** have their rear arms split, as shown in Figs. 39 and 50, and the upper portion **794** of each is bent at an angle toward the left, as viewed from the front of the machine into the path of the similar portion of the next adjacent pawl. It will be apparent that if a higher order slide **672** is to be shifted toward the rear by virtue of its pawl having been rocked, the straight lower portion **795** of the latter will have engaged the bent portion **794** of the next lower order pawl and will have rocked it also. This in turn will have produced the same effect upon the still lower order pawl and so on until the units pawl is reached and rocked. In this way all orders below the highest significant figure set up will have their bars **766** shifted, regardless of whether the related type carriers have been moved from their zero positions or not.

Substantially the same sort of construction is provided for operating the hammers related to the lower sets of type. A bail **797** (Fig. 38) is adapted to engage the ends of any of the pawls **774** which may have been rocked clockwise due to movement of the related type carriers. For the purpose of operating the bail **797** in unison with the upper bail **780**, a link **798** (Fig. 27) is connected between an extension of one arm of the upper bail and similar extension of an arm of the lower bail. Furthermore four bails **799** similar to the bails **765** are provided, one adjacent each line of the lower hammers for restoring the latter and these bails must be operated at the proper time also to get out of the path of the hammers. Proper timing of the operation of these bails in coordination with the upper bails is effected by means of segments **800** and **801** formed respectively on an arm of one of the upper bails **765** and an arm of a lower bail **799** (Fig. 27). A link **802** pinned to each of the lower bails serves to tie them together for joint operation.

The hammer operating means for the date, consecutive number, special character, total designation, cashier's designation, and three lower order amount carriers differs slightly from that above described for the higher order amount type carriers. This difference is due to the fact that the hammers for all of these type carriers are to be operated at all times, provided printing takes place at all at particular printing points; i. e., there is no zero elimination associated with these carriers. For this reason as best shown in Fig. 52 only two pairs of slides **803** and **804** equivalent to the slides **766** and **770**, are required for the entire special group of carriers mentioned, not including the three lower order amount carriers, and these special carriers are provided with fixed shoulders **805** (Fig. 27) in the path of the bails **780** and **797** in lieu of the pivoted pawls **774** carried by the individual slides **766**. The slides **803** which are provided for the upper groups of hammers are bent or offset to pass around the edges of the check strip, while the other pair of slides **804** is straight and is provided for the lower groups of the hammers. Cross bars **806** are provided between the slides of each pair in position to cooperate with the tails of the related hammers. These cross bars perform precisely the same function as the shoulders **767** on the individual slides **766** related to the higher order amount carriers. The three lower order amount hammers for the upper and lower sets of type are operated by single slides **807** each having studs **808** (Fig. 28) at the various printing lines and cooperating with the tails of these three hammers. Each of these slides furthermore has a fixed shoulder, similar to **805**, cooperating with the related bail **780** and **797** for operating the slides. In other respects the operation of the printing hammers for the special carriers and the three lower order amount carriers is just the same as for the higher order amount carriers, as has been described. It will be clear therefore that an impression is taken from all of these type carriers at a plurality of points on each operation of the machine although printing may be prevented at one or more of the printing lines in the manner to be described hereinafter.

Record media

The machine illustrated, as already explained is adapted to enter items on a detail strip which passes from a supply roll to a storage roll and is retained within the machine until the end of a day or week or any given period when it is removed by an auditor or other duly authorized person. Provision is also made for printing upon checks issued from a roll mounted within the machine, as well as upon slips which may be inserted into a suitable slot at the side of the machine. The arrangement disclosed is such that if a slip is fully inserted in printing position, the check printing mechanism will not be operated. If the slip is inserted only partially, however, as for example to be printed upon by only the two front impression means, then the check printing mechanism will operate. Furthermore the latter is under the separate control of a knob which may prevent check printing operations altogether or may permit a single check or a double or stub-check to be printed at will, provided no inserted slip is present. The slip printing elements are also under control of a knob to form either three impressions at three relatively close points on different detachable sections of a slip or at two points which are quite widely separated on two sections of an inserted statement card or sheet. Preferably the construction of the printing features is such that the detail strip is printed upon during every operation of the machine. Checks of either the single or stub variety may be desired whether in accordance with particular types of transactions such as "cash," or in accordance with the class of goods involved, such as sheet music, rolls, etc. Inserted slips of the triplicate form may be desired either upon such transactions as "C. O. D." or upon ordinary sales of commodities other than those for which checks are issued. On the other hand, it may be desired to print in duplicate on separate sections of a statement sheet to note payments on account of instruments, such as pianos, victrolas, etc., when these are purchased under a credit plan. Similarly, regular "charge" account customers may have statement cards on which may be noted additional items of credit extended or payments received on account.

With the foregoing prospective or possible uses of the flexible provisions of the printing features of the machine, the latter will now be described in detail. It is to be understood that the particular uses and modes of employing the various

controls are illustrative only and that a variety of schemes suitable for the requirements of any particular business may be worked out within the scope of the present invention.

Detail strip

The detail strip **809** (Fig. 21) is adapted to be fed from a supply roll **810** (Fig. 39) and after receiving an impression and, if desired, an autographic notation, is adapted to be wound upon a storage roll **811**. The printing line for the detail strip is at **812** (Fig. 39), printing being done by the foremost group of upper hammers, while the autographic opening is at **813** which is some distance directly above the printing line. It will be apparent that a considerable shifting of the record strip will be required in order to place the written notation in its proper relation, adjacent to the printed item to which it pertains. Normally the last printed item will appear just below the lower portion of the glass **814** at **815** (Fig. 39), thus permitting a notation to be made directly beneath it through the opening **813**. Upon the subsequent operation of the machine the blank space just below the last autographic notation will be carried around to the printing line below the hammers **762** and after printing has been effected it will be returned a greater distance to carry this new item below the lower portion of the glass **814**. The course of the record strip from the roll **810** to the storage roll **811** is as follows: (see Figs. 39 and 41) over the roller **816** mounted upon shaft **817**, under the guide roller **818**, thence forwardly under the writing table **819**, around a guide roller **820**, downwardly under the guide roller **821**, then toward the rear between the pair of guides **822** and **823**, around the latter roller, thence forwardly around a roller **824**, upwardly around a roller **825**, toward the rear over the table **819** but beneath the writing opening **813** and glass **814**, around a guide roller **826**, upwardly in rear of another glass **827** and around a guide **828**, then down and toward the rear around a pair of rollers **829** and **830**, and finally toward the front around the forward guide roll **831** of a sliding table **832** and back around a guide **833** on to the storage roll.

Shifting of the record strip to carry a portion near the writing opening down to the printing point, and vice versa as explained, is brought about through the reciprocation of the sliding table **832**. As this table is shifted toward the right (Fig. 41) a roller **834** supported at the right hand end of the table will engage that portion of the strip which is stretched between the roller on the shaft **817** and the roller **818**. It will be apparent that continued movement of the table will cause the record strip to be carried with it until the strip assumes a V formation such as indicated in dotted lines in Figure 39. In order to permit this formation of the strip it must be supplied from a source in the direction of one or the other of its two ends.

Drawing of the paper from the supply roll **810** is prevented at this time by means of a friction block **835** (Fig. 41) formed of rubber or similar material and which may be forced against the roller on shaft **817**, thus pinching the strip between the block and roller. Block **835** for this purpose is secured to a bar **836** having end trunnions, one of which has secured thereto an arm **837** having a pin roller **838** that cooperates with a cam groove **839** in a gear **840** (Figs. 41 and 45). This gear is coupled by means of a stud **842** extending from it and cooperating with a hole or slot **843** in the disk **793** which is secured to the driving shaft **37** that is in direct alinement with the shaft **817**. The gear **840** is mounted on a bearing **841** secured to the shaft **817**. As will be hereinafter explained, the form of connection between the gear and disk is provided to enable the ready removal of the detail strip frame. The formation of the cam groove **839** in such that normally a slight clearance is permitted between the block **835** and the roller on the shaft **817**, so that the record medium may be passed between them in the process of threading a new roll and so that the strip may be manually fed in the manner to be explained. However, soon after the operation of the machine commences and during the time that the table **832** is beginning to shift toward the right (Fig. 41), the cam will rock the arm **837** clockwise to carry the block against the roller, thereby gripping the strip. This arrangement will insure the drawing of the strip from the opposite direction to supply the extra material in the V loop.

Now, it will be observed that as the right hand end of the table serves to draw a portion of the strip toward the right, the left hand end of the table will provide the necessary slack due to recession of this end of the table from the loop extending from roller **830** around the roller **831** at the end of the table and then around the roller **833**. Thus the entire strip between the loop around the left end of the table and the loop being formed at the opposite end will be shifted, thereby carrying that portion of the strip which is just to the left of the writing opening **813** (Fig. 39) to the printing line **812** of the foremost hammers **762**. The table is shifted to such an extent that the roller **831** at the left hand end around which the left loop is formed is carried to a point where the strip may assume a straight line between the rollers **830** and **833** but with no clearance between the strip and the roller **831** on the table. On the other hand, there is a slight normal clearance between the roller **834** at the right end of the table and the strip extending between rollers **816** and **818**. As a result of this construction the amount of slack yielded at the left loop is greater than that taken up in the right loop. Furthermore the V formation of the right loop brings about a still greater difference in the amount of material in the two loops. Therefore when the table is fully shifted toward the right, there is still a portion of slack in the left loop.

Provision is made for taking up this extra slack on the storage roll **811** while the table remains in shifted position and this, in effect, constitutes the line spacing movement of the strip. For this purpose an arm **844** (Figs. 41 and 45) secured to one of the trunnions of bar **836**, which carries the block **835**, is connected by means of a link **845** to an arm **846** pivoted on a stud **847**. This arm is curved around the bearing for roll **811** and carries at its upper end a pawl **848** which is adapted to cooperate with a ratchet wheel **849** loosely mounted on a stud **850** in line with the center of the roll **811** and held by nut **851** in the right side frame **852** (see also Fig. 42).

A spring **853** normally urges the ratchet wheel **849** and a connected or integral friction disk **854** toward the left (Fig. 42) until the disk cooperates with a corresponding friction disk **855**, secured to the end of the storage roll spool **856**. A hub **857** of the ratchet **849** acts as a bearing for one end of the storage roll. It will be apparent from this arrangement that toward the

beginning of an operation of the machine the arm 844 will be rocked clockwise to carry the pawl 848 idly over the teeth of the ratchet 849. However, after the table 832 has been fully shifted to the right, the block 836 together with the arm 844 will be restored counter-clockwise toward normal and in their movement will cause the pawl 848 to turn the ratchet wheel 849. Through the friction drive between the ratchet and the storage roll 811, the latter will be driven until the slack remaining in the left loop, after the right loop has been fully formed, is taken up, after which then the friction drive will merely slip during the remaining movement of the arm 844. At this point in the movement of the record strip the printing hammers will be operated to print the amount standing on the type carriers.

During the last half of the operation of the machine, the table 832 will be restored toward the left and in its movement will tend to reestablish the left loop in the strip. A ratchet 858 (Fig. 42) secured to the storage roll spool 856 and a pawl 859 on lever 860 serves to prevent reverse rotation of the roll so that the paper to form the loop cannot come from this source but must come from the opposite direction. Obviously the V loop formed at the right, which is at this time set free, furnishes the greater portion of the material for the new left loop but an extra amount must be taken from the supply roll 810 at this time to make up for the portion previously wound upon the storage roll. This is made possible by the fact that by this time the block 835 will have been restored to its normal position away from the roller on the shaft 817.

The means for shifting the table to and fro in the manner explained comprises a pair of rack extensions 861 (Figs. 40 and 41) integral with the sides of the table and adapted to cooperate with a pair of pinions 862 attached to a shaft 863 above the racks. An extension of this shaft carries another pinion 864 which as best shown in Fig. 44 cooperates with a segment 865 loosely pivoted on a stud 866 extending from the left side frame 867. The segment is provided with a cam slot 868 which cooperates with a stud or roller 869 extending from the side of the gear 870. This gear in turn meshes with the gear 840 coupled to the drive shaft 37 so that upon each operation of the machine these gears are given one complete rotation. The formation of the cam slot 868 is such that as the pin 869 rotates clockwise with the gear 870 the segment 865 will be rocked clockwise, then held for a period as required and then returned counterclockwise to normal. Reciprocation of the table 832 results from the oscillation of the shaft 863 by means of the segment in the manner indicated.

In the foregoing description it has been mentioned that the loop formed at the right upon movement of the table 832 is of V shape. Due to the shortening of the path of the strip to form the V, rather than causing it to follow the upper and lower surfaces of the table as is the case with the left loop, the amount of paper in this V loop is considerably less than that in the left. This difference is in addition to that brought about by the fact that there is a normal clearance between the end of the table or roller 834 and the straight portion of the strip between rollers 816 and 818. The combined difference in the sizes of the loops is enough to account for the feeding of a section of the strip from a point below the autographic opening 813 to a point under the glass 814. In other words, this feed is enough to permit autographic entries to be made below printed amounts.

Provision is made for reducing this feeding action by causing the right loop to conform more closely to the horizontal surfaces of the table rather than to assume a V formation. The difference in the size of the two loops is then due almost entirely to the normal clearance between the right end of the table and the surface of the strip. This clearance brings about just enough extra slack in the left loop, to be taken up by the storage roll, to cause a single line space action as shown on Fig. 22, with no space for autographic entries. For this purpose there is mounted on the shaft 817 a pair of collars 871 (Fig. 45) between which extends a cross bar 872 (Fig. 41) fastened at each end to one of the collars. Also secured to the shaft 817 is a pair of arms 873 and 874 which carry between them another cross bar 875. One of the arms 873 has an extension which carries a spring plunger 876 (Fig. 45) having a knurled button 877. The inner end of the plunger 876 is normally urged by a spring into engagement with a hole 878 (Fig. 41) but it may be disengaged by pulling out on the button 877. When the button is pulled out the arm 874 and the collars 871 together with both of the cross bars 872 and 875 may be rocked clockwise (Fig. 41) until the end of the plunger is in line with another hole 879 in the right side frame. In this position of the parts the cross bar 872 is placed just above the path of the upper surface of the table and just to the right of the section of record strip between rollers 816 and 818, while the forward end of the cross bar 875 will be similarly placed just below the path of the lower edge of the table. With the cross-bars thus shifted, the record strip will not be permitted to form a V at the right upon movement of the table but will be held against the table to form a loop like that at the left but slightly smaller than the latter. In this way the feeding of the record strip may be varied at will by movement of the plunger 876 to either position so that space for autographic notations may be provided or omitted, as desired.

Means are also provided for feeding the strip manually whenever desired. For this purpose the previously mentioned arm 860 is pivoted loosely on the stud 847 and extends upwardly through the cover 28 that is located over this portion of the printer, the arm being provided with a knob or handle at its upper end. A pawl 859 carried by this arm is spring urged into the teeth of the ratchet 858. As the handle is moved toward the front the pawl will rotate the ratchet and the connected storage roll 811 to feed the record strip. A spring 880 serves to return the arm 860 idly to its normal position against a stop stud 881 in frame 852.

Whenever it is desired to remove a section of the printed record strip from the machine the spool 856 which serves to store the record may be lifted out of the machine to facilitate the handling of the strip. When the spool is removed it may be replaced by an empty spool or the record strip may be unwound from it and the same spool returned. The cover 28 through which the arm 860 extends is directly over the storage roll and is under the control of a lock 882, the key for which is preferably in the hands of an auditor or other authorized person. The left hand end of the spool is provided with a trunnion adapted to fit into a groove 883 (Fig. 43) in a suitable bearing 884 extending from the frame 867. A spring urged hook 885 pivoted on the frame is

adapted to pass over the upper surface of the trunnion and hold it in the groove 883. This hook, however, may be manually rocked toward the front of the machine to release the trunnion.

At its right end the spool is provided with an opening at its center which normally fits over the hub 857 projecting from the center of the feeding ratchet 849. As already explained the latter is loosely mounted on a stud 850 carried by the frame element 852 and is urged by a spring 853 toward the left. It is adapted to be slid toward the right, however, by means of the lever 860 to disengage the hub 857 from the opening in the spool. For this purpose an extension 886 formed on the arm 860 cooperates with the side of the ratchet 849. A portion of this extension is in the same plane as the main body of the lever 860 so that the latter may be rocked sufficiently to feed the record strip, as explained, without shifting the ratchet laterally. The slot in the cover 28 is only of such length as to permit this strip feeding movement of the arm and prevents any further movement. However, when the cover is raised the arm may be shifted further so that the end of the extension 886 which is bent laterally may cooperate with the side of the ratchet 849 and cam the latter toward the right (Fig. 42) against the action of spring 853 to disengage the hub 857 from the opening in the spool. It will be apparent that when the hook 885 is drawn forward against the action of the attached spring and the lever 860 is shifted fully toward the front, both ends of the spool will be freed and the latter may be lifted out of the machine.

In order to facilitate the attachment of the end of a strip to the spool 856, it is provided with a bail 887 (Figs. 41 and 42) which is pivoted eccentrically on the ends of the spool and is adapted to bear upon the surface of the spool. The end of the strip is passed around this bail which is thereby drawn down against the spool to grip the paper. Obviously any other suitable means for securing the paper would be equally applicable and could be substituted for the form shown.

For convenience in the insertion of a new record strip in the machine the entire strip supporting and feeding means is mounted on a removable frame to which access may be had through the door 29 on the right side of the cabinet. This frame comprises a pair of side plates 852 and 867 (Figs. 40, 41 and 45) which are secured together by means of a sleeve 888 and the tie rods upon which the rollers 826, 830, 818 and 833 are mounted. Toward the front of the frame assembly there is secured to the right hand frame 852 a secondary smaller frame comprising two downwardly extending plates 889 and 890 and a cross plate 819 forming the writing table which has been mentioned. This secondary frame may be secured to the frame 852 by means of a sleeve 891, studs 892 and 893 and rods which support certain of the guide rollers and which are riveted to the frames. Upwardly extending ears 894 are also formed integral with the secondary frame and are similarly secured to both of the outside frame members 852 and 867. The sleeve 888 and 891 of the frames are adapted to slip over elongated studs 790 (Fig. 45) and 895 (Fig. 54) extending from the right main side frame 10. The detail strip unit when inserted in position over these studs may be held fast against shoulders on the latter by means of screws. The left hand downwardly extending portion 890 of the secondary frame is cut away, as shown, to a relatively small area so that in sliding the assembly into position on the studs 790 and 895 the forward set of hamers 762 will be cleared. Suitable slots 896 are formed in the frames 852 and 867 for supporting and guiding rollers 897 secured to the sliding table 832. One or more of the rollers 897 may be mounted on studs or bolts having enlarged heads adapted to cooperate with the outer surfaces of the frame members. Tapped hub 898 (Fig. 45) and hub 899 secured respectively to the frames 852 and 867 are adapted to support a screw 900 which forms a removable bearing, permitting the insertion and withdrawal of the supply roll. It will thus be seen that all of the essential portions of the detail strip supporting and feeding mechanism are formed into a self-contained unit removable from the machine. The break in the connection between the feeding elements and the main drive shaft of the machine occurs between a stud 842 mounted on the gear 840, and a slot or opening 843 (Fig. 47) in the disk 793 secured to the main shaft 37. In order to prevent displacement of the gear 840 and connected parts after the unit is removed from the machine, a spring operated pawl 901 (Fig. 44) is pivotally mounted at 902 on the frame plate 867 and is adapted to engage the teeth of the gear 870 which meshes with the gear 840. Normally the pawl 901 is held out of engagement with the teeth by cooperation of lugs 903 and 904 formed on the pawl with cam faces 905 and 906 cut into the top and bottom surfaces of a collar 907 secured to the supporting-stud 790. As the unit is removed from the machine the spring 908 rocks the pawl into locking position while upon insertion of the unit into the machine the lug 903 and cam face 905 cooperate to disengage the pawl. In Fig. 44 the pawl 901 is shown in a position allowing the assembly of the detail strip unit in the machine. As will now be explained, if the parts on the removable unit have been displaced from normal the unit can not be inserted in the machine. It will be noted that in its normal position a finger 909 of the pawl 901 is in a deep notch 910 between two teeth of the gear 870; all of the other spaces between teeth of this gear are of ordinary depth. If finger 909 is not in the deep notch, lug 904 will be held slightly elevated and if an attempt is made to insert the unit this lug will strike shoulder 911 of the collar 907, thus preventing the insertion of the unit into the machine. Should the unit be assembled in the machine and an effort be made to remove it while the machine is in partially operated condition, the lug 904 will be unable to clear the cam face 906 because the pawl 901 will be unable to rock sufficiently and it will be held up by the finger 910 cooperating with a shallow notch; therefore the unit cannot be removed until its parts are restored to normal position, since the disk 793 is connected with the drive shaft of the machine there is no danger of its getting out of proper position and since the pawl 901 will hold the gear 840 in proper alinement when the stud and slot are disengaged, re-engagement of the parts may be effected without difficulty.

As an aid to the insertion of a new record strip in the printer unit a line provided with a number of arrows may be formed in red or any other distinguishing color on the outer frame 852 to indicate the course of the strip from the supply

roll around the various guides and to the storage roll. In order to further simplify the threading of a new record material when an old roll is almost exhausted but still in the machine, the end of the old strip may be pinned or glued to the beginning of the new strip and the latter may be fed through by operation of the lever 860. A warning of any suitable nature may be printed toward the end of a roll of record material so that when the warning reaches the autographic opening or soon thereafter the new roll may be inserted in the manner indicated.

The check strip 912 (Figs. 27 and 39) which is adapted to receive impressions from the two rearmost of the upper sets of hammers is fed from a supply roll 913 which is freely mounted on a rod 914 (Fig. 46) riveted into the frame member 10. From the roll 913 the strip is passed between a pair of guide rollers 915 mounted between the frame 10 and a secondary frame plate 12. Continuing downwardly the strip passes between an electro roll 916 and a cooperating feed roll 917 and then between a similar pair of rollers 918 and 919. The two electros 916 and 918 are adapted to print on opposite sides of the check strip and are inked by means of felt rollers 920 and 921. After leaving the second pair of electro and feed rollers the strip passes around a guide roller 922 and thence forwardly along the upper surface of a guard or plate 923 which extends over the series of shafts 158 and attached pinions 663. From the end of the plate the strip passes under a guide roller 924, between two pairs of rollers 925 and 926, under the ends of the rearmost hammers 762, through a rotary type of perforating and cutting blade 927, (see Figs. 27, 27*a* 39, and 51) under the ends of the second set of hammers 762, and finally beneath the detail strip 809 and between the two pairs of ejecting rollers 928 and 929 out through a slot at the front of the casing of the machine. It should be understood that when printing occurs the strip terminates at a point between the impression ends of the foremost group of hammers and the corresponding portion of the second group of hammers so as to permit printing upon the check strip by means of the two rear groups of hammers while at the same time the detail strip is free to be printed upon by the foremost group. After the check strip is printed upon it may, if desired, be perforated by appropriate turning of the blade 927, after which it is fed forward until its forward end projects into the pairs of ejecting rollers 928 and 929. At this time the cutting blade 927 may be operated to sever the check and the ejecting rollers are then subsequently operated to issue the check. On the next operation of the machine, during substantially the first quarter of the operation, the strip is again fed forward a sufficient extent to carry the end thereof to its print receiving position between the first and second groups of hammers, as explained.

Before passing to a description of the means for feeding the check strip in the manner indicated attention is called to the construction of the bars 766 (Fig. 39) which serve to operate the upper sets of hammers and which are bent to avoid interference with the check strip in the passage of the latter from the lower electro roll 918 to the guide roller 922. The bending or displacement of these bars to the left (Fig. 50) is clearly shown in this figure and is of sufficient extent to permit the free passage of the check strip in the manner indicated.

In order to draw the strip from the supply roll the pairs of electro and feed rollers 916, 917, 918 and 919 are driven in the following manner. A disk 930 (Figs. 27 and 47) secured to the drive shaft 37 carries a pair of pins or rollers 931 and 932 adapted to cooperate with the slots 933 in a Geneva wheel 934 mounted on a stud 935 extending from the frame 10. Arcuate faces 936 (Fig. 27) of this Geneva wheel are adapted to cooperate with the circumference of a disk 793 (Fig. 47) to normally lock the wheel but, in accordance with the usual operation of a Geneva drive, the cut out portions 937 of the disk 793 in line with the rollers 931 and 932 will permit the free turning of the wheel as it is driven by the rollers. Upon each operation of the machine the Geneva wheel 934 will be rotated a half revolution in two separate steps, since each of the rollers 931 and 932 will rotate it through a one-quarter revolution. A gear 938 (Fig. 50) secured to the Geneva wheel by sleeve 939 is in constant mesh with a pinion 940 loosely mounted on the shaft 941 (Fig. 39) which supports the inking roller 921. Another pinion 942 (Fig. 50) of the same size as pinion 940 is arranged adjacent the latter and is secured to the ink roller 921. A broad toothed pinion 943 is normally out of mesh with the pinions 940 and 942 but, as will be explained, is adapted to be rocked into mesh with the latter to serve as a clutch in the connection between the gear 938 and the roller 921. Secured to the electro 918 (Fig. 27) is a gear 944 which meshes with the pinion 942 and also with a pinion 945 secured to the feed roller 919. It will be apparent that by means of this system of gearing the electro and feed rollers will be turned with the inking roller. Suitable gears 946 (Fig. 46) and 947 on the outer ends of the electros 916 and 918 serve to transmit the movements of the Geneva wheel 934 to the upper electro. A gear 948 (Fig. 27) toward the inner end of the electro 916 then drives the associated inking and feed rollers by means of pinions 949 and 950 respectively. The arrangement of the pins or rollers 931 and 932 of the disk 930 is such that two steps of movement will be imparted to the check strip at the appropriate times in the manner indicated.

Another check strip feeding mechanism is provided further toward the front of the machine and this operated simultaneously with the feeding mechanism just described. It comprises the pairs of rollers 925 and 926 which are driven in a manner somewhat similar to the electros. Thus a pair of rollers 951 and 952 (Figs. 47 and 49) extending from the opposite side of the disk 930 from that on which the rollers 931 and 932 are mounted, are adapted to cooperate with a Geneva wheel 953 (Figs. 27 and 6) mounted on a stud 954 extending from the side frame 10. A locking disk 955 (Figs. 47 and 49) similar to the disk 793 cooperates with the Geneva wheel to lock the latter until it is driven by the rollers. The arrangement of these rollers is such that the roller 952 falls at the same point on the disk 930 as the roller 931 on the opposite side, so that these may be held by a single stud passing through the disk.

A gear 956 (Fig. 6) secured to the Geneva wheel 953 meshes with a pinion 957 loose on a stud 958. Another pinion 959 on this stud, in turn, meshes with a pinion 960 cooperating with a pinion 961 secured to the knurled roller 925, which, in turn, is secured to an upper roller shaft 962. On a square portion at the opposite end of the shaft 962 is keyed a pinion 963 and another roller 925 (Fig. 6). A broad toothed pin-

ion 964 is normally out of mesh with the pinions 957 and 959 but is adapted to be rocked into mesh therewith to clutch them together. The lower rollers 926 mounted on studs 965 and 966 extending from the frames 12 and 10 are driven from the upper rollers by means of pinions 967 and 968 in mesh with the upper pinions 963 and 961, respectively.

The means for rocking the broad toothed pinions 943 and 964 to clutch or unclutch the pairs of pinions 940, 942, and 957 and 959 will be described in a later section. So also the means for operating the cutting and perforating device 927 will be described in connection with the means for determining whether a single check or stub check or none is to be printed.

After a check, either single or stub, has been printed it will have been fed by the three pairs of rollers mentioned until its forward edge is placed between the pairs of ejecting rollers 928 and 929. As shown in Fig. 27, these rollers are normally so arranged that their outer peripheries are in engagement but the upper rollers are provided with a flat side 969 which is brought directly above the lower rollers at the time the strip is fed forward between them. For the purpose of turning the rollers to effect this result, as well as to eject the check, the two pairs are intergeared by means of gears 970 and 971 (Figs. 27 and 46). One of the upper gears 970 meshes with a gear 972 to which is secured, by sleeve 974, a pinion 973. This pinion cooperates with rack teeth 975 on the lower edge of a slide 976 supported toward its front end on the cross bar 769 and connected at its rear end to an arm 977 (Fig. 48) suspended from a screw 978. A spring may, if desired, be employed to urge the slide 976 forwardly thus aiding in the production of a quick ejection action. A pin or roller 979 carried by the arm 977 engages a cam slot 980 in the gear 36, which slot is so formed that it produces no effect upon the arm during the first part of the rotation of the gear while the printing is taking place. However, just before the strip is given its second forward movement, or during such movement, the slide is shifted to the right (Fig. 27) so that the upper roller 928 is turned counter-clockwise until the flat side 969 is brought above the lower roller. After the strip has been fed forward and severed the arm 977 is rocked in the reverse direction to shift the slide 976 to the left beyond its normal position, thereby ejecting the check. Subsequently the slide is returned toward the right to normal. The purpose of having the flat side 969 normally away from the lower roller is to close up the space which it provides between the rollers so that when the machine is at rest the type carriers may not be tampered with by the insertion of a wire or the like and no shield or card may be inserted to prevent printing on the detail strip. This is a valuable feature provided full width feed rollers are to be used so that the entire width of the check opening will be closed off. If only pairs of cooperating feed wheels are employed the wheels 928 are secured to a shaft or sleeve 928—A so that all may rotate in unison and the outer wheel may drive the cooperating wheel 929 through the gears 970 and 971.

In Fig. 4 it is shown that two large holes 981 and 982 are provided in the outer frame 12 in line with the electros 916 and 918. These holes are larger in diameter than the outside diameter of the driving pinions 944 and 948. The purpose of the holes is to permit the electros to be removed from the machine. To remove the electros all that is necessary is to unscrew the retaining screws 985 and slide the electros off of the supporting studs 983 and 984 (Fig. 46) extending from the side frame 10. If desired the large holes 981 and 982 may be used as bearings for the outer ends of the electros and for that purpose shoulders 986 and 987 of appropriate diameter may be provided on the ends of the electros.

Inserted slip printing

As previously stated, the illustrative machine is provided with four sets of type on the lower sides of the several type carriers and there are correspondingly four sets of hammers 762 (Fig. 39) for taking impressions from these types. The arrangement is such that either a triplicate record such as shown in Fig. 26 may be printed or a duplicate record such as shown in Fig. 24 may be formed. If a sales slip in the form of three separable sections such as the stub section to be retained by the cashier, the original itemized portion sent to the bookkeeper and the duplicate itemized portion given to the customer, is to be printed on, the three forward sets of hammers 762 are rendered active. On the other hand, if a duplicate statement card or sheet such as shown in Fig. 24, is to be printed upon the foremost and rearmost sets of hammers are rendered active. The spacing between these hammers is such as to insure printing on corresponding line of the two sections of the statement. For the purpose of assisting in the location of the proper lines of the statement at the printing lines, the latter are designated by suitable marks 988, as indicated in Fig. 1 on the slip supporting shelf 989.

In order to determine which of the sets of lower hammers are to be operated the latter are placed under the control of a knob 990 (Fig. 27) which may assume either of two positions designated, respectively duplicate and triplicate. This knob is secured to a squared shaft 991 which extends over to the frame plate 10 and also has secured to it near this frame plate a pinion 992 meshing with teeth on a slide 993 (see also Fig. 28). The upper side of this slide is provided with three groups of rack teeth 994, each group meshing with a pinion 995 mounted on a journal member 996 having a bearing in the frame 10. These pinions are connected to disks 997 which carry eccentric rods 998 each extending across one of the several groups of hammers, with the exception of the foremost group. At their opposite ends these eccentrics are supported by journal members similar to 996 and having bearings in the frame 13. When the knob 990 is in the position shown the eccentric rods for the second and third groups of hammers, as shown in Figs. 27 and 39, are in their uppermost positions, where they are inactive. However, the rearmost rod is in its lower position, where it is in the path of the concave portions of the rearmost group of hammers and thereby prevents the latter from striking the inserted sheet or the type carriers. This therefore, is the condition of the parts when the knob 990 is positioned for triplicate printing. Upon turning this knob to the duplicate position it will cause the slide 993 to be shifted toward the rear of the machine and will thus turn the pinions 995 through a half revolution, thereby reversing the positions of the three eccentric rods 998. This will render the rearmost rod inactive while the other two rods will be placed in the

path of the second and third groups of hammers to disable them. It is to be noted that no disabling means is provided for the foremost group of hammers since these are active during either duplicate or triplicate printing. Obviously any other coordination of the rods might be adopted as desired to effect the proper enabling and disabling of the hammers. If desired, individual knobs each controlling a single eccentric rod **998** could be employed for separately controlling the several groups of hammers including the foremost group. A spring pressed arm **999** (Figs. 27 and 50) forced against a collar **1000** is provided for retaining the knob in either of the positions to which it may be adjusted.

Check control

The check printing devices may be controlled from two sources, i. e., from a knob **1001** (Figs. 1 and 50) and by devices controlled by the presence or absence of an inserted slip. These latter devices are best shown in Figs. 27, 53 and 54. As already explained the lower set of feed rollers **925** and **926** for the check strip are adapted to be driven through a broad toothed clutching pinion **964** (Fig. 6) which serves to connect the pair of adjacent pinions **957** and **959**. The broad toothed pinion **964** is carried by an arm **1002** pivoted on shaft **1003** and provided with a downward extension **1004** having a shoulder adapted to be engaged by a hook member **1005** pivoted on a stud **1021**. Normally this hook prevents rocking of the broad toothed pinion into mesh with the pinions **957** and **959** but it may be disengaged to permit such rocking whenever an inserted slip is absent from the supporting shelf **989**. For this purpose an extension **1006** of the hook member has connected thereto a link **1007** which at its other end is connected by a pin and slot connection to a two armed member **1008**. This member is secured to sleeve **1009**, which also has secured to it a feeler finger **1010**.

A link **1011** connected to an arm of the member **1008** is connected at its oposite end to a rock plate **1012** which is normally urged in a counter-clockwise direction by a spring **1013**. Movement of the connected series of elements under the influence of this spring is normally prevented by means of a stud **1014** carried by a plate **1015** and standing in the path of the rear arm of the two armed member. The plate **1015** is adapted to be rocked clockwise and returned upon each operation of the machine by means of a link **1016** connected at one end to the plate and at its other end to an arm **1017** secured to the rock shaft **382**. As the plate **1015** is rocked upon operation of the machine the spring **1013** causes the two armed member **1008** to rock clockwise on shaft **1018**, following the pin **1014** and thus causing the end of the finger **1010** to rise. If the latter does not encounter any inserted slip it will rise to a considerable extent. During the first part of its movement it will have no effect upon the link **1007**, due to the pin and slot connection between it and the arm of the member **1008**, but after this idle movement the link will be raised or shifted toward the front and will rock the hook **1005** to disengage the extension **1004** of frame **1002**. If the finger **1010** had encountered an inserted slip in its upward movement it would have been arrested, since the spring **1013** is not strong enough to cause it to pierce the slip and the total movement of the finger would have been great enough only to take up the slack in the pin and slot between the arm of the plate **1008** and link **1007**. Thus the hook **1005** would not have been rocked.

Now for the purpose of rocking the frame **1002** when it is released by the hook **1005** a special spring tensioning means controlled by the rock plate **1015** is provided so that very little resistance is presented to the withdrawal of the hook **1005**.

This construction is as follows: A pin **1019** carried by the frame is engaged by a bifurcated arm **1020** pivoted on the stud **1021** and provided with a downwardly extending arm **1022**. In the latter there is provided a pin **1023** to which is connected one end of a spring **1024** which is connected at its opposite end to a pin **1025** carried by a link **1026** having a slot **1027** surrounding the pin **1023**. At its lower end the link **1026** has a pin and slot connection to the rock plate **1015**. This arrangement is such that when the plate is rocked by operation of the shaft **382**, there is first a slight idle movement due to the lower pin and slot connection and then the link **1026** is shifted upwardly, thus placing either an initial or a further tension on the spring **1024** and carrying the upper end of the slot in the link away from the pin **1023**. Preferably the slot in link **1007**, which corresponds to the idle movement of the finger **1010**, is shorter than the lower slot in link **1026** so that latch **1005** may be released before the spring **1024** is placed under any appreciable tension. Obviously if the hook **1005** has been disengaged due to the full upward movement of the finger **1010**, resulting from the absence of an inserted slip, the frame **1002** will be rocked under the action of spring **1024** to engage the pinion **964** with pinions **957** and **959**. This will serve to allow operation of the lower set of feed rollers.

In order to control the operation of the upper sets of feed rollers a link **1028** (Figs. 27 and 53) connected to a pin **1029** on the lower frame **1002** is also connected to an arm **1030** of the frame **1031** which carries the broad toothed pinion **943** that serves to couple the pinions **940** and **942** (see also Fig. 50). It will be apparent that by means of this connection all of the sets of feed rollers will be coordinated and the feeding of check strip will be enabled or disabled according to whether the lower frame **1002** is rocked or not.

Whenever the check feed is disabled it is important that the rear set of hammers should be disabled since otherwise a series of numbers might be printed on the check strip and be confused with the proper amount when a check is issued on a subsequent operation of the machine. For this purpose a rib **1032** (Figs. 31 and 53) formed on a tube **1033** pivoted on the shaft **962** is normally in the path of this set of hammers to block their full movement. Thus, while these hammers may be operated they will normally be arrested by this rib before they strike the check. However, when the hock **1005** is rocked to permit the rocking of the frame **1002**, the tube **1033** will be rocked counter-clockwise (Fig. 53) until the rib **1032** is carried out of the path of the hammers. To accomplish this result an arm **1034** connected by a hub **1035** (see also Fig. 54) to the hook **1005** is connected by a link **1036** to an arm **1037**. This arm is directly secured to one section of the tube **1033**, while a bail formed by arms **1038** (Fig. 31) and **1039** and rod **1040** serves to connect the arm **1037** to the main portion of the tube. The formation of the tube **1033** in two sections, as shown, is for the purpose of avoiding interference with the check feed roller

925 (Fig. 6) which enters into the space between the two sections. No provision is made for disabling the printing hammers which are adapted to print on the forward portion of the check since when no check is to be issued there will be no portion of the strip beneath these hammers and their operation will be idle.

In addition to the control by the presence or absence of an inserted slip over the check printing and feeding devices, the latter may be controlled by the knob 1001 having a sleeve 1041 secured to the shaft 761 (Figs. 53 and 54). Toward its opposite end this shaft has secured to it an arm 1042 carrying a pin 1043 which is in the plane of the frame 1002. The knob 1001 may be placed in any one of three positions and is frictionally held wherever set, by means of a spring urged detent 1044 (Fig. 54). In one position of the knob the parts assume the position shown in Fig. 53 and the machine is conditioned for the issuance of a stub check. At this time the pin 1043 is away from the frame 1002 and will not interfere with the latter so that if no inserted slip is present the frame will be rocked to cause feeding of the check strip. However, if the knob is turned clockwise (Fig. 53) to a position designated "no check," the pin 1043 will be carried under a shoulder 1045 of the frame 1002 and the latter will be held against rocking even though the hook 1005 may be withdrawn due to the absence of an inserted slip. At the same time a pinion 1046 secured to the sleeve 1041 meshes with a pinion 1047 mounted on a shaft 1048 which is mounted at its opposite ends in the frame members 10 and 12. This shaft 1048 is formed as a crank shaft having an intermediate eccentric portion 1049 which is adapted to be moved upon rotation of the shaft counterclockwise into a position where it is in the path of the horizontal portions of the rearmost set of upper hammers near the pivot of the latter. Thus when the knob 1001 is turned to the "no check" position, the rear check printing hammers as well as the check feeding devices will be disabled regardless of the position of the feeler finger 1010.

A third position of the knob is provided for conditioning the check printer to form only a single impression of the check. For this purpose the knob must be turned counter-clockwise from the position shown (Fig. 53) through substantially 180°. In this position of the parts the pin 1043 will still be out of the path of the frame 1002 as the latter is rocked so that its action is left entirely under control of the feeler finger and the check strip will be fed if no inserted slip is present in the machine. At the same time the eccentric portion 1049 of the shaft 1048 will be carried to a position substantially diametrically opposite that shown in Figure 53. In this position it will hold the rear set of hammers in a rocked position and will prevent engagement of the latter with the check strip. While they may be operated to a limited extent their movement will be idle.

The perforating blade 1050 (Figs. 27 and 27a) and cutting blade 1051, formed on the rotary cutting device 927, are operated on each operation of the machine for the purpose of severing the check after it has been fed forward into the ejecting wheels and the device is operated to perforate the check between the two impressions on a stub check. Whenever only a single impression is made on a check provision is made for disabling the perforating action of the blade. This mechanism is constructed as follows: A pin 1052 (Figs. 27a and 53) extends radially from the rotary device 927 near one end. Another radial stud 1053 (Figs. 27 and 27a) extending from the rotary device is provided to permit attachment of a centralized spring 1054 which holds the device in normal position. Adjacent the pin 1052 there is mounted on the studs 786 extending from each of the hammer restoring bails 765, a slide 1055 (Figs. 27a and 51). This is in addition to the link 785 which, as previously explained, serves to tie together the series of bails. The slide 1055 is provided with an overturned lug 1056 in front of the pin 1052 and adapted to cooperate therewith when the slide is shifted toward the rear. A spring 1057 connected between the stud 786 on the middle one of the bails 765 and a stud 1058 on the slide 1055 serves to shift the latter toward the right (Fig. 53) whenever the hammer restoring bails are rocked clockwise due to the form of the operating cam 792 (Fig. 47). This movement of the bails and slide 1055 from normal is timed to occur after the first feeding of the check strip and after the latter has received its impressions. Cooperation of the lug 1056 with the pin 1062 at this time will serve to rock the rotary device with the blade 1050 clockwise (Fig. 27) and will result in the perforation of the check strip at a point between the two impressions formed on it.

In the event that only a single impression is formed on the check due to turning of the control knob 1001 to the "no stub" position the perforating action of the blade is prevented. For this purpose the shaft 1048 having the eccentric portion which serves to arrest the rear set of printing hammers has another eccentric portion 1059 (Fig. 54) in the plane of the slide 1055 and when the knob is turned, as stated, this eccentric portion is brought to a position just in rear of a projection 1060 formed on the slide. This will prevent movement of the slide toward the right (Fig. 53) and will cause the spring 1057 to be merely tensioned upon operation of the bails 765. Elongated slots 1061 in the slide permit this idle movement of the bails.

Similarly, whenever the check printing and issuing devices are disabled, due to the presence of an inserted slip below the lower sets of type, the rib 1032 on the tube 1033, as before explained, will remain in the position indicated in Fig. 53. It has a portion in the plane of the slide 1055 and when in normal position this is in the path of a projection 1062 on the slide thereby preventing its perforating movement toward the right. If the knob 1001 is turned to "no check" position, wherein it holds the pinion 964, in idle position, and if at the same time no inserted slip is presented to the lower sets of type the rib 1032 will be moved away from the projection 1062 on the slide 1055 and it will not block the perforating action of the blade 1050. Neither will the eccentric portion 1059 interfere with the slide at this time. To eliminate the undesired perforation of the check which would result at a point near the border of the next check to be issued a lug 1063 is formed on the arm 1002 and is turned into the path of another lug 1064 on the slide 1055. Thus premature or misplaced perforation of a check is prevented because slide 1055 in its movement to the right (Fig. 53) will be obstructed by lug 1063 before the perforation blade 1050 (Fig. 27) reaches the check. Spring 1057 will merely be tensioned at this time during the full movement of the hammer restoring bails 765. It will

be apparent however that when the arm or frame 1002 is rocked to cause the check feeding devices to become active the lug 1063 will be carried out of the path of the lug 1064.

The link 785 carried by the pins 786 is provided with an overturned lug 1065 (Fig. 51) which is in rear of the pin 1052 and extends into the plane of the latter so that upon movement of the link toward the left as the bails 765 are rocked the blade 1051 (Fig. 27) will be rocked counter-clockwise to sever the check. It will be recalled that the link 785 is connected directly to the bails 765 by the studs 786 without any idle play or flexible connection so that the link responds to all movements of the bails. The operating cam groove 792 (Fig. 47) for the bails 765 is so constructed that movement of the link 785 toward the left for the purpose described will take place after the second feeding movement of the check. The rotary cutting device 927, it will be noted, turns in a fixed sleeve 1066 which is provided with cutting edges cooperating with the blades 1050 and 1051.

Slip-hammer disabling device

In order to disable all four sets of the lower or slip printing hammers whenever no slip is present in the machine the plate 1012, which is rocked by spring 1013 (Figs. 27 and 53) when the feeler finger 1010 is permitted to rise, is provided with a stud 1067. This is in the plane of an extension 1068 (Fig. 27) of the hook 798 which, as previously explained, serves to operate the hammer tensioning and releasing bail 797. When the plate 1067 is rocked counter-clockwise upon lifting of the feeler finger due to the absence of any inserted record material the hook is disengaged from the arm 1069 of the bail so that none of the lower hammers will be tensioned and released.

Ribbon mechanism

To provide suitable inking means for all of the seven printing lines which have been described, a single broad inking ribbon is employed. This ribbon extends in double thickness across all of the sets of type carriers. For this purpose the ribbon is looped around a guide bar 1070 (Fig. 27) supported by the frames 10 and 12 and situated in back of the rearmost of the upper sets of hammers. A pair of fixed guide bars 1071 and 1072, supported in the same manner as bar 1070 and positioned respectively above and below the bar 1070 serve not only to help support the latter but also to converge the two sides of the loop into a single plane toward the front. The ribbon in double thickness is then passed forwardly just above the type elements and below the check and detail strips. At the front of the machine the one thickness of ribbon is passed around a guide rod 1073, between a felt roller 1074 and a main feed roller 1075, around a lower guide rod 1076 and then toward the rear. The other thickness of ribbon is passed in back of the main feed roller 1075 between the latter and a pair of cooperating smaller feed rollers 1077 and 1078. The double thickness of ribbon then passes toward the rear beneath the lower type elements but above the plane of an inserted slip or card. In rear of the rearmost set of lower type elements the loop is again opened up and passed around a guide bar 1079 which is wedged in as shown in Fig. 27 beneath a fixed guide bar 1080. The two guide bars 1079 and 1070 around which the ribbon is looped at its opposite ends are removable laterally through suitable openings in the frame plates; in this way the ribbon may readily be removed from the machine and replaced by a new ribbon. Feeding of the ribbon upon each operation of the machine to present a fresh portion at each printing line is effected by means of a pawl 1081 adapted to cooperate with a ratchet wheel 1082 secured to the feed roller 1075. Pawl 1081 is urged into cooperation with the ratchet wheel by a spring 1083 and is pivotally connected at its rear to an arm 1084 extending upwardly from the lower forward hammer restoring bail 799. By means of this connection the ribbon will be fed a step on each operation of the machine as the bails are rocked. The underside of the crossbar 675 serves to arrest the upward movement of the pawl under influence of the spring 1083. The forward felt roller 1074 is adapted to receive a quantity of ink and to transfer it continuously to the ribbon to keep it evenly and properly supplied. A portion 30 of the enclosing casing which conceals the ink supplying roller 1074 may be pivoted at 1085 (Fig. 1) so that it may be raised to permit adding more ink to the roller.

An advantage of the double thickness of ribbon which is provided between the several sets of hammers and type elements is that it serves to take up a part of the severity of the blow of the metal hammers on the type faces. Less danger of tearing the record media is thus encountered.

In order to avoid interference with the feeler finger 1010 so that the latter may rise in the absence of an inserted slip the inking ribbon may be made sufficiently yielding for the purpose or as shown in Fig. 54 it may be formed in two laterally spaced sections mounted on separate adjacent guide rollers and on bars provided with grooves adapted to maintain a space of about ⅛ of an inch between the sections. By reference to Fig. 54 it will be noted that the feeler finger 1010 operates in a plane between the amount printing type elements and the department designating element.

Timing chart

The timing chart (Fig. 57) illustrates graphically the sequence of operation of the major functions performed by the machine of which the printing mechanism of this application may form a part. The heavy lines used in this chart illustrate the period and duration of activity of movement of the operating parts while the light line portion of any circle designates the idle condition of the represented function. Sudden breaks in the heavy lines indicate points at which the operating members change their direction of movement.

Starting at 0°, circle 1, which designates the timing of the indicator parts, shows movement of certain of its parts up to 20°. This time is utilized to bring down the indicator supporting and lifting plates 1088 and the previously raised tablets themselves, thus destroying the previous setup and conditioning the indicator section for a new setup. The key locking bar 52 is released at this time, 0° to 20° (circle 18), to hold all keys locked in either normal or depressed position. From 20° to 35°, circle 2, indicates operation of the differential units related to the special keys to select the proper totalizers, counters, and special indicator tablets according to the transaction, department and clerk keys depressed. The consecutive numbering mechanism is also operated during this period to set up the new number to be printed. From 35° to 45° the slides 370 holding

out the totalizer engaging bails 364 are shifted to allow any of the bails, which have a series of notches in the bars 359, 472, 486, and 496 aligned below their cooperating fingers, to engage the related totalizer lifting frames preparatory to lifting them. During the interval from 45° to 60°, as shown by circles 4 and 5, the totalizers are lifted into mesh with the actuators when either a subtotal or a reset or grand total is being taken. Movement of the actuators to the positions represented by the keys or the selected totalizer under the action of the positive differential mechanism, or by the aid of the spring levers 548, on totalling operations, next takes place between 60° and 155° (circle 7). Meanwhile from the beginning of the operation up to about 155° (circle 15) the detail strip will have been shifted from autographic to printing position, while from 45° to 100° (circle 14) the check strip will have been fed to printing and perforating position. The hammer tripping operation (circle 10) is started at 145° but as this operation requires time for tensioning the hammer springs, actual tripping of the hammers will not occur until between 160° and 165°. If an item entering operation is being performed the totalizers are lifted into mesh with the actuators between 155° and 170° (circle 6). The printing hammers are reset by means of the bails 765 and 799 between 165° and 180° (circle 11); as the same operating means is used to operate the check knife, perforating will occur at about 175°, if a stub check is to be issued. The short period between 180° and 185° (circle 11) is used to provide a quick withdrawal of the perforating blade from the check. Further movement of this mechanism, between 185° and 250°, withdraws the restoring bail from the hammers and places the parts in their normal position while a still further movement in the same direction between 250° and 280° serves to sever the check.

If a rerest total is being taken the totalizers will be carried out of mesh with the actuators between 175° to 185° (circle 4) while early during this period the rack detents (circle 9) will move in to keep the racks from jumping and will stay in this position while the racks are being restored. The detents engage the racks very quickly at about 178° before the totalizers are more than half out of mesh. The indicators are lifted slightly at this time, 175° to 185° (circle 1), to permit the detents 1121 to latch their selection bars 1113 and 1114 in position before the amount differential slides move back towards normal.

From 165° to 195° (circle 16) the check ejector wheels 928 will be rotated about 180° into a position wherein the flat or cut out portions 969 of the wheels are directly above the path of the check strip to permit passage between the upper and lower wheels of the check which is later fed into them during the time indicated by circle 14 (190° to 245°). After the check has been thus fed and is severed the grooved wheels make one complete revolution during the period from 280° to 350° (circle 16) thereby ejecting the check. The wheels then move in the initial or opposite direction, between 335° and 360° (circle 16), to carry the flat or cut out portions away from the ejecting slot into the normal position shown in Fig. 27 so that no check or slip can be inserted from the front for fraudulent operation of the printing devices.

During the last portion of the operation of the machine other mechanisms are operated to complete their functions. For example the detail strip is shifted, 205° to 360° (circle 15), from printing position to autographic position, and the depressed keys are released late in the operation, 345° to 360° (circle 12). If the machine is operated to take a total the rack detents 571 will be active, as already explained, and during the last ten degrees (circle 9) these will be lifted out of the teeth of the racks. The devices for operating the consecutive numbering mechanism are retsored to normal (circle 2) simultaneously with the restoration of the special key differential devices, 345° to 360°.

Résumé

One suitable form of the invention having thus been described in detail the coordination of the several operative features will now be more clearly set out by a brief description of an operation of the printing mechanism in connection with the operation of the machine as a whole.

Assuming that a customer of the store in which the machine is located has previously purchased a victrola and is now about to make a payment of $7.50 on account to clerk B while cashier number 2 is on duty, the machine, in the first place, will be conditioned by the turning of cashier 2's lock 455 (Fig. 1) to designate her responsibility for the items entered. Total controlling levers X and Y (Fig. 9) will be located in their item entering positions. The knobs 714 will have been adjusted at the beginning of the day to indicate the date on certain of the printed record. Upon receipt of the money the cashier will depress the proper amount keys representing $7.50 and also the proper special keys representing the "Received on account" transaction, the clerk "B' and the "Victrola" department, all of these keys being held depressed by the detents described. Proper adjustment of one of the cashier's locks and depression of a key in each of the special banks will serve to release the machine for operation by withdrawing the set of four independent locking pawls 589 (Fig. 17) which cooperate with the operating shaft 37. Before the machine is operated the installment card (Fig. 24) of the particular customer will have been taken from an appropriate file and inserted in the machine while the knob 990 will have been adjusted to cause duplicate printing.

The main operating parts of the machine may now be turned either by means of a motor or by the hand operated lever 33. Depression of the "Received on account" key will have served to shift the slide 306 (Fig. 11) of its bank downwardly a distance of two steps. The slide 306 carries the stud 323 which will have been thus carried down two steps from normal. Similarly the "B" clerk's key will have served to shift its slide 307 upwardly one and one half steps so that the adjacent slide 306 will have been shifted upwardly three steps, thru the gears 311 and 312, thereby carrying its stud 323 up three steps from normal. Depression of the "Victrola" department key will likewise have shifted its slide 307 up one and one half steps and the related slide 306 together with its stud 323 up three steps.

Now upon the operation of the main shaft of the machine the shaft 324 (Fig. 11) together with arms 325 will be rocked clockwise very early to carry the rod 326 and hence the cam plates 329 upwardly. The jaws 331 of the latter cooperating with the several studs 323 will have caused the segments 330 to rock.

Prior to the engaging movement of the totalizers, the differential operating frames 138 (Fig. 2)

will begin to rock and through the gearing associated therewith will tend to cause the slides 130 to be moved upwardly and the slides 131 to be moved downwardly. In those banks where no keys have been depressed the slides 130 will be barred from any upward movement by means of the zero stops 120 while the complemental slides 131 will partake of the full nine steps of downward movement. In the dollars bank, however, the zero stop will have been raised and the slide 130 will be permitted to move upwardly 7 steps until the lug 134 engages the depressed 7 key while the complemental slide 131 will move downwardly 2 steps until its lug 135 engages the opposite side of the 7 key. Similarly the dimes slide 130 will move upwardly 5 steps while its complemental slide will move downwardly 4 steps. Subsequently, after the selected totalizers have been lifted into mesh with the actuators which have been shifted to the same extents as the slide 130, the frames 138 will be restored and will return the actuators 162 as well as the slides 130 and 131 to their normal positions.

In the turning of the differential shafts 158, etc. (Fig. 5) in accordance with the movements of the slide 130, to operate the actuating racks 162 another series of pinions 663 will be turned to adjust the type carriers 672 and 664. These are each provided with seven sets of type to enable the printing of an item at seven different printing points. In addition to these carriers for the amount and special key character type there are provided special type carriers 703 and 693 (Fig. 28) adjustable under the control of the cashiers' locks, the total controlling levers and the reset lock 474 (Fig. 3). The series of knobs 714 (Fig. 55), furthermore, are adapted to adjust similar carriers 712 for the purpose of designating dates; these carriers, however, are not provided with type adjacent the detail strip printing point since it is not necessary to identify by date on this strip each of the large number of entries occurring on the same day. Still another group of type carriers 725 is adapted to consecutively number the transactions entered in the machine over a given period. The devices for controlling and resetting these members have been fully described and need not be discussed in further detail here.

After all of the carriers have been adjusted in accordance with their various controls and before the amount differentials start on their return movements the series of hammer operating slides 766 and 770 (Fig. 39) will be operated to effect printing. Prior to this, however, the detail strip will have been shifted by the sliding of the table 832 (Fig. 41) to carry the portion which normally stands beneath the autographic opening 813 to the printing point of the upper foremost group of printing hammers. In view of the nature of the transaction an installment sheet such as illustrated in Fig. 24 will have been inserted in the machine and the knob 990 (Fig. 1) will have been adjusted to predetermine the operation of only the front and rear sets of slip printing hammers. Through the action of the slip in preventing rising of the feeler finger 1010 (Fig. 27) the feed rollers 916, 917, 918, 919, and 925, 926 will remain inactive due to the fact that the frames 1002 and 1031 carrying broad toothed clutching pinions will not be rocked. At the same time the rear check printing hammers 762 will be disabled by the action of the bar or rib 1032 (Figs. 31 and 53) carried by the sleeve 1033 while the operation of the forward set of check printing hammers will be idle since no check strip will be in their paths.

Had no slip been inserted in the path of the feeler finger 1010 and had the check control knob 1001 been adjusted to its stub-check position then the frames 1002 and 1031 would have been rocked to couple up the feed rolls and the latter would have been operated once before the operation of the printing hammers and once after such operation. Under this condition of the machine the cutting and perforating blade 927 (Fig. 27) would have been rocked clockwise (Fig. 27) after the first feed to perforate the check, and then counter-clockwise after the second feed to sever the check. Immediately following this severing operation the ejecting rolls 928 and 929, which will have been previously turned to receive the check on its second feed, would be operated to eject the check.

Upon the return of the differential mechanisms to normal those type carriers which have been shifted thereby will likewise be returned to normal and during this period the hammers will be restored and the table 832 will be returned toward the left (Fig. 41) to shift the printed entry on the detail strip just beyond the autographic opening 813 and under the glass 814.

The detail strip is mounted on a frame comprising side plates 852 and 867 and may be removed bodily from the machine to facilitate the replacement of the supply and storage rolls if desired. In order to avoid the necessity of tracing out the course of the strip whenever a new roll is inserted the beginning of the latter may be pinned or otherwise fastened to the end of the previous roll and these ends may be fed through the machine in the usual way by manual operation of the lever 860 (Fig. 1).

When it is desired to take totals one of the levers X and Y (Fig. 9) must be shifted to some position depending upon the totalizer desired. If the total is to be taken from one of the totalizers in the three universal carry banks the slide 475 related to the lever X will be shifted one step up. This will rock the bail 614 (Fig. 17) clockwise to a slight extent by the connections shown in Fig. 3 for rocking the shaft 607 so that if any one of the pawls 589 should be rocked all four of the latter will be moved in unison. The purpose of this is to enable the release of the machine by depression of a single one of the special keys or turning of one of the cashier's locks instead of requiring depression of a key in each bank and the turning of a cashier's lock as in item entering operations. As the same time the single-key frame 624 will be rocked to a position wherein it will prevent depression of more than a single one of the special keys or the corresponding turning of a cashier's lock.

Movement of the total lever as indicated will also serve to carry the stud 517 (Fig. 3) away from the lock 519 and will permit the latter to be rocked by spring 521 to place the shoulder 528 in the path of the lug 523 on the segment 524. Early in the operation of the machine this segment will be operated and will lift the link 519 thereby rocking the plate 529 and shifting the slide 510 part way toward the rear. Cam slot 508 in the latter serves to shift the sleeve 502 with attached arms 501 and 503 so that the rollers 504 (Fig. 19) and 505 will each extend only about half way into the cam grooves 511 and 512 of the disk 506. Now upon continued operation of the machine both of the cam grooves will be effective

to control the period of engagement of the selected totalizer wheels and actuators.

A link 560 (Fig. 3) extending upwardly from the plate 529 is connected at its opposite end to a cam plate 558. An extension of the latter is connected by a link 570 to an arm on shaft 72 to cause all of the zero stops 119 (Fig. 2) to be rocked by the action of pins 568 carried by arms 567 secured to the shaft.

At the same time the slot 557 in the plate 558 cooperates with the roller 556 to lower the series of spring tensioned arms 548 (Fig. 2) into engagement with the racks 162 so that the springs 550 may assist in the operation of the latter on totals. This is to insure operation of the slides 130 and racks 162 first, until these parts are arrested by the engagement of the single teeth 174 of the totalizer wheels with the shoulders 544, before the complemental slides 131 start their movement. The springs 550 are not normally under any considerable amount of tension but are given additional tension upon the operation of the machine when the latter is conditioned for totaling. For this purpose the arms 552 (Fig. 2) to which the springs are attached at their forward ends, are secured to the rock shaft 546 which is operated by the main operating mechanism whenever the hook 563 (Fig. 3) engages a pin 562 carried by the arm 561 secured to this shaft. Engagement of the hook and pin in this manner is permitted whenever the links 519 and 520 are raised by virtue of one of the latter being coupled to the segment 524 due to shifting of one of the total levers. The hook 563 is pivotally mounted on the rock plate 153 which is rocked by the driving cam 156 and serves also the function of rotating the differential operating shaft 137.

During an operation of the machine with the parts in the positions indicated the combined effect of the cam grooves 511 and 512 will be to cause engagement of the selected totalizer during both the forward and return movement of the actuating racks. For the type of total suggested, i. e., taken from a universal bank those of the slides that are controlled by the two of the special key banks in which no keys are depressed will remain in normal position while those related to the third bank will be shifted in accordance with the key depressed. The bars controlled by the cashiers' locks and the two total levers will assume positions determined by their respective controls.

The selected totalizer wheels will first be turned backwardly to their normal or zero positions by virtue of the action of the springs 550 (Fig. 2) and the regular differential mechanism. Their movement is arrested by the engagement of the long teeth 174 with the shoulders on the transfer controlling bars 184. At this time the amount formerly standing on the totalizer wheels will be set up on the type carriers 672 and 674 and may be printed at any one or more of the seven printing points. As the operation continues the racks will be restored and the amount previously on the wheels will be returned thereto and will also be set up on the indicator tablets 1086 (Fig. 1).

If the total standing on one of the item counters is desired the control lever X (Fig. 9) is shifted to the "read counters" position with identically the same result as produced upon movement to the "read" position except that the selecting bars 486 are shifted another step in each of the banks of totalizers and counters. This has the effect of determining the selection of a particular counter instead of a totalizer upon depression of a desired special key and subsequent operation of the machine.

Should the lever X be shifted to any of the remaining seven positions it will serve to shift the connected totalizer selecting slides 486 to such positions that only the particular totalizer corresponding to any definite position will be selected for engagement with the racks. At the same time such movement of the lever X will, due to the form of the slot 649 (Fig. 3) in the arm 647, serve to rock the shaft 607 and hence the bail 614 (Fig. 17) an additional amount which is sufficient to carry it to the bottom of the slots 619. In moving to this position the bail will serve to rock all of the locking pawls 589 to free the shaft 37 and at the same time it will be carried into the path of the arms 596 and hence will lock the special keys against depression and the cashiers' locks against turning. In other respects the operation of the machine will be substantially the same as when the lever X is placed in the "read" position.

Movement of the lever Y to any of the nine positions away from normal will produce the same effect as explained above with respect to the seven last described positions of the lever X. For each of these positions there will be selected a definite totalizer for total printing purposes, the selection being effected under control of the selecting bars 496 and not being interfered with by any of the other selecting bars. Upon movement of the lever Y to any of its nine shifted positions the bail 614 (Fig. 17) will be rocked to release the shaft 37 from the four pawls 589 and to lock up all of the special keys and the cashiers' locks.

In order to prevent operation of the machine with the levers X and Y in their "add" positions and the lock 474 turned to reset position the special locking hook 652 (Fig. 3) comes into play upon turning of the lock. This prevents operation of the shaft 37 until the hook is again raised by the action of one of the arms 516 upon the pin 656 carried by the rear arm 657 of the hook whenever one of the levers X and Y is shifted.

While one admirable form of the present invention disclosing its many novel and improved features has been disclosed herein, it is to be understood that numerous modifications may be made in the specific constructions illustrated and described without departing from the spirit or scope of the invention. Not only is it contemplated that changes may be made in the specific mechanisms provided for the accomplishment of various functions but if desired parts may be omitted or rearranged to bring about variations in the results effected. It is not desired to be limited other than by the scope of the claims which follow.

What I claim is:

1. In a machine of the class described, the combination of a plurality of slidable type carriers, a main operating mechanism, means operated by the main operating mechanism for printing upon a plurality of record media from said type carriers, and means operated by the main operating mechanism and adapted to cooperate with certain of the type carriers for one unit of movement after more than nine units of idle movement.

2. In a machine of the class described; printing means, devices for supporting record material adapted to receive an impression from said printing means, a casing enclosing said devices and provided with an autographic opening,

means for shifting said record material to carry a point adjacent said opening to a point to receive an impression from said printing means, said shifting means comprising a slidable table, and adjustable guiding means for said record material cooperating with said table to vary the extent of shifting of said material in one direction.

3. In a machine of the class described, a plurality of sets of type adapted to form a single or double impression upon a check strip, separate impression means for printing from said type on said strip, means for supporting said strip with a portion normally beneath only one of said impression means, means for feeding said record strip beneath also the other of said impression means, means for operating both of said impression means, and means for at will disabling said feeding means and one of said impression means.

4. In a machine of the class described, a plurality of sets of type adapted to form a single or double impression upon a check strip, separate impression means for printing from said type on said strip, means for supporting said strip with a portion normally beneath only one of said impression means, means for feeding said record strip beneath also the other of said impression means, means for operating both of said impression means, an adjustable knob, and means controlled by said knob for at will disabling one of said impression means either alone or while also disabling said feeding means.

5. In a machine of the class described, the combination of a set of type carriers, mechanism for differentially moving the type carriers, paper supporting feeding and shifting device adapted to support record material, mechanism adapted to print upon the record material from said type carriers, and means for at will changing the amount of shift of the record material by interposing obstructions in its regular path when said changing means is effective.

6. In a machine of the class described, the combination of a set of movable type carriers, means for differentially moving the type carriers, record material supporting and feeding mechanism arranged to be removable bodily from the machine, means adapted to print from the type carriers upon record material carried by said mechanism, and means arranged automatically to lock said feeding mechanism when the record material is out of proper position in the machine, said locking means being made ineffective when the supporting means is returned to normal position in the machine.

7. In a machine of the class described, the combination of a set of movable type carriers, means for differentially moving the type carriers, means adapted to support, shift, and feed record material so arranged as to be slidable transversely out of the machine, mechanism adapted to print from said type carriers upon record material supported by said means, means arranged to prevent the operation of the paper feeding and shifting device when removed from the machine, and means for making said preventing means ineffective when the supporting means is returned to normal position in the machine.

8. In a machine of the class described, the combination of a set of type carriers, means for differentially moving the type carriers, mechanism adapted to support and feed record material, said mechanism being arranged for convenient removal from the machine, means for printing upon the record material from the type carriers, and means for preventing operation of the shifting mechanism when the record material supporting mechanism is removed from its normal position in the machine, said preventing means comprising a locking pawl spring-urged toward locking engagement with the record material feed means and cam means for camming said locking means to ineffective position when the record material supporting means is moved into proper position in the machine.

9. In a machine of the class described, the combination of a set of movable type carriers, means for differentially moving the type carriers, record material supporting and feeding mechanism arranged to be removable bodily from the machine, means adapted to print from the type carriers upon record material carried by said mechanism, and means arranged automatically to lock said feeding mechanism when the record material is out of proper position in the machine, said locking means being made ineffective when the supporting means is returned to normal position, said automatic locking means comprising a locking pawl spring-urged toward locking engagement with the record material feeding mechanism, and cam means for camming said locking means to ineffective position when the record material supporting means is moved into proper position in the machine.

10. In a machine of the class described, the combination of a set of movable type carriers, means for differentially moving the type carriers, record material supporting and feeding mechanism comprising a gear arranged to be removable bodily from the machine, means adapted to print from the type carriers upon record material carried by said mechanism, and means arranged automatically to lock said gear when the record material is out of proper position in the machine, said locking means being made ineffective when the supporting means is returned to normal position, said automatic locking means comprising a locking pawl spring-urged toward locking engagement with said gear, and cam means for camming said locking means to ineffective position when the record material supporting means is moved into proper position in the machine.

11. A check severing device for use in a machine of the class described, comprising a slotted rod, a sleeve closely surrounding and fitted for rotation relative to said rod, said sleeve being also formed with slots on its substantially diametrically opposite sides normally in alignment with said slot in the rod, one edge of one of said slots in the sleeve being formed with perforating teeth, and means for causing relative rotation between said rod and sleeve in either direction so that paper located in said slots is perforated when the relative rotation is in one direction and severed when the relative rotation is in the other direction.

12. A check severing device for use in a machine of the class described, comprising a slotted rod, a sleeve closely surrounding and fitted for rotation relative to said rod, said sleeve being also formed with slots on its substantially diametrically opposite sides normally in alignment with said slot in the rod, one edge of one of said slots in the sleeve being formed with perforating teeth, and means for causing relative rotation between said rod and sleeve in either direction so that paper located in said slots in perforated when the relative rotation is in one direction and severed when the relative rotation is in the other

direction, and means for normally holding all said slots in alignment.

13. In a machine of the class described, the combination of a plurality of type carriers each having a plurality of sets of type on the upper side and a plurality of sets on the lower side, mechanism for differentially setting the type carriers, means for printing from the type on two record media, means for feeding each of said media, and a device controlled by one record medium arranged to determine whether the other record medium is to be fed forward and then printed on or printed on without being first fed forward.

14. In a machine of the class described, the combination of a plurality of type carriers each having a plurality of sets of type on the upper side and a plurality of sets on the lower side, mechanism for differentially setting the type carriers, means for printing from the type on two record media, means for feeding each of said media, and a device controlled by one record medium arranged to determine whether the other record medium is to be fed forward and then printed on or printed on without being first fed forward or neither printed on nor fed forward.

15. In a machine of the class described, the combination of a plurality of type carriers, mechanism for differentially setting the type carriers, a supply roll for record material, means for printing from said type on record material supplied from said supply roll, an autographic opening to permit autographic entries to be made on said material, said opening being located at a distance from the impression point, means for shifting the material from a point adjacent the opening to the impression point to receive a printed impression from the type carriers and for then shifting the material back to its original position and a predetermined distance therebeyond for line spacing, and means for at will varying the amount of said line spacing, the said varying means comprising at least one bar movable into a position where it will be engaged by the record material when the latter is moved to the impression point, whereby an additional amount of material is drawn from the supply roll.

16. In a machine of the class described, the combination of a casing, a plurality of type carriers, mechanism for differentially setting the type carriers, a supply roll and a storage roll for record material, means for printing from said type on record material supplied from said supply roll, a visual opening in the casing to permit viewing said material, said opening being located at a distance from the impression point, means supporting record material supplied from said

supply roll extending past the impression point and past the autographic opening to said storage roll, a movable frame for shifting the record material so that a specified part of the material is shifted from a point adjacent the opening to the impression point to receive a printed impression from the type carriers and for then shifting the said part of the material back to its original position and a predetermined distance therebeyond for line spacing, said shifting means comprising a roller between the supply roll and the impression point and another roller between the impression point and the storage roll, and means for at will increasing the amount of said line spacing by interposing means to cause the first mentioned roller to draw a longer length of record material from said supply roll.

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