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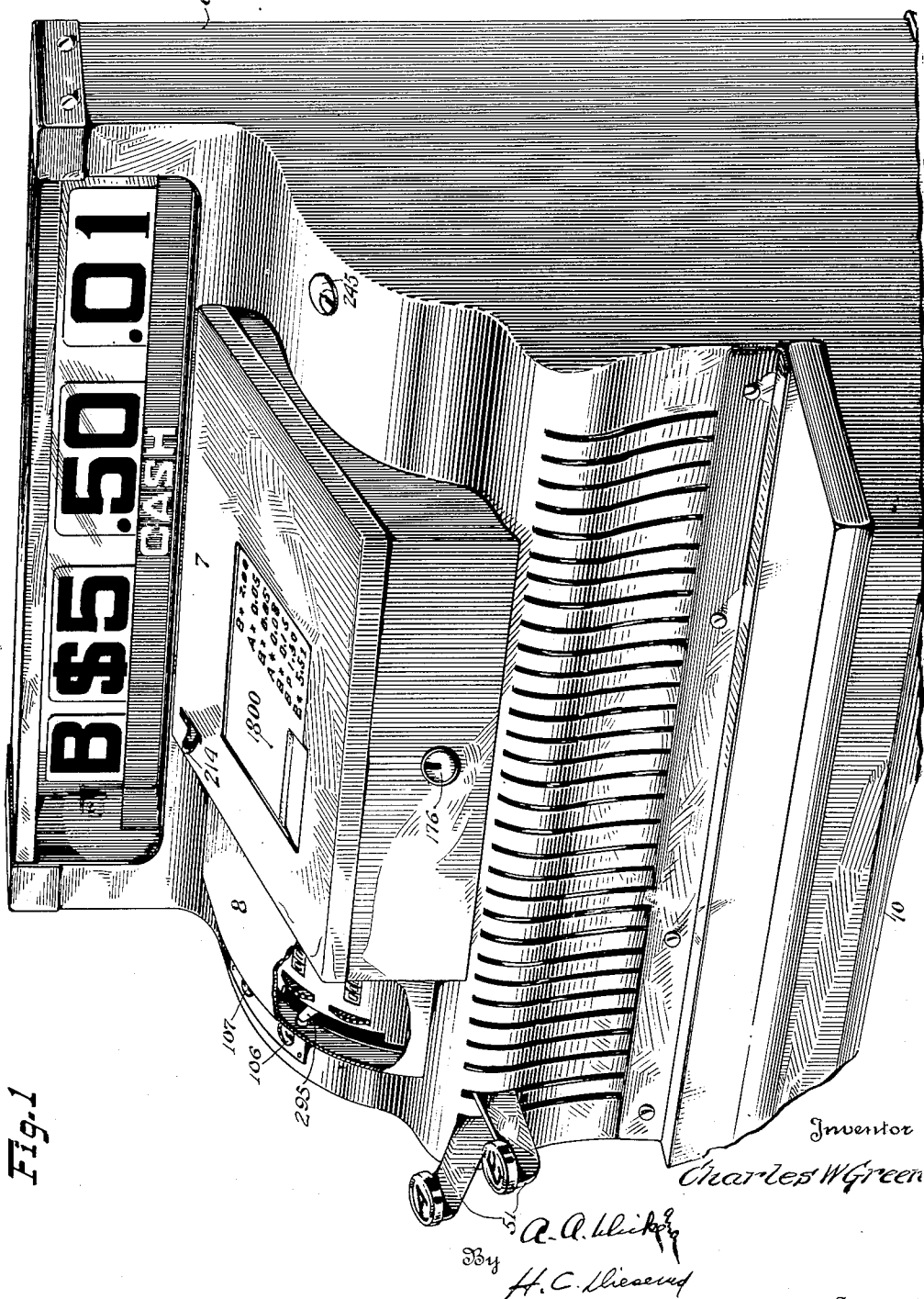
C. W. GREEN

1,920,374

CASH REGISTER

Filed Oct..20, 1925

18 Sheets-Sheet 1



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CASH REGISTER

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18 Sheets-Sheet 2

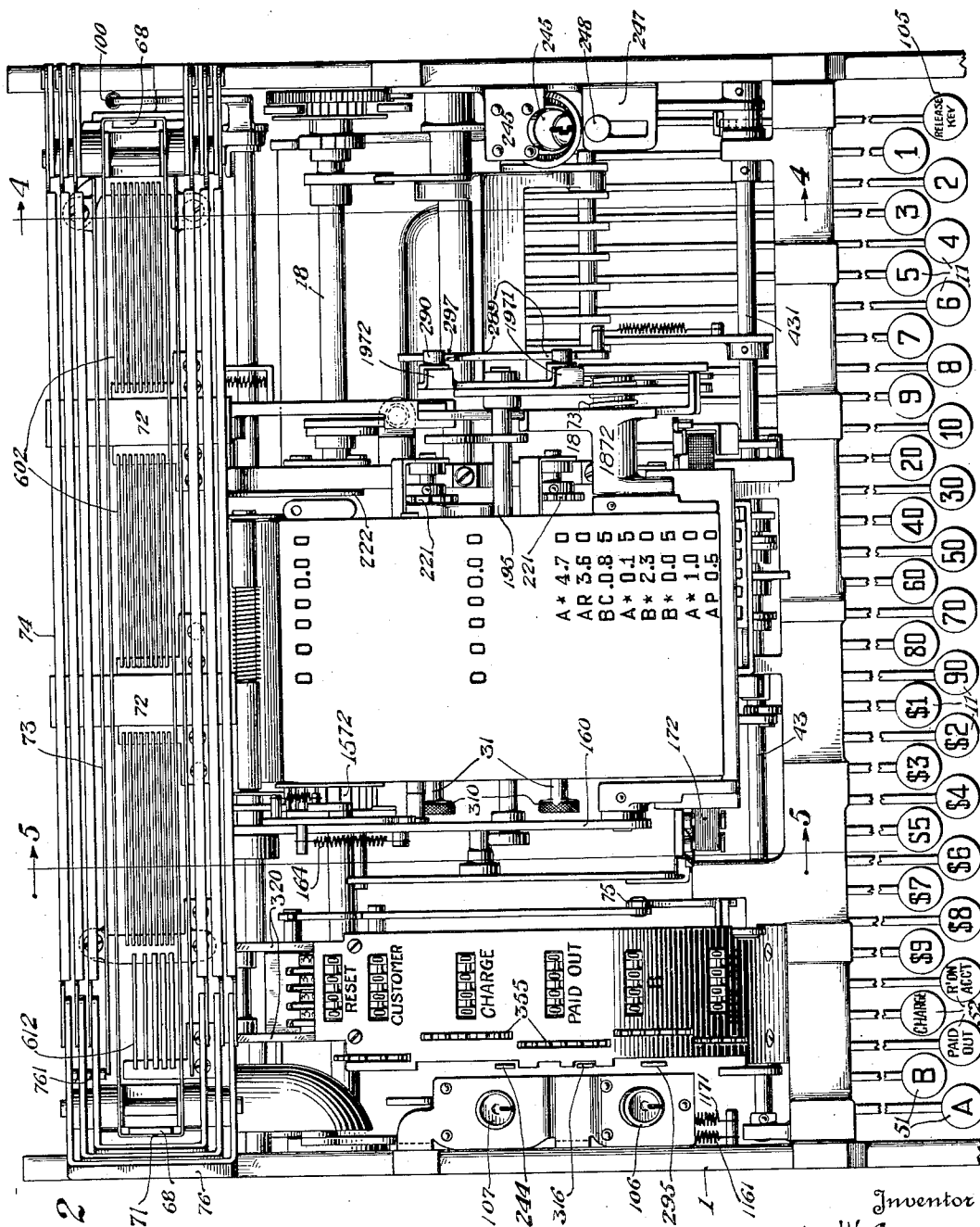


Fig. 2

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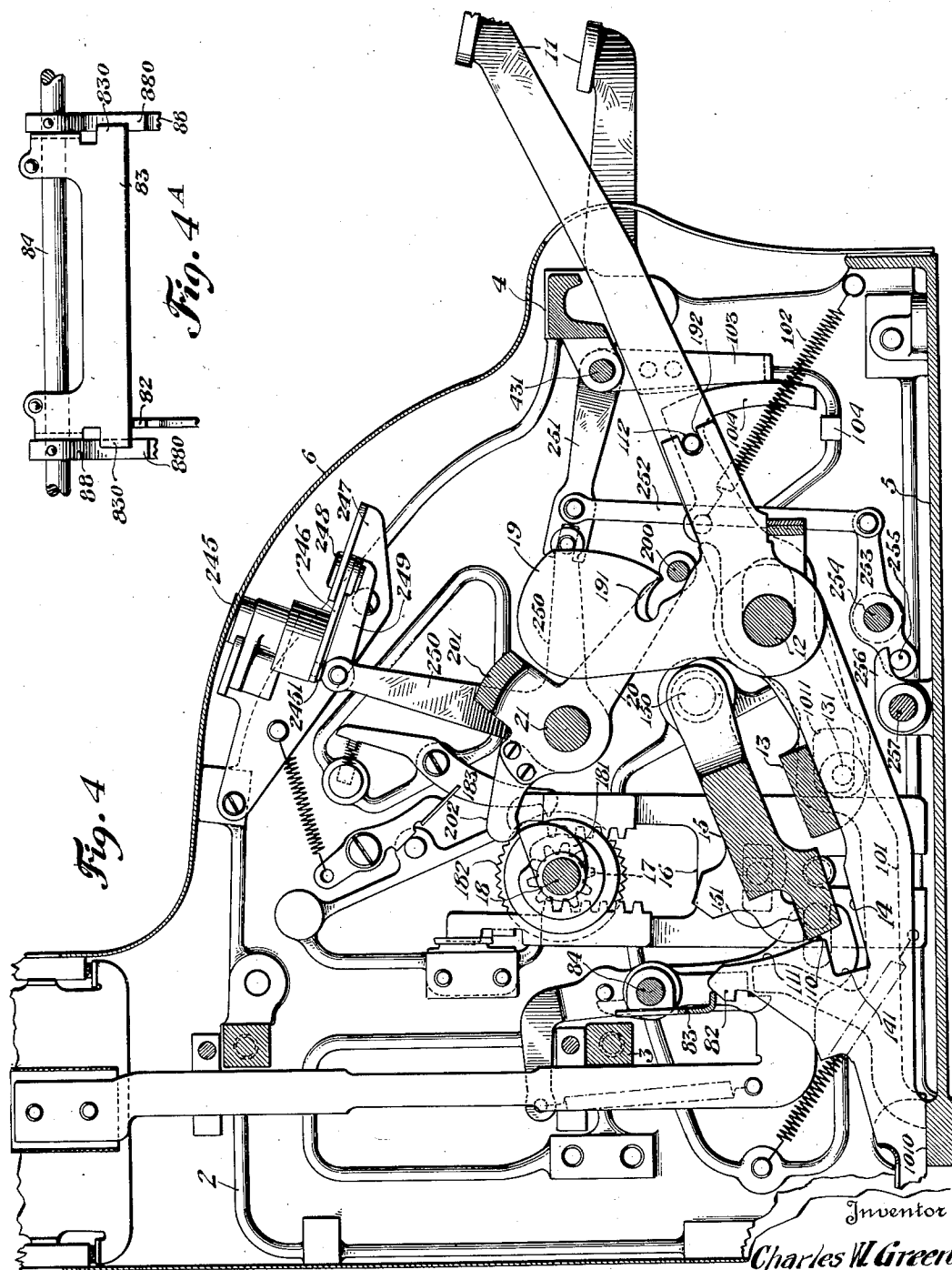
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CASH REGISTER

Filed Oct. 20, 1925

18 Sheets-Sheet 4



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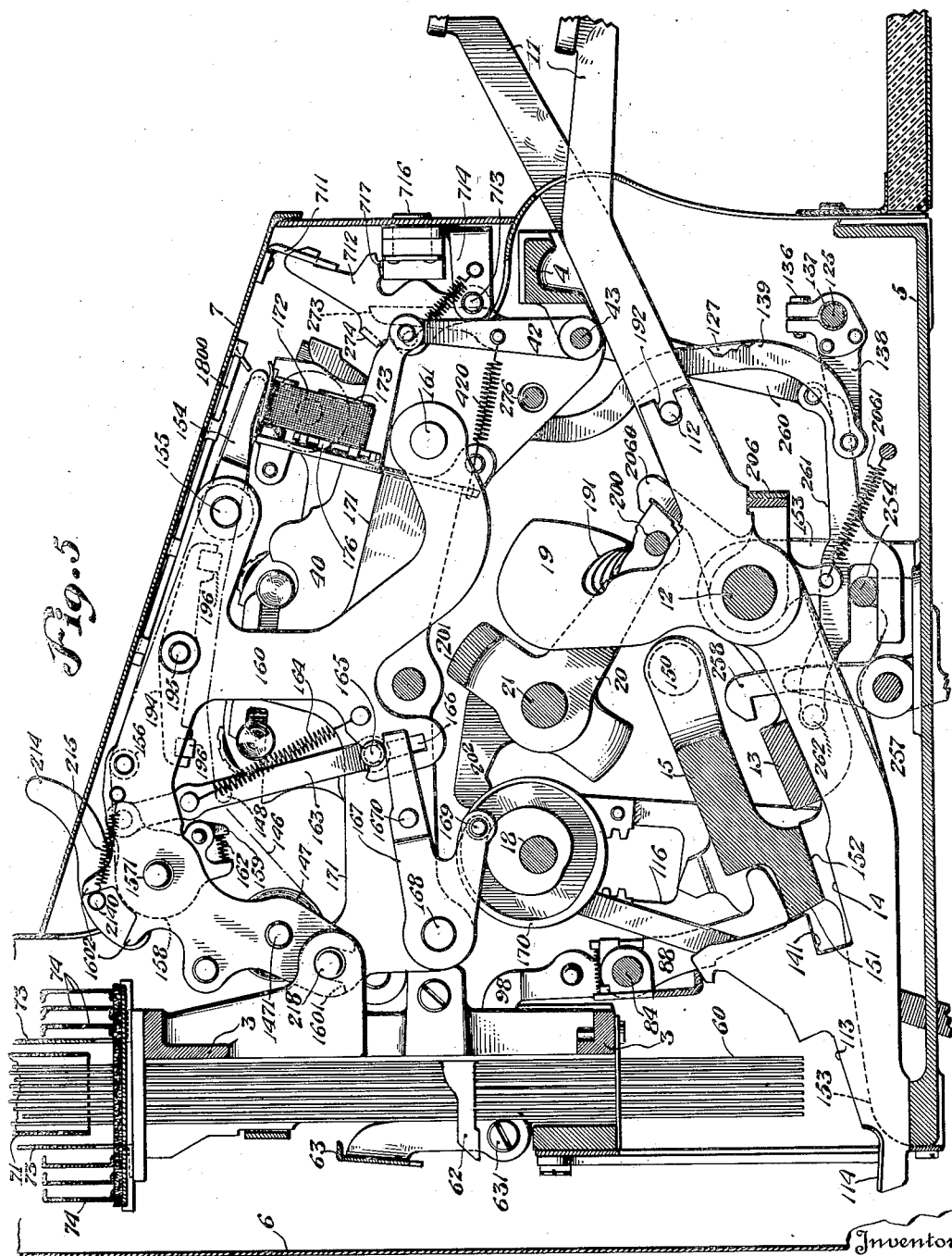
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CASH REGISTER

Filed Oct. 20, 1925

18 Sheets-Sheet 5



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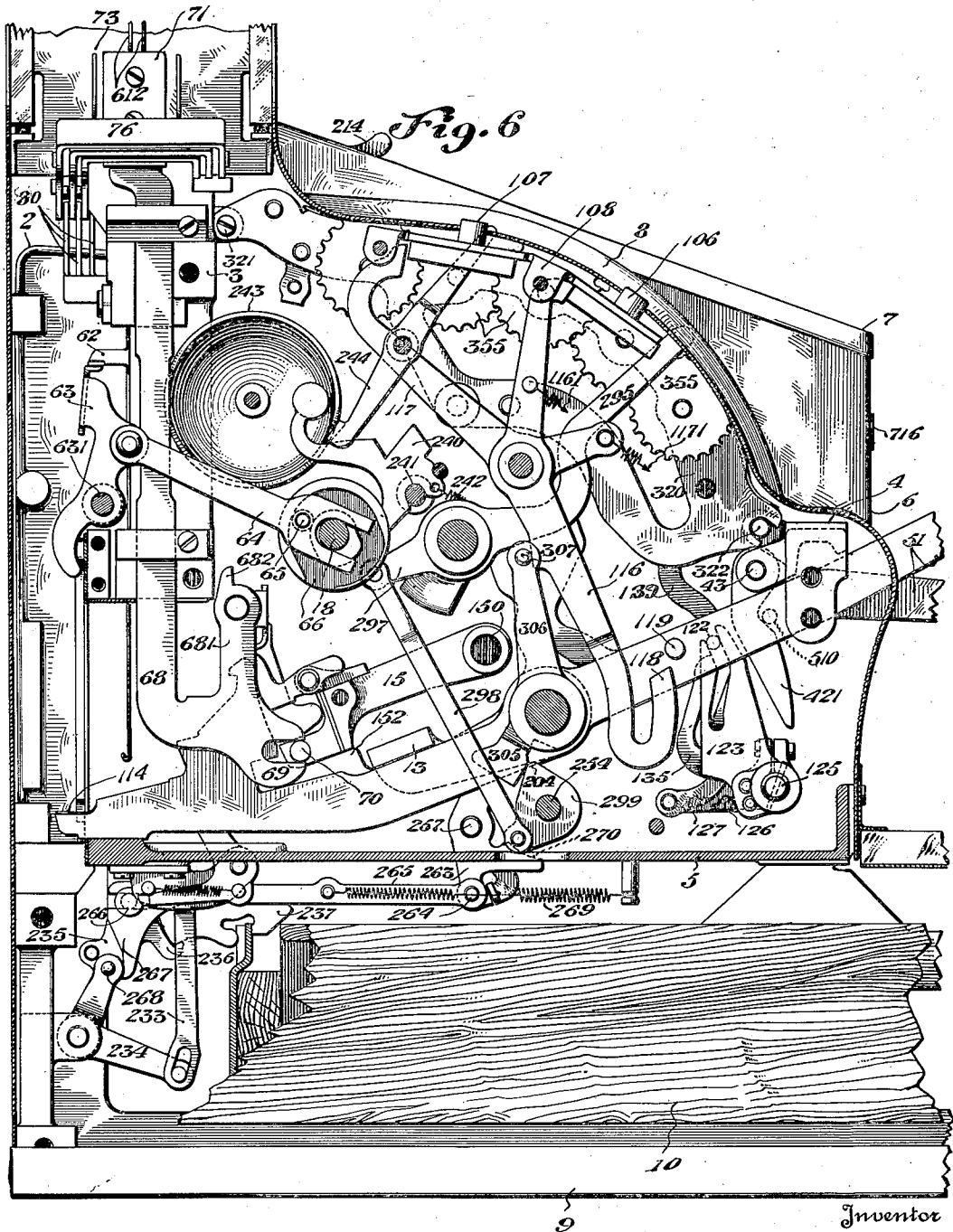
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CASH REGISTER

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18 Sheets-Sheet 6



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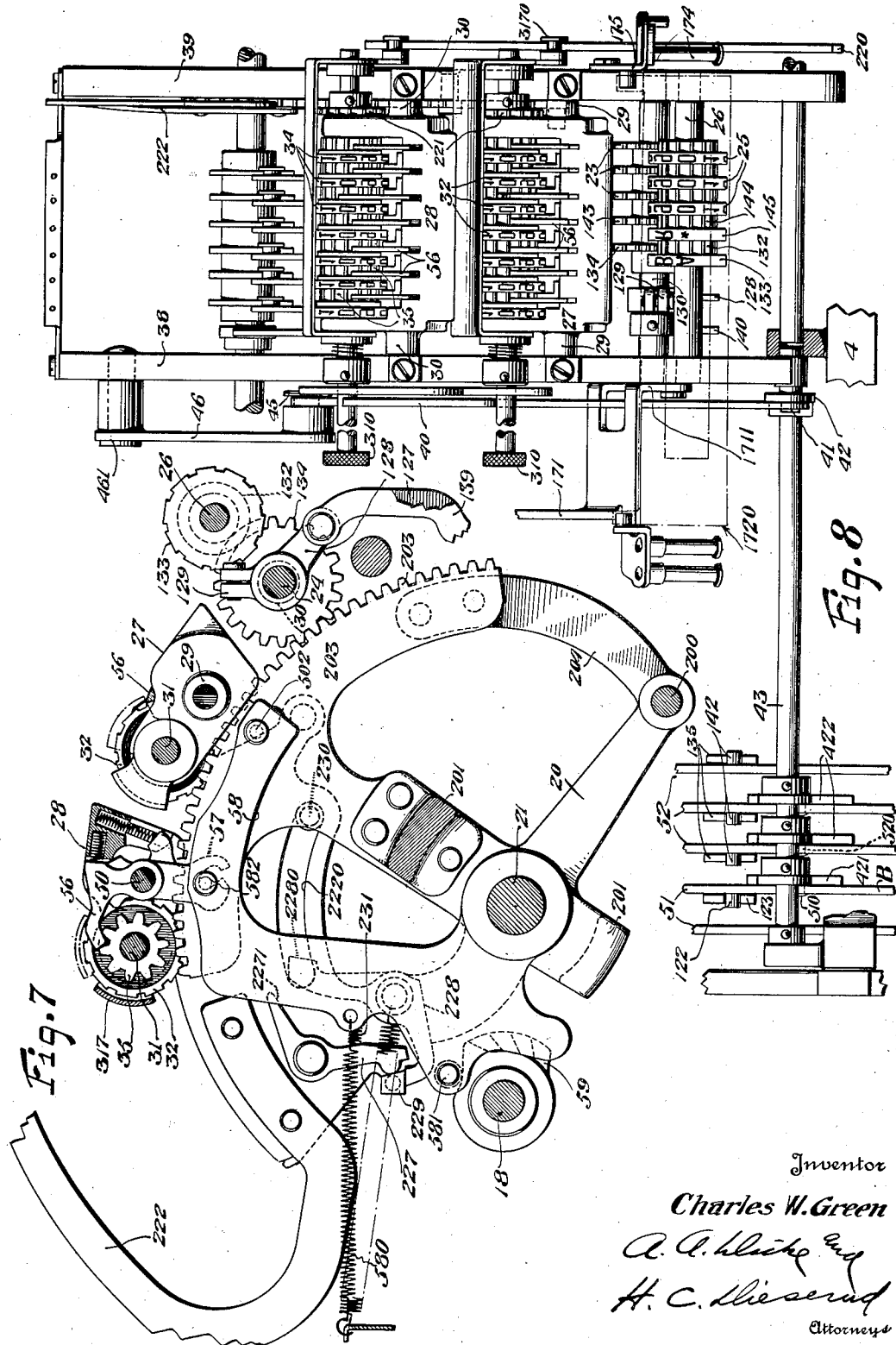
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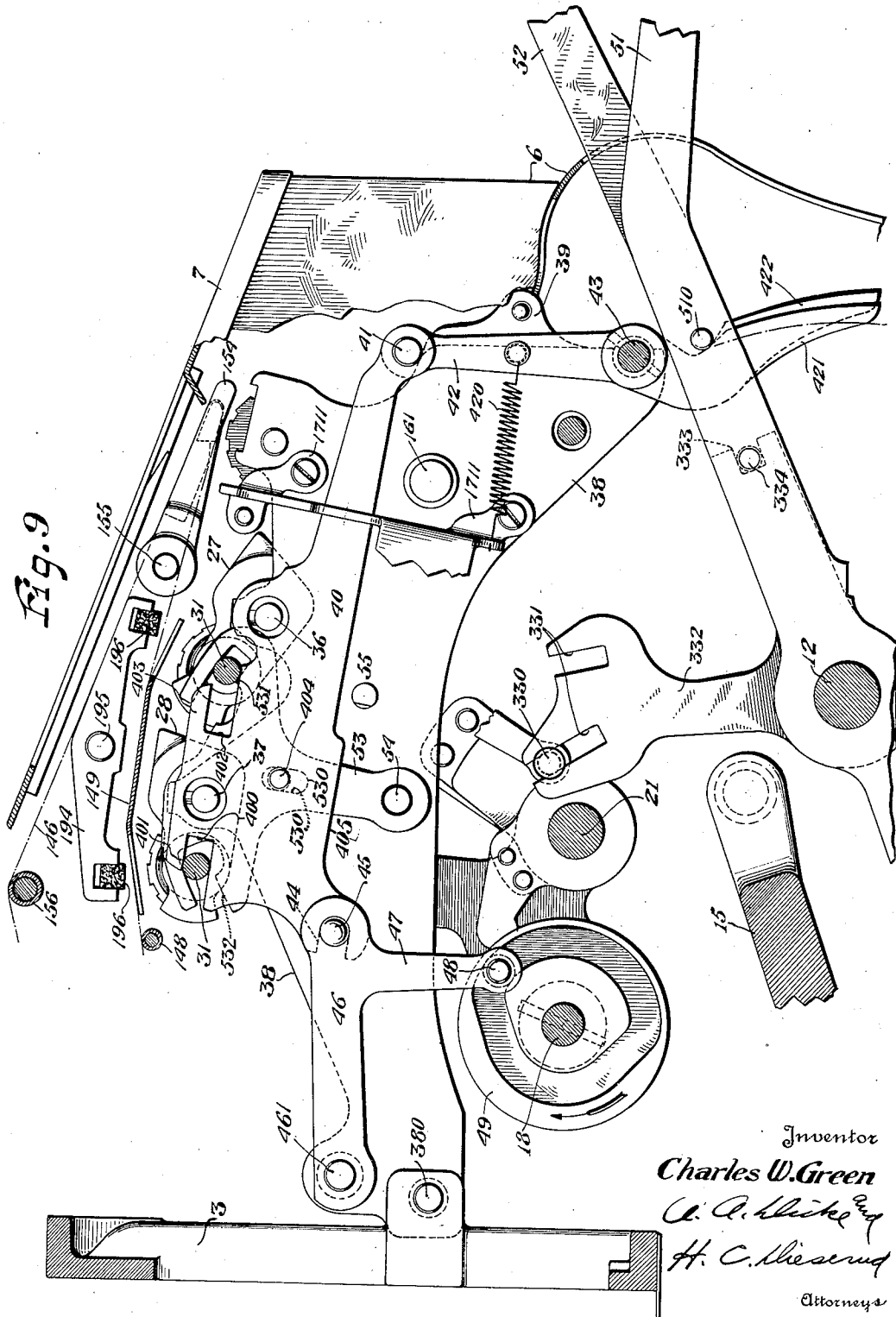
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Filed Oct. 20, 1925

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CASH REGISTER

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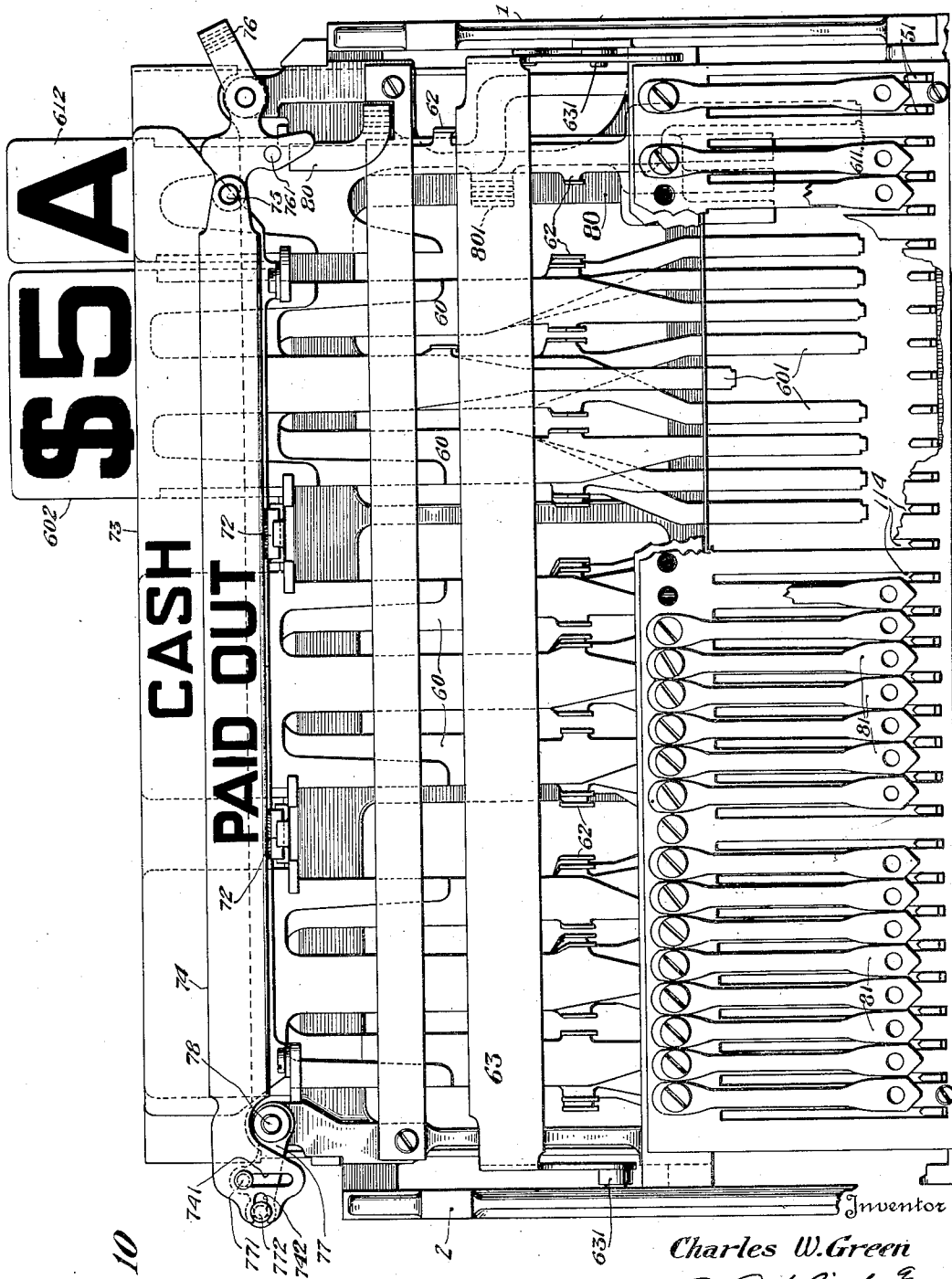


Fig. 10

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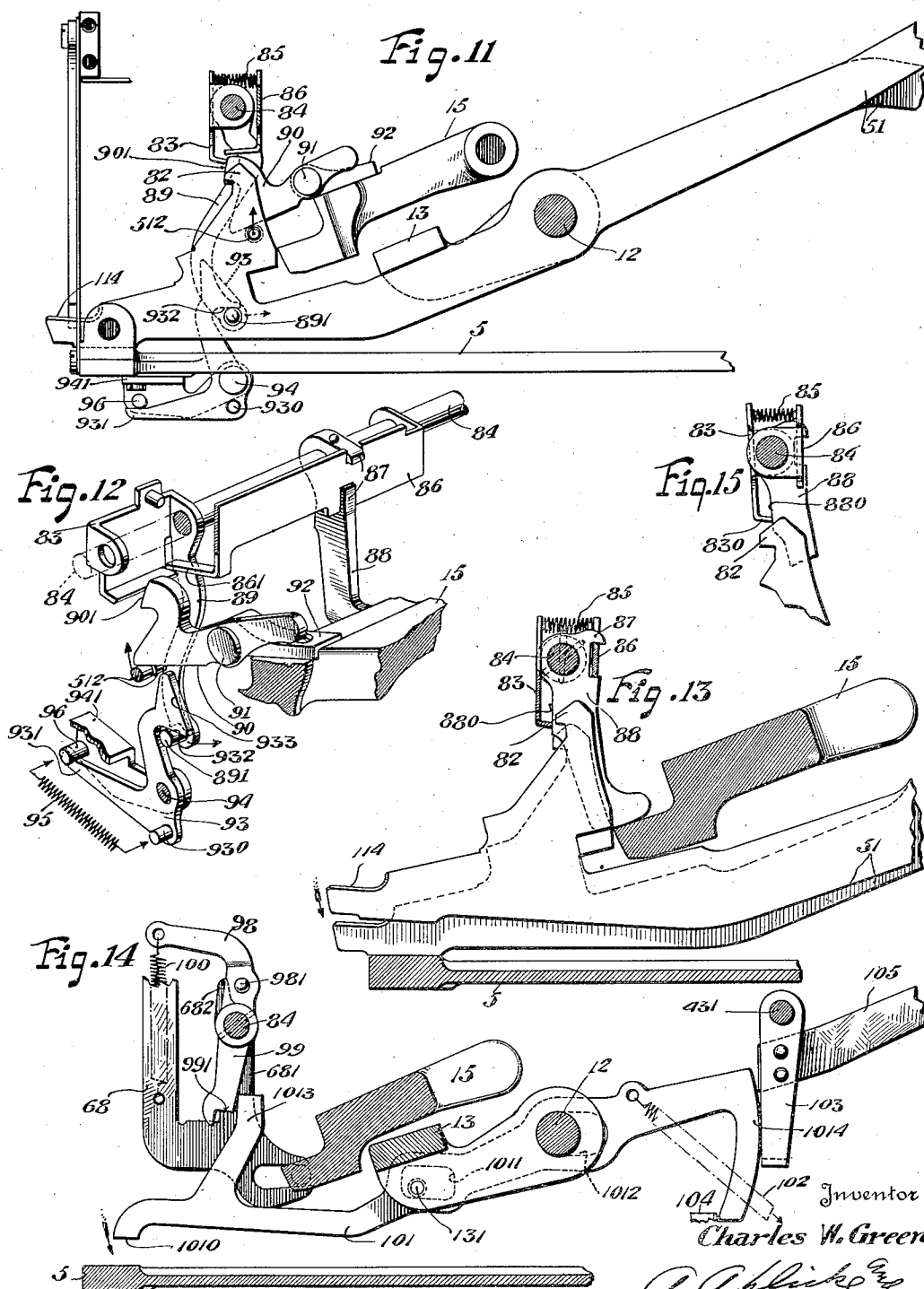
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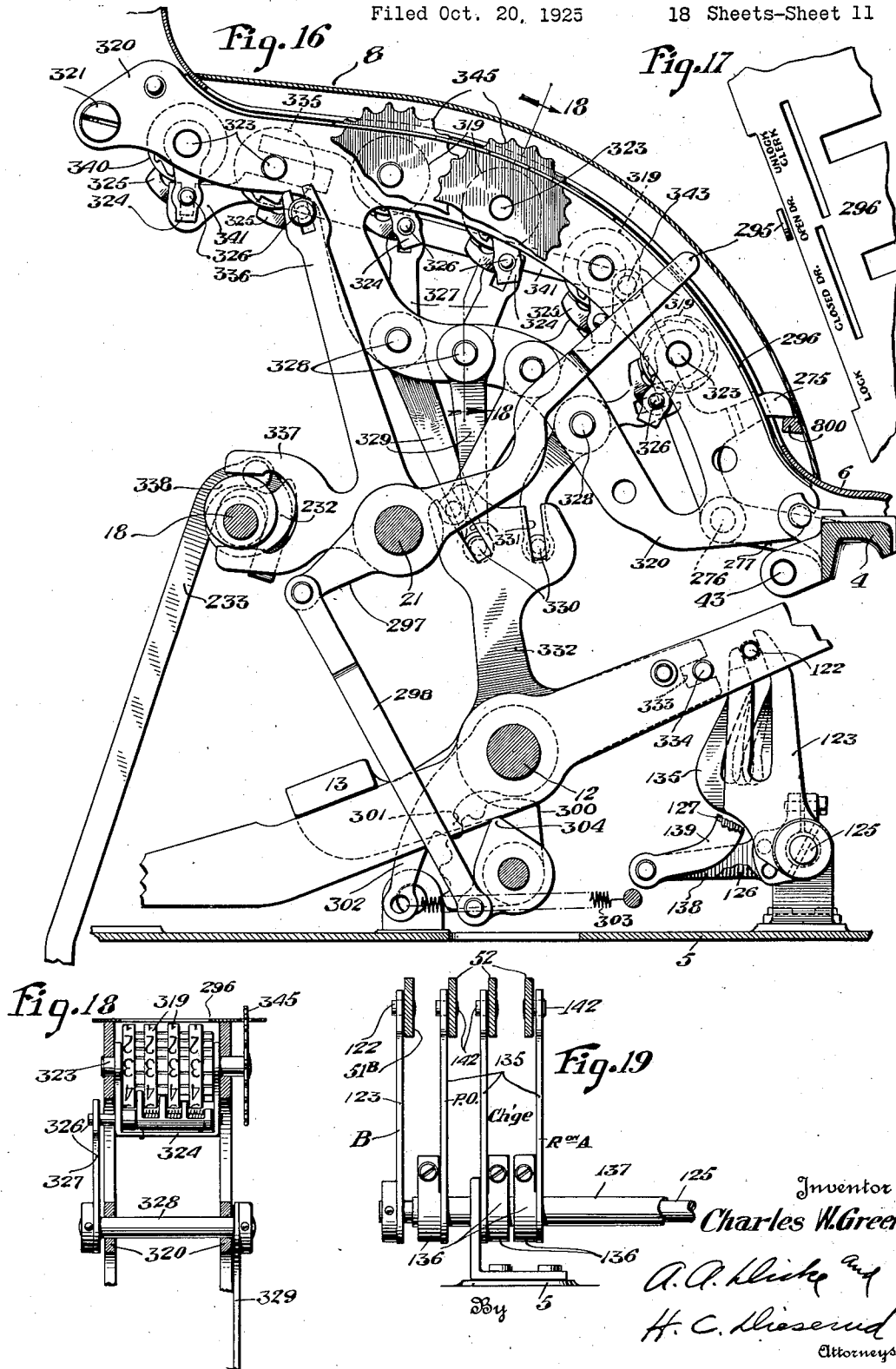
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Fig. 20

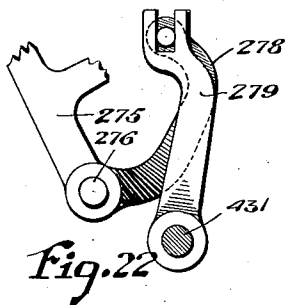
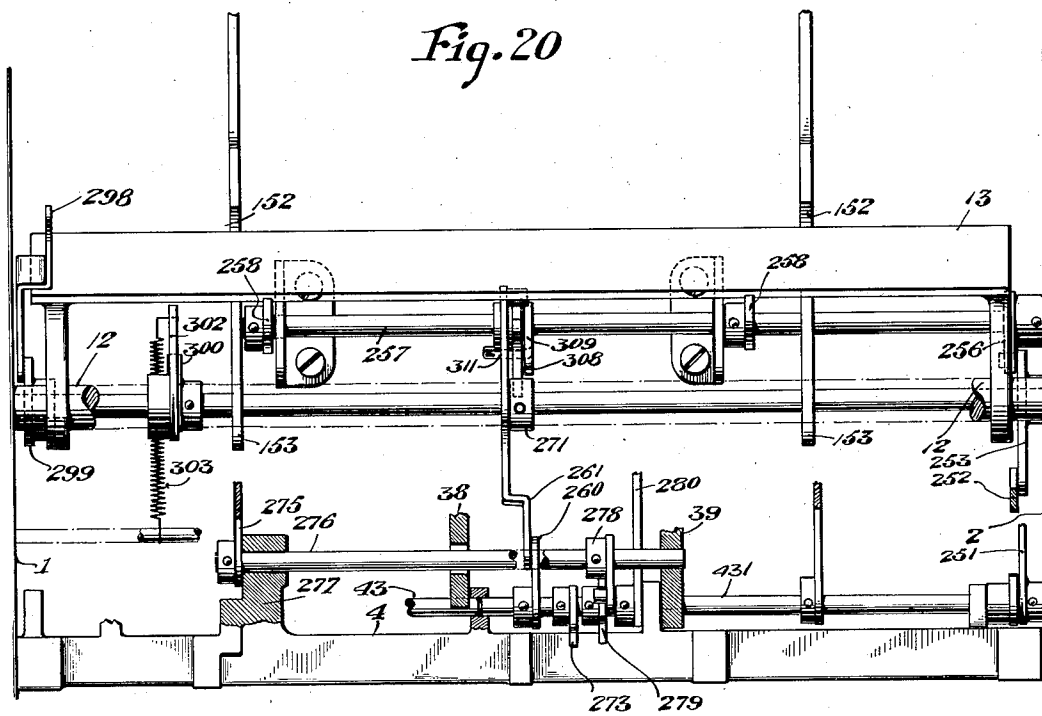


Fig. 22

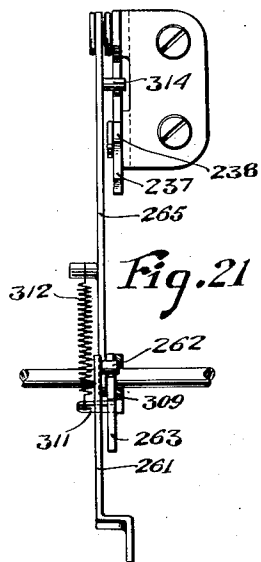


Fig. 21

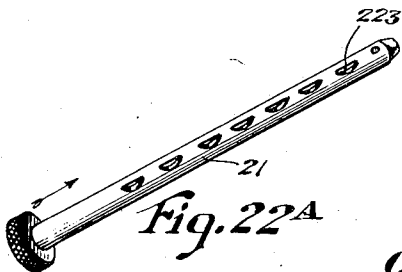


Fig. 22A

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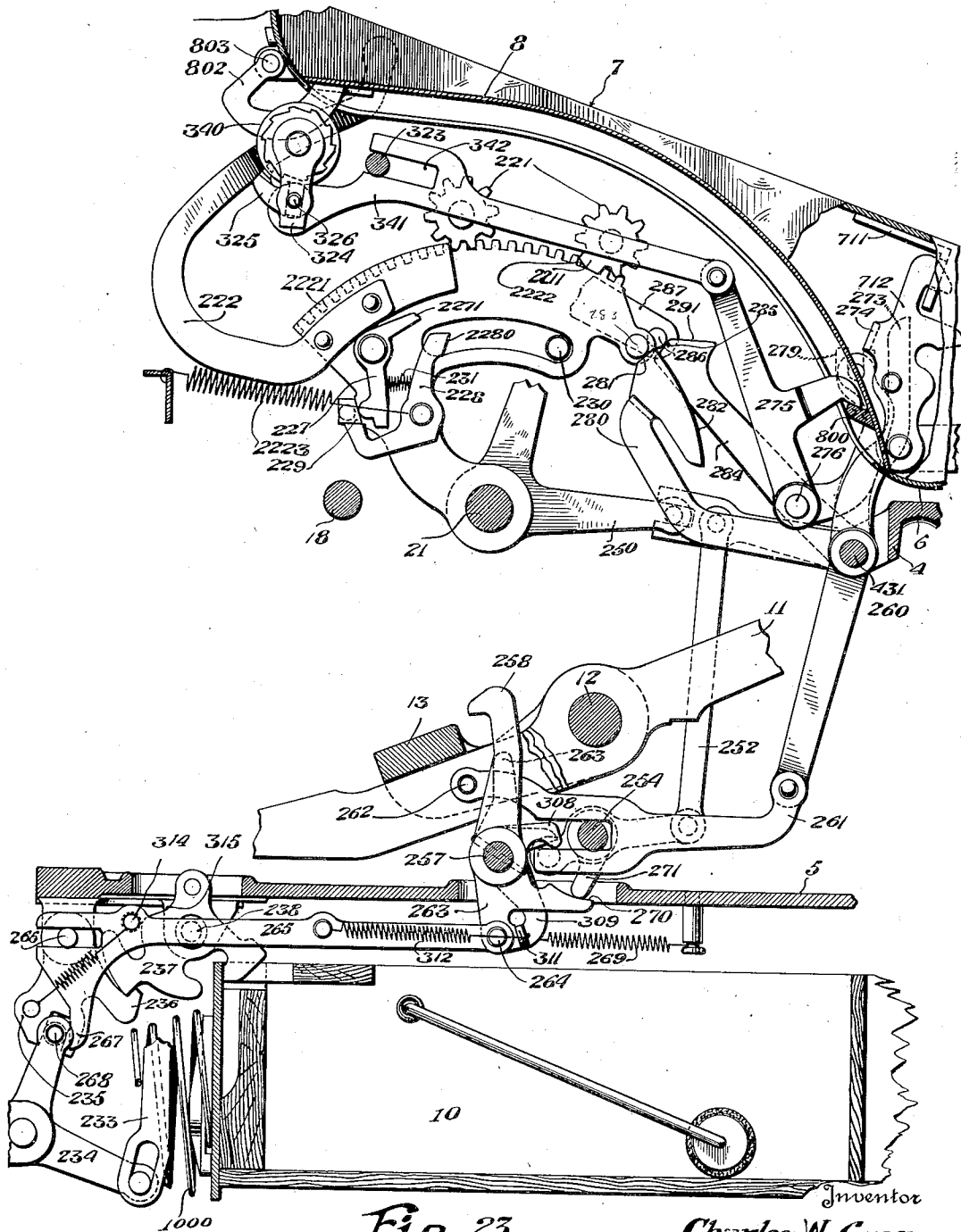


Fig. 23

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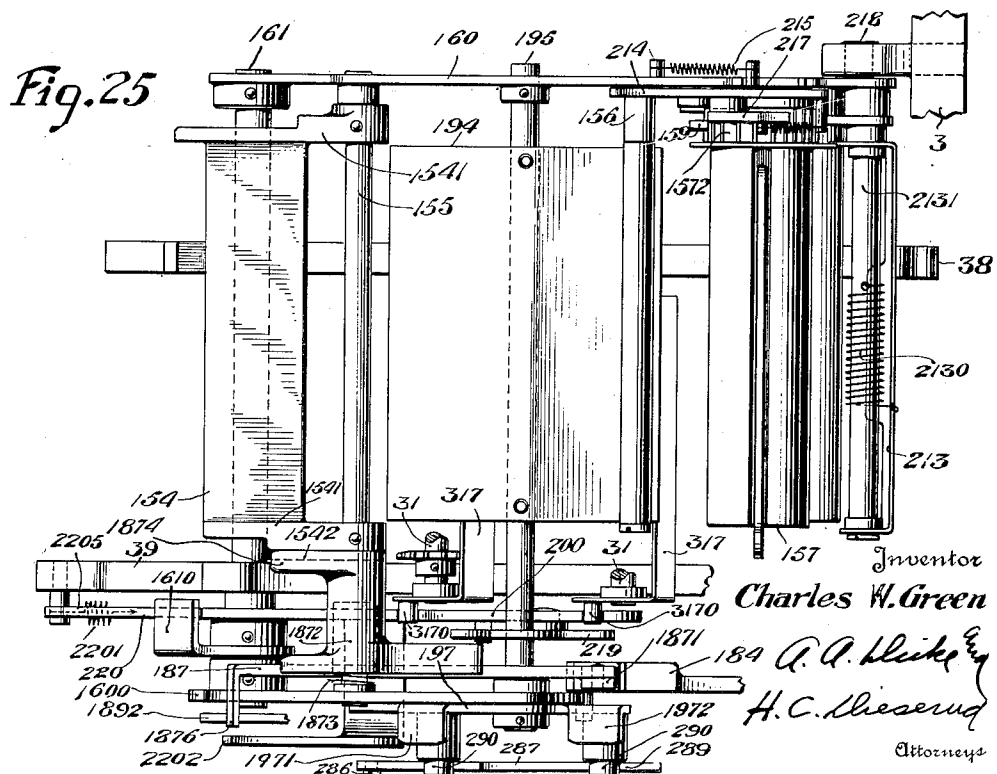
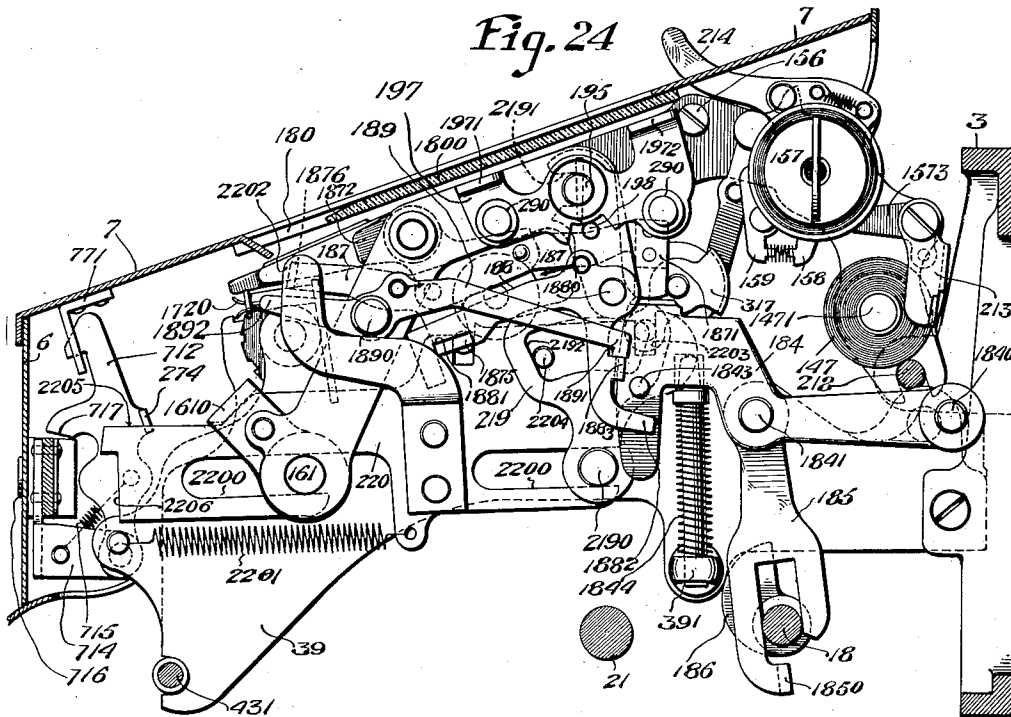
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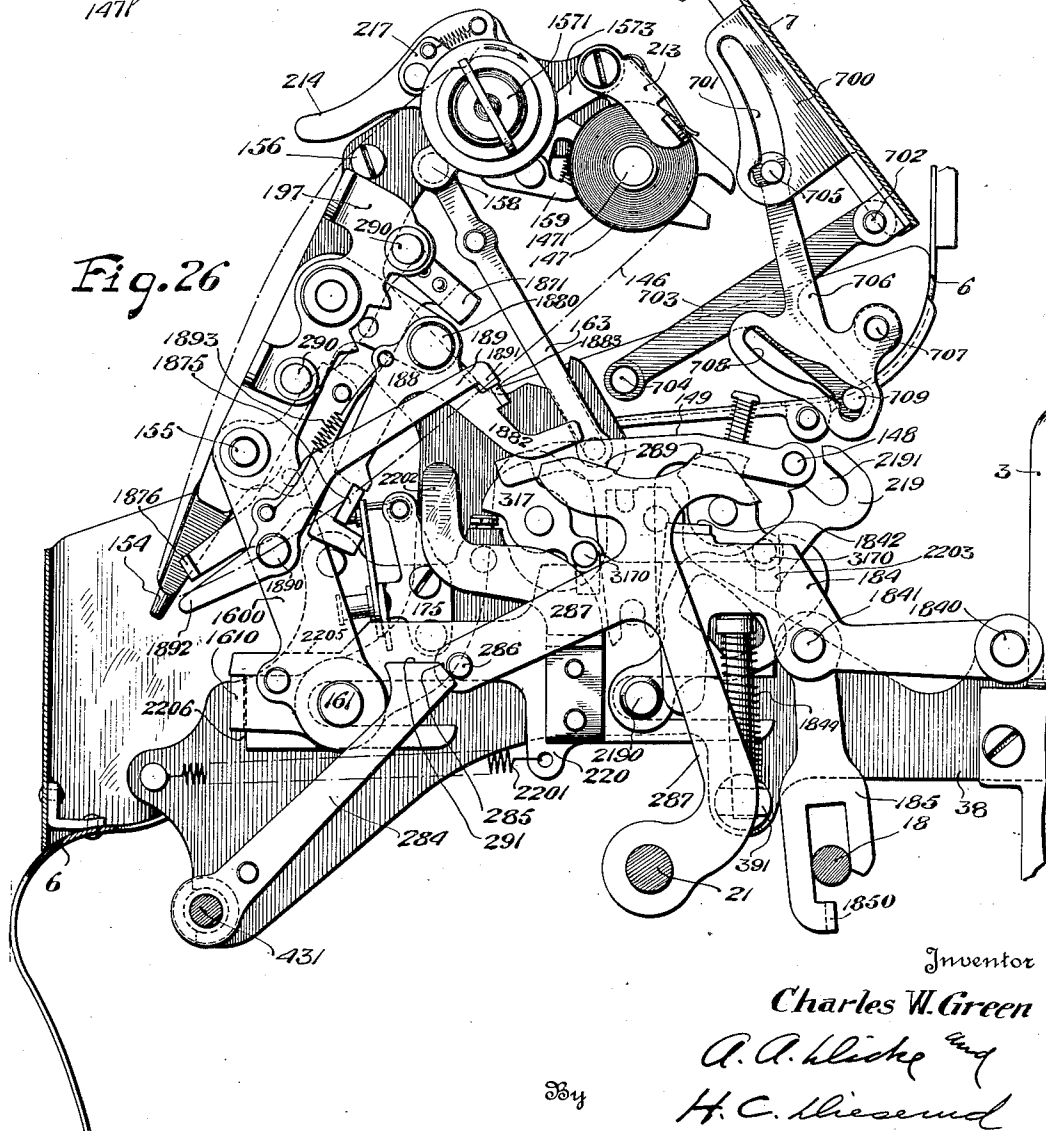
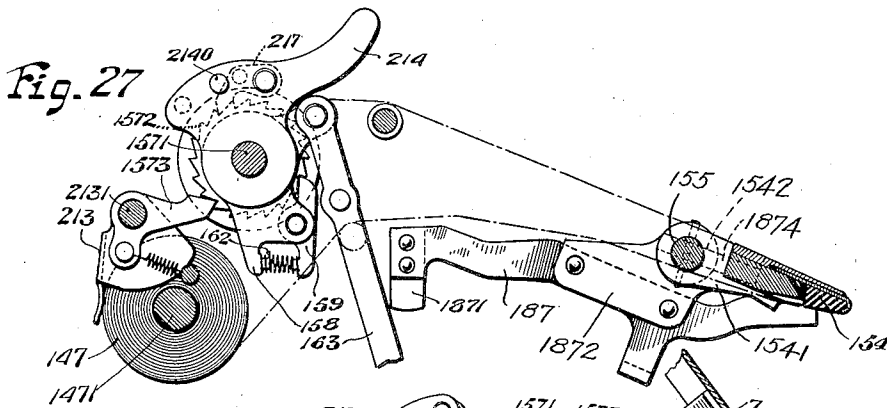
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Fig. 28

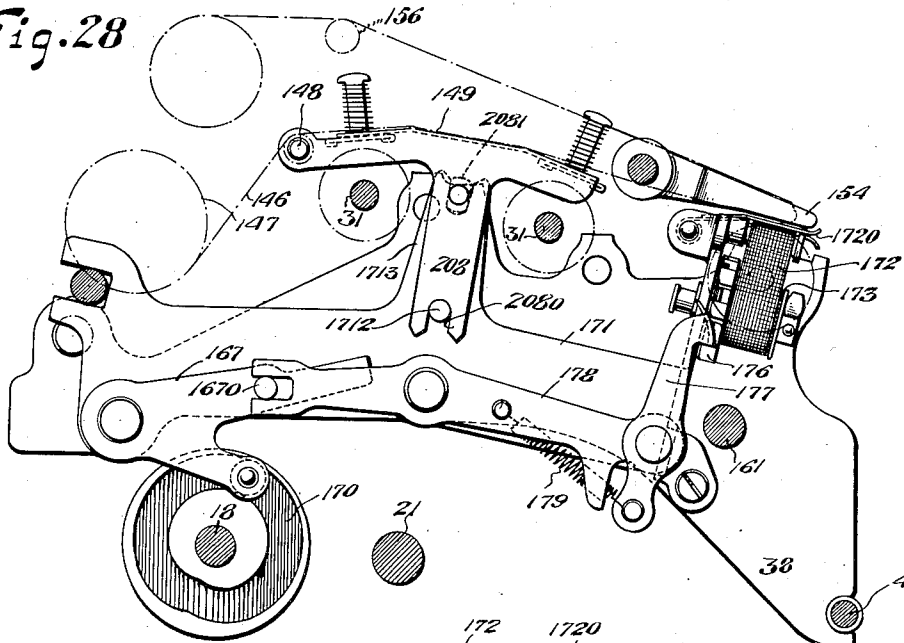


Fig. 29

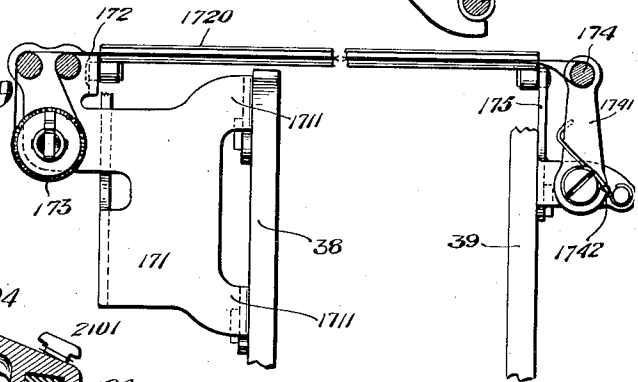


Fig. 30

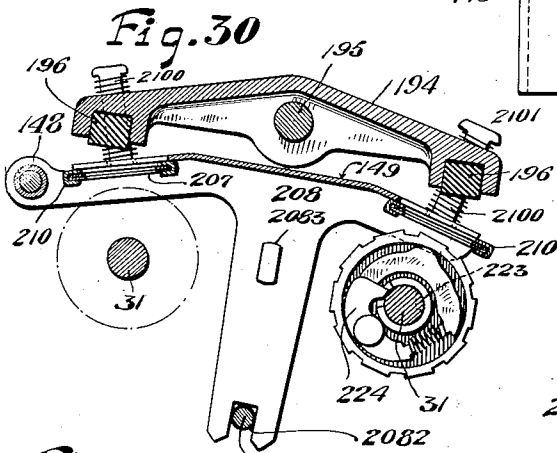


Fig. 32

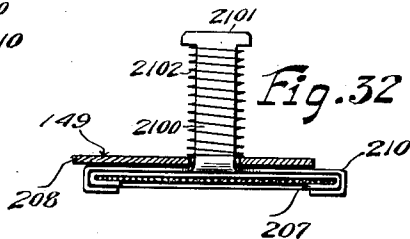
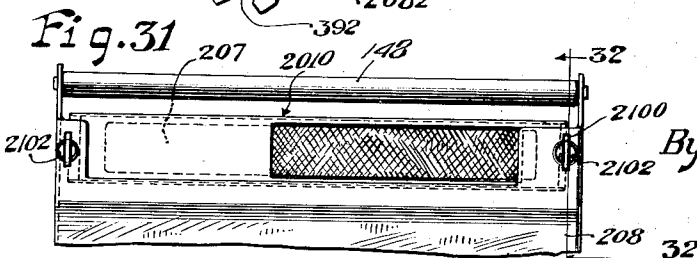


Fig. 31



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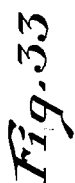
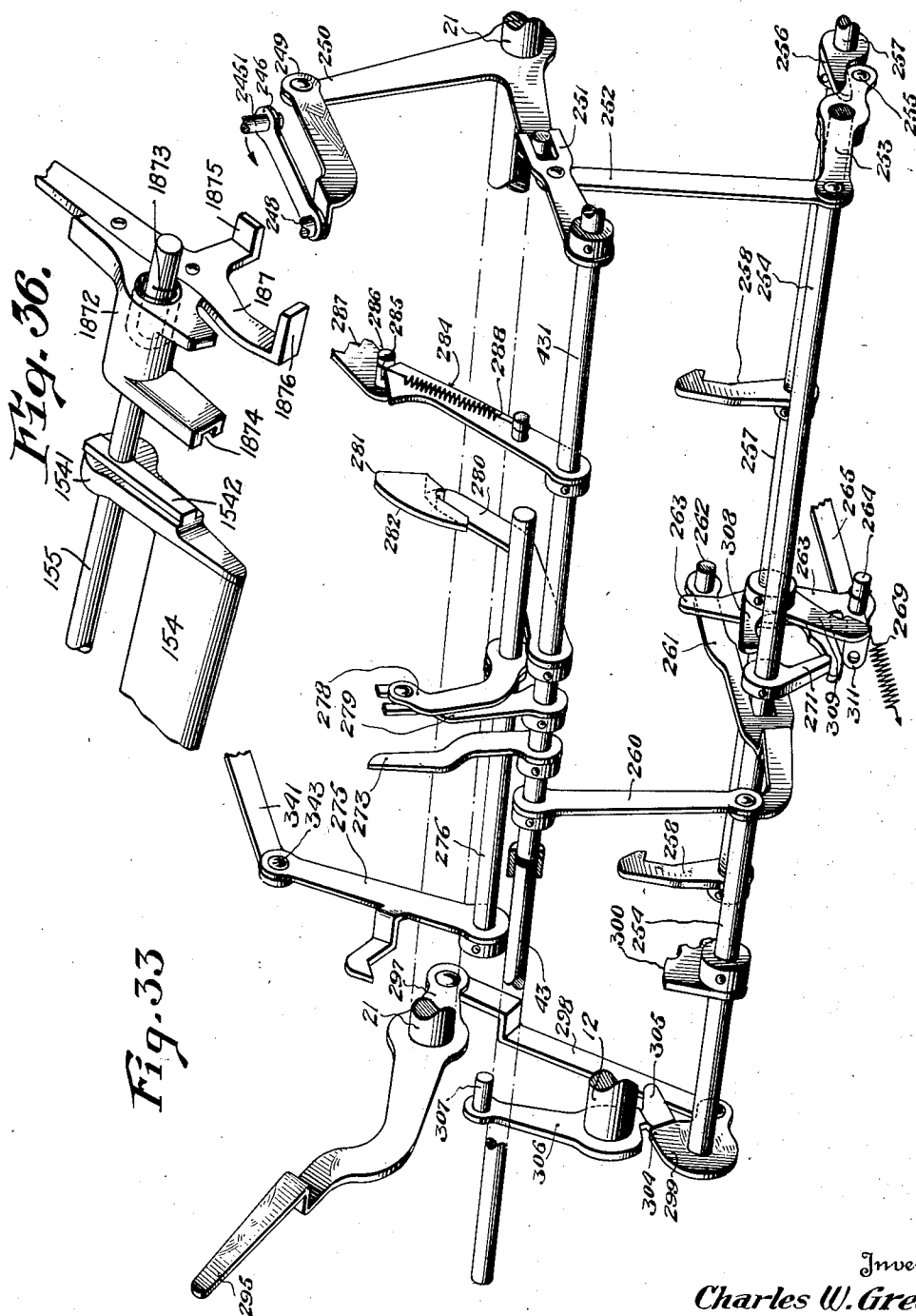
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18 Sheets-Sheet 17



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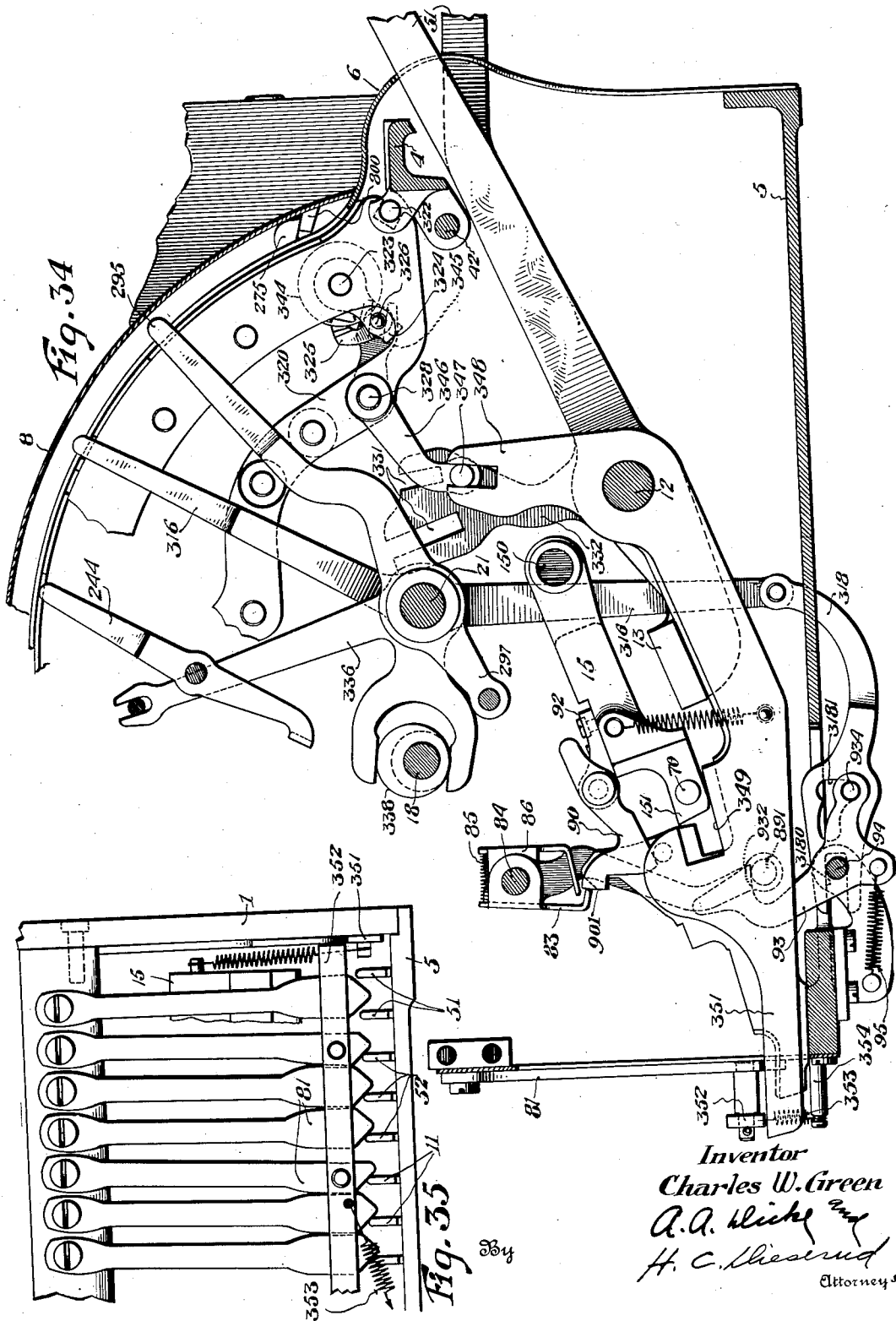
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UNITED STATES PATENT OFFICE

1,920,374

CASH REGISTER

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Application October 20, 1925. Serial No. 63,695

19 Claims. (Cl. 235—2)

It is a primary object of the present invention to provide an improved construction of a cash register or accounting machine which is adapted to register and record a series of items entered into the machine and to print the totals of such series of items accumulated during any specified period. The machine upon which the present improved constructions are shown applied, is provided with a plurality of totalizers for separately accumulating items of different classes or sub-divisions and these totalizers are provided with suitable means for restoring them independently to zero position, at the will of some person who is authorized to reset them.

In the preferred embodiment of the invention, as disclosed in the drawings, it is applied to a machine of the key operated type, in which a key coupler is directly operated by the depression of one or more of the keys and the coupler in turn, through suitable connections, rotates a main operating shaft within the machine. Differential mechanism directly operated by the keys for adjusting item printing wheels and also driving the elements of the totalizers is provided, as is usual in this type of machine. An improvement in the differential mechanism consists in the mounting of differential operating cams as separable units on the several keys, and this serves to greatly simplify the manufacture and assembly of these parts.

Among the many features included in the present invention is a novel form of key latch and key releasing mechanism, which is simple in construction and reliable in action, and has numerous advantages which will be apparent from the full disclosure which will be given.

According to the present invention, the various operating keys, in their normal positions, are maintained somewhat below the key coupler so that an initial depression of any key will not cause any movement of the coupler. It is during this initial depression of a key that it becomes latched to the key coupler without causing any movement of the latter. The obvious advantage of this construction is that it permits an easy touch for the latching of any desired keys which may be selected for operation upon a complete operation of the machine. In the normal operation of the machine, it is intended that the several keys which are to be operated for the entry of a particular item shall be latched to the key coupler successively and singly, so that the operator may control the operation of the machine by the use of but a single finger of one hand. Thus, where a series of keys are to be depressed, to represent

a particular form of transaction made by a particular clerk for a given amount, involving dollars, dimes and cents, the five keys necessary to represent the transaction may be successively depressed to their latched positions, without causing any movement of the key coupler. The fact that no movement of the key coupler is required up to this time insures a substantially uniform touch in the operation of all of the keys to be latched. In the past, wherever provision has been made in a key operated machine for a successive latching of keys to the key coupler, it has been necessary to raise the coupler by the initial operation of the first key depressed, with the result that a variable amount of touch has been required in the depression of a series of keys to represent a transaction. When the desired keys have been latched to the coupler the operation of the machine may be completed by the full depression of any one of the keys already partially depressed or by the full depression of the last key to be latched to the coupler.

Provisions have been made for the release of the keys which have been latched to the coupler during an operation, so that these keys may be properly restored to their normal positions below the coupler. This release of the keys is effected entirely automatically and remains effective at the time the key coupler is restored to its normal position, so that a weighted bail extending across all of the keys may return to normal all those keys previously latched to the coupler.

In order that any error which may have been made in the partial depression of the keys may be corrected and the keys restored, without compelling a full operation of the machine, which would result in the entry of an erroneous record, a manually operable key releasing device is provided, and in accordance with the present invention this device may co-operate with certain portions of the automatic key releasing mechanism to effect a release of latched keys and a restoration of the parts to normal by the aid of the weighted bail. In this connection, interlocking means are also provided to prevent the misuse of the error key after the operating keys have been moved beyond coupling position.

In adapting the invention for the performance of the objects stated above, the latching mechanism, in the illustrative machine herein disclosed, has been mounted on a separate vertically movable frame, which is independent of the key coupler but is connected for movement at all times by the latter. By the use of this con-

struction the keys, when partially depressed, are latched to the vertically movable frame and when the operation of the machine is continued by the full depression of one of the keys all of the latched keys are held, not only by the special latches but also by the usual lip on the key coupler which enters a notch in the rear end of each of the depressed keys. It is toward the end of the down stroke of the keys that they are released from the special latches on the vertically movable frame, due to divergence of the paths of movement of the ends of the keys and the latches and, on the return stroke of the keys, the latches are held out of active position so that it is merely by the engagement of the lip of the coupler with the notches of the keys that the latter are held in coupled position. When the coupler reaches its normal position the lip will have been fully withdrawn from the notches in the keys so that they may be fully restored by the weighted bail. It may be understood that the special latching mechanism preferably comprises a series of separately movable members, such as bails, one of which is related to each group of keys; for example, one member may be associated with the clerks' keys, another with the transaction keys, another with the dollars amount keys, another with the dimes amount keys, etc. In connection with this form of latching mechanism, the present invention includes suitable connections for preventing a full operation of the machine until a key in one of the groups has been partially depressed. In the embodiment herein disclosed these connections co-operate with the latch member or bail associated with the clerks group of keys so that a full operation of the machine is prevented until one of the clerk's keys has been partially depressed. This mechanism is so constructed, however, that no particular sequence of operation of the keys is compelled and it is immaterial whether the clerk's key is depressed prior to or after the depression of either the transaction or amount keys. This form of operation which compels the depression of a clerk's key before the machine is fully released for operation, is known as the "closed keyboard". In order that the machine may at times be operated on the "open keyboard", so that a depression of a clerk's key will not be compelled, a suitable manipulative device is provided, together with connections to the mechanism normally compelling the operation of a clerk's key. On proper adjustment of this manipulative means, therefore, the machine may be made to operate either on the "open" or "closed" keyboard.

Another important improvement which is effected by the present invention is the simplification of mechanism for controlling the engagement of one or a plurality of totalizers. Machines of the general type, on which the present invention has been disclosed, are usually provided with connections from the main operating shaft for causing the engagement with the actuators of the totalizer of a single totalizer machine or of a selected totalizer of a machine equipped with more than one totalizer. In machines of the latter type the engaging mechanism is frequently not only designed to select the totalizer which it is desired to operate for the entry of a particular item, but it is further usually provided with means under the control of certain special keys, such as the "Charge" and "Paid out" keys of a cash register, so that an item may be prevented from being entered into any of the totalizers. This function of preventing the engagement with the actuators of a totalizer which has been selected, is known as a "throwout" function. According to the present invention the totalizer engaging mechanism is adapted both to select one of a plurality of totalizers for engagement with the actuators and to cause a throwout function of the selected totalizer upon the operation of a special key.

In accomplishing this result a great simplification has been introduced by the present invention through the use of a single shiftable and pivoted slide for both selecting a totalizer and providing the throwout function. The slide is normally adapted to be rocked, upon an operation of the machine, about a pivot at one end, and when so rocked it will normally cause the engagement of one of the totalizers. Operation of a totalizer selecting element, such as a clerk's key, is designed to shift the slide by moving its pivotal point so that, during the subsequent operation of the machine, the first totalizer will not be affected but another totalizer will be rocked into engagement with the actuators. Still further movement of the slide by shifting the pivotal point still further by connections from a special manipulative means, such as a "Paid out" key, will serve to completely disengage the slide from the operating mechanism, which normally caused it to engage one or another of the totalizers. Thus, when the slide is in this position, none of a plurality of totalizers will be engaged with the actuators. In order that a totalizer which is not intended for operation will not be accidentally rocked, a special detent element is placed under control of the selecting slide and this element will prevent the movement of one or another of the totalizers. Suitable means is similarly provided to prevent the rocking of any totalizer when a "throwout" key has been operated.

In carrying out the present invention it has been found an advantageous feature to employ a single train of connections from all of the controlling keys to the single controlling slide. These connections may include a rock shaft extending across the clerks and special transaction keys, so that a cam shoe may be pinned to the shaft, adjacent any of the desired keys, in order that pins carried by such keys may rock the shaft to different extents to either select a totalizer or perform a throwout function. By applying the principle of the totalizer control mechanism, disclosed herein, the system of selection and elimination of totalizers for engagement with the actuators may be very readily varied, so that if desired, two totalizers may be engaged at one time with the actuators, and one may be eliminated without eliminating the other, or both may be eliminated simultaneously.

The machine disclosed in the present application is equipped with indicating mechanism adapted to indicate to the front and to the rear, not only the amount of a transaction but the clerk making the entry as well as the nature of the transaction being performed. It is particularly in connection with the latter indicators that a novel construction is provided. In order that the transactions may be indicated by full words rather than by the customary abbreviations, such as P. O. for "Paid out", R. Acct. for "Received on account", etc. the machine herein disclosed is provided with a series of long, narrow indicator plates extending across the full width of the machine and mounted at opposite ends on pairs of arms so that it may be moved from a lower, concealed

position to an upper exposed position by a parallel link motion. Suitable connections are provided from the arm supporting one end of each indicator plate to the corresponding special transaction key. Provision is also made for retaining an indicator in exposed position after it has been elevated, and during the beginning of a succeeding operation the previously exposed indicator is released and dropped into concealed position. For the purpose of indicating a cash transaction, which is by far the most frequent entry to be made, a fixed indicator is employed and this is adapted to be concealed by any of the other transaction indicators which may be elevated.

It has already been stated that the illustrative machine is provided with printing mechanism for printing not only the items entered in the machine, including the amount, clerk and transaction, but also the totals of the items entered during any given period of time. Since the items may be segregated into a plurality of sub-divisions in the plurality of totalizers, the separate totals represented by the totalizers may be recorded independently of each other. It is contemplated by this invention to permit the recording of the items, together with written notations, if desired, as well as the totals on the same record strip and for this purpose the record material is passed from a supply roll around suitable guide rollers to a storage roll, and in its course it passes an automatically operated platen for printing items from the item type wheels and a pair of impression blocks carried by a single manually operable platen member above the two printing totalizers. A manually operable lever is provided for rocking this platen element to take a total from one or the other of the totalizers. For the purpose of supplying ink for the recording operations, an automatically fed ink ribbon is passed over the item type wheels, while each of the totalizers is provided with a substantially stationary ribbon plate. Since totals are printed infrequently it has been found that such stationary ribbon plates are very satisfactory and may be used for a considerable time. In order that the various entries on the record strip may be properly spaced, suitable paper feeding mechanism is provided for operation by the machine and additional means is provided for manually feeding the paper, when desired, as during total taking operations. It has been an object of the invention to improve and simplify, generally, the construction of the printing mechanism.

Another important feature of the invention is the general system of controlling mechanism which is provided for pre-determining the various functions and modes of operation of which the machine is capable. It is frequently desirable, in machines of this type, to compel the closing of the cash receptacle, which is released upon each operation of the machine, before another operation may be effected. At times, however, when the clerks are particularly rushed it may be advisable to have the same machine capable of successive operations, without the necessity of closing the cash drawer between operations. The present invention includes certain improved mechanisms whereby a lever may be moved to different positions for pre-determining these two modes of operation. It has also been found convenient to adapt the same lever for control over the machine as a whole, so that when it is shifted to a third position it may effectively lock all of the keys against an item entering operation.

Again, it has been found desirable, in the past, to provide machines of this character with locks under the control of the various clerks, so that where the totalizers are adapted to segregate the entries made by each clerk, the machine may be locked against operation to register in a particular clerk's totalizer whenever that clerk is absent from the store or shop. Thus, where two totalizers are devoted, respectively, to the clerks A and B, clerk A upon leaving the store may lock his selecting or machine releasing key against operation, and thus prevent the selection of his totalizer and the recording of his initial during his absence. However, where machines are equipped with this type of lock it sometimes becomes necessary for the proprietor, or other authorized person, to effect a registration in the totalizer of the absent clerk. To provide for this contingency, the settable lever, which has been mentioned above, is adapted for movement into a fourth position, in which it serves to unlock both of the clerks keys for operation, even though they may have been locked up by one or more of the clerks before leaving the store. It will be apparent that all of the functions which have been ascribed to the lever, which is settable to four different positions, should be subject to the control merely of the proprietor or manager of a particular store, and for this reason the lever, according to the present invention, is located under a lid, which can be released only by such an authorized person, in a manner which will later be explained.

Since a cash register is primarily designed for the purpose of keeping a record of the various operations of the machine during an interval of time, it is desirable that the information thus stored should be accessible only to the proprietor or manager or other authorized person connected with the store, and such a person should be the only one capable of altering the records, such as registered totals, or other information stored in the machine. Thus, a clerk should not be permitted to reset any of the totalizers to zero position, since the amount standing on the totalizers should be available at the proper time to persons in authority and should represent all amounts entered in the machine since the last inspection by such persons in authority. To this end the present invention contemplates the use of a single lock which will control the simultaneous preparation for the performance of functions which are usually associated with an inspection of the register by the proprietor or manager. For example, in the illustrative embodiment of the invention the mere turning of the barrel of a lock, exposed at the top of the casing, is designed to release the cash drawer; to release the lid, heretofore mentioned, which conceals the lever settable to four different positions; to release a lid which normally conceals the printing mechanism of the machine so that a lever which controls the printing of totals will be accessible; to release this total printing lever for operation when made accessible; to release a resetting lever which, when operated, may be made to restore the several totalizers to their initial positions; to lock the key coupler against operation and hence prevent any item entering movement of the operating keys; and finally, to insert a unit in a special counter, which will at all times indicate the number of operations of the special lock. It has been an object of the present invention, in connection with these controlling mechanisms, to simplify their construction and to so co-ordinate the va-

rious controls as to provide a maximum protection to the proprietor against any accidental or intentional mis-operation of the machine.

Briefly summarizing the control features of the machine, it will be seen that the single lock which extends to the exterior of the casing of the machine, is made to control, by the simple turning of the barrel, all of the functions of the machine which it is desirable to perform incidental to the printing of the totals standing on the totalizers and the resetting of the latter, prior to the commencement of a new period of accumulation of items. In addition, this single lock controls the accessibility to certain other controlling elements which determine the nature of the operation of the machine, and which should be normally regulated by the same person authorized to perform the total printing and resetting operations. These elements include, not only the four-positioned settable lever, before mentioned, but, also, a member to control the operation of a bell upon release of the cash drawer, as well as the special manipulative device which determines whether the machine is to operate on the "open" or the "closed" keyboard.

For the purpose of resetting the several totalizers, selectively, the machine herein disclosed is provided with a resetting lever which is adapted to operate a rack segment which, in turn, may co-operate with a pinion on one or the other of the totalizer supporting shafts. In order to reset a particular totalizer it is necessary to manually slide its supporting shaft longitudinally to carry a pinion mounted on the shaft into the plane of the resetting segment and this same sliding action results in carrying notches, provided in the shaft, into alignment with pawls mounted on the several totalizer wheels.

The machine herein disclosed is furthermore provided with a series of special counters, arranged in a vertical bank or tier and each adapted to register the performance of a particular function of the machine. It has already been mentioned that a counter is provided to register the number of operations of the controlling lock, and this counter may be regarded as giving a fair indication of the number of resetting operations. Another counter is adapted to register the number of operations of the operating keys, while other counters are adapted to register the number of operations of certain of the special clerks and transaction keys. Obviously, counters might be added to indicate or register the performance of any other function of which it is desired to keep a definite record. It is an object of this invention to simplify the manufacture and assembly of the counters and their operating means, and to this end the latter are adapted to be operated by bell cranks mounted on pivots adjacent the counters themselves, the counters, as a group, thus being permitted to follow the contour of the casing of the machine and in conjunction with the operating levers forming a separable counter unit. To standardize the connections from the various special keys to their associated counters a standard actuating plate is adapted to be connected to each of these keys for movement therewith. The standard plate is provided with suitable slots to adapt it for connection with the arm of any desired counter operating lever, so that the several plates employed may be readily interchanged.

In connection with the special counters, it is an object of this invention to register the number of "No sale" operations of the machine, without the necessity of providing a special No sale key,

as commonly used in this type of machine. This is accomplished by permitting a No sale operation to be performed by the depression of any clerk's key without the depression of any amount or transaction key. When a clerk's key is thus operated alone a special No sale counter will be actuated by suitable connections from the key coupler. However, when an amount or transaction key has been partially depressed and latched, in addition to a clerk's key, the connections from the key coupler to the No sale counter are disabled. One obvious advantage of this construction is that it permits the inclusion of an extra amount key in place of the usual No sale key provided on cash registers, for such emergencies as the making of change.

It has been a primary object of the present invention to provide a machine adapted for the performance of all of the foregoing functions in a simple and efficient manner, with the parts so interrelated that the proper performance of the various functions is compelled to a maximum degree. In accordance with this primary object, it has been the purpose of this invention to improve the construction and mode of operation of all of the several sections of the machine, and particularly those having to do with the differential movement of the actuators, the latching and releasing as well as interlocking of the keys, the selection and control of the totalizers, the indication of the transactions entered, the printing of items and totals, the consecutive counting of the operations of the various elements of the machine, and the general system of control over the several functions and types of operation of the machine. Other objects and advantages of the present invention will appear from the detailed description which will follow. While the invention will be described hereinafter as applied to a specific form of machine, it will be clear that the various novel features are capable of broader application to other forms of accounting machines, falling within the terms of the appended claims, and the present disclosure is merely of one preferred form of embodiment of the invention. Reference will now be had to the figures of the drawings which, taken in connection with the detailed description, which will follow, constitute a full disclosure of one form of the invention.

In the drawings:

Fig. 1 is a perspective view of the machine, as a whole, disclosing its general appearance and some of the operating elements extending to the exterior of the casing. One of the lids is shown partially broken away, to disclose some of the elements normally concealed by it.

Fig. 2 is a plan view of the machine with the casing removed, a portion of the keys and side frames being broken away.

Fig. 3 is a plan view of the machine with a number of the operative portions removed, the removed parts including the indicator mechanism, the printing mechanism, the totalizers and the special counters.

Fig. 4 is a section in elevation through the machine, taken through the pennies section on line 4—4 of Fig. 2 and viewed toward the right hand end, so as to disclose a number of the features of the main operating and differential mechanisms.

Fig. 4A is a detail back view, in elevation, of one of the key latching balls.

Fig. 5 is a sectional elevation, taken through the dollars group of keys on line 5—5 of Fig. 2.

Fig. 6 is a sectional elevation of the machine,

taken just inside the left hand side frame and disclosing, particularly, the clerks' keys and their controlling locks, as well as the general control lever.

5 Fig. 7 is a detailed sectional view disclosing the relation of the actuating segments to the item type wheels as well as the plurality of totalizers.

10 Fig. 8 is a part plan view of the item printing wheels and the plurality of totalizers, together with the connections from the special keys for controlling the selection of the totalizers.

Fig. 9 is a sectional view in elevation showing particularly the mechanism for controlling the engagement of the totalizers.

Fig. 10 is a rear elevation of the machine with the casing removed and with some of the frame structure cut away, to disclose the arrangement of the indicator mechanism.

20 Figs. 11, 12, 13, 14 and 15 are detailed views of certain portions of the key latching and releasing mechanism.

Fig. 16 is a sectional elevation, taken to the left of the tier of special counters, and showing particularly the mounting and operating connections for these counters.

Fig. 17 is a detail of the casing above the counters, showing the various designations adjacent the general control lever.

30 Fig. 18 is a detail, in sectional front elevation, taken on line 18—18 of Fig. 16 of one of the special counters and its operating connections.

Fig. 19 is a detail of a portion of the connections from the clerks' and transaction keys to their printing wheels.

35 Fig. 20 is a plan view of various connections operated by the general control lock and the general control lever.

Fig. 21 is a detail plan view of a portion of the connections between the cash drawer and the control lever.

Fig. 22 is a detail, in elevation, of certain connections between the control lock and the hook for the special counter lid.

45 Fig. 22A is a detail, in perspective, of one of the totalizer wheel supporting shafts, particularly illustrating the aligning notches used in resetting to zero.

Fig. 23 is a sectional elevation of the machine and is a view toward the right, showing portions of the connections from the control lock to the various sections of the machine affected by the turning of the lock. A portion of the resetting mechanism is also shown in this view, but most of the remaining intervening mechanism has been eliminated.

Fig. 24 is a sectional elevation, as viewed toward the left and taken to the right of the printer section of the machine.

60 Fig. 25 is a plan view of the printer section of the machine and the various controlling elements.

Fig. 26 is a view in side elevation of the printer showing the liftable printer frame in elevated position and showing the hinge mechanism for the printer lid.

Fig. 27 is a detail in part section of the paper feeding mechanism.

Fig. 28 is a detail showing the ribbon feeding mechanism for the item type ribbon and the ribbon supporting plate for the total type ribbons.

Fig. 29 is a detail front view of the endless inking ribbon for the item type wheels.

Fig. 30 is a sectional detail of the ribbon frame for the total printing ribbons showing particu-

larly the relation of the latter to the total printing platen and the totalizer wheels.

Fig. 31 is a detail plan view of a portion of the ribbon supporting frame.

Fig. 32 is a detail in section taken on line 32—32 of Fig. 31, showing one of the ribbon plate carrying means.

Fig. 33 is a perspective view of the various elements directly operated by the general control lock and the general control lever.

Fig. 34 is a sectional elevation taken to the left of the special counter section showing particularly the No-sale counter operating means and the control lever for disabling the clerks' and amount keys interlock.

Fig. 35 is a detail view of a portion of the single-key pendants showing the bar controlling the operation of the No-sale counter.

Fig. 36 is a fragmentary diagrammatic perspective showing the connection of the item printing platen to its operating devices.

The general construction and operation of the various features of the invention, as embodied in the illustrative machine, have been explained rather fully in the foregoing statement of the objects of the invention. A detailed description will now be given of the essential elements of the machine embodying the broad invention defined by the appended claims.

Frame work

Suitable frame work is provided for the purpose of supporting the various operating elements of the machine. This supporting structure comprises a pair of side frames 1 and 2 (Fig. 3) which are connected toward the rear of the machine by a cross frame 3 and toward the front of the machine by a tie bar 4, and at various intermediate points by the several shafts, which will be mentioned. A base plate 5 (Fig. 4) serves to connect the side plates and support them as well as a number of other fixed and movable parts which will be mentioned hereinafter. Toward the center of the machine a pair of intermediate supporting frames 38 and 39 (Figs. 3 and 9) are provided and these serve to carry a number of the totalizing and printing elements, as will be more fully explained hereinafter. At the rear these intermediate frames are supported by a rod or shaft 380 passing through a hole in each frame and a hole in each of a pair of forwardly extending ears of the frame member 3. Toward the lower front ends of the intermediate frames they are forked to engage a pair of aligned shafts 43 and 431 supported by ears extending rearwardly from the tie-bar 4. For the purpose of concealing the operating parts of the machine and to protect them from dust as well as tampering, by unauthorized persons, a suitable casing 6 (Figs. 1 and 6) is provided. The contour of the casing is such as to properly enclose all the operating parts, with the exception of a few elements which extend to the exterior of the casing for the purpose of operating the machine, and otherwise controlling it, as will be explained. A pair of lids are provided in the casing for the purpose of rendering access to the various features which, from time to time, may require attention or some inspection. These lids will be termed the printer lid 7 (Fig. 9) and the special counter lid 8 (Fig. 16). The registering mechanism, as a whole, is mounted on a suitable drawer stand 9 (Fig. 6) which houses a cash drawer or receptacle 10.

Main operating parts

The illustrative machine is of the key operated type of cash register and is provided with the usual series of operating keys, including amount keys 11 (Figs. 2 and 3) and a number of special keys which will be later described.

The machine, as disclosed, is provided with 27 amount keys (Fig. 2) for registering amounts from 1¢ to \$9.99, but obviously the capacity of the machine and the designation of the amounts may be varied to suit the particular use to which the invention is put. The operating keys, as shown in Fig. 4, are all mounted on a shaft 12 extending across the machine between the side frames 1 and 2 and the keys are normally maintained with their forward operating ends elevated by means of a weighted bail 13 extending across the tops of all the keys in rear of their pivots, the bail having a plurality of arms extending forwardly and pivoted about the key shaft 12. Depression of the forward end of any key will serve to elevate the weighted bail 13 and carry the upper surface of the latter substantially into engagement with the under cut-out surface of a key coupler 15. At the same time, an upper surface 14 toward the rear end of the key will engage the under surface of a projecting lip 151 of the key coupler. Continued depression of the forward end of the key will then serve to elevate the key coupler 15 as well as the bail 13 and during this continued movement of the parts the lip 151 of the coupler will enter the notch 141 of the operated key. The usual connections are provided from the key coupler to a main operating shaft within the machine, these connections comprising a double rack member 16 (Fig. 4) having sets of oppositely facing rack teeth adapted to alternately engage a pinion 17 mounted on a main operating shaft 18. As is well known in the art, the oscillation of the key coupler by the depression and return of one or more of the operating keys will serve to produce a full rotation of the shaft 18. In order to insure a complete rotation of the shaft and to prevent a reverse movement of the latter a ratchet wheel 182 is secured to the shaft and is adapted to be engaged by a spring pressed detent pawl 183, which permits only clockwise rotation of the shaft (Fig. 4).

Differential mechanism

Adjacent to each of the amount keys and pivoted upon the key supporting shaft, 12 is a cam plate 19 (Figs. 4 and 5), which is provided with an operating cam slot 191, the slots of the cam plates of a series being graduated to effect an action of from 1 to 9 units, as will be explained. A suitable connection is provided between each key and its associated cam plate, which may be in the form of a pin 112 mounted in each key and adapted to co-operate with a slot or notch 192 in a forwardly extending arm of the plate. For each group of keys, such as the pennies group, the dimes group and the dollars group, there is provided a segment frame comprising a pair of forwardly extending arms 20, loosely mounted upon a shaft 21 extending between the side frames 1 and 2. Between each pair of arms 20 and supported at its ends by the latter is a rod 200, which normally rests in the open end of the graduated cam slots 191 of the series of cam plates 19 associated with the operating keys of a particular group. The arms 20 of each segment frame are also connected together by means of

a yoke 201 (Fig. 3) which, for the pennies and dollars groups, extends beyond one of the arms 20 and is provided with an overturned arm journaled upon the shaft 21 and having secured to it by some suitable means, such as rivets (Fig. 7) an actuating segment 203. It will be apparent from Fig. 3 that the pennies and dollars yokes are located to the front of and above the supporting shaft 21 and are of sufficient length to transmit the movements of their respective actuating rods 200 to the segments 203 toward the center of the machine. The yoke for the dimes group of keys, however, is located below and to the rear of shaft 21 and is merely of sufficient length to connect the associated arms 20. The actuating segment related to this group of keys is pivoted loosely about the shaft 21 and is connected to the actuating frame by means of an extension 204 (Fig. 7) at the lower end of the segment which has a hub surrounding the actuating rod 200 associated with the dimes group. Now, as the operating key of a particular group is depressed it will rock its associated cam plate 19 by means of the pin and slot connection 112-192 and this cam plate, through its cam slot 191, will engage the rod 200 and rock the segment frame related to the key depressed an amount depending upon the value of the cam slot. As the rod 200 is raised by one of the cam plates of a group, it will pass in front of the forward edge of the cam plates associated with the undepressed keys of the group. Rocking of the segment frame will, through the cross bail 201, serve to rock the actuating segment 203 in a counter-clockwise direction (Fig. 7) about the shaft 21. Upon release of the operated key after full depression, the parts described will return to their normal positions but in order to insure the full and proper return of the segment frame a cam 181, mounted on the main operating shaft 18, is adapted to cooperate with a rearwardly extending arm 202, secured to the segment frame so that the latter will be positively restored to its normal position before the completion of an operation of the machine.

As is usual in machines of the type herein disclosed, a segment lock is provided for the purpose of preventing any accidental displacement of the segment frame and this lock is adapted to be released by depression of any key in the group related to the particular segment frame involved. Referring to Fig. 5, the segment lock herein illustrated comprises a bail 206 pivoted about the key shaft 12 and normally urged by a spring 2061 into contact with the underside of the keys of a particular group, at the same time placing a hooked extension 2060 of one arm of the bail over a shoulder formed at the forward end of the segment arm 20. Depression of any key of the group will, of course, rock the bail to release the segment frame and permit the latter to be rocked by the associated cam plate 19. A segment lock of this type is provided for each group of amount keys and hence for each segment frame.

Totalizers and totalizer engaging mechanism

The machine, as herein disclosed, is provided with a plurality of totalizers (two being shown), (Figs. 7, 8 and 9), which are adapted to selectively receive and accumulate the several amounts entered into the machine. The machine is so constructed that both of the totalizers are out of engagement with the actuating segments, but one of them is adapted to be normally rocked into engagement with the seg-

ments, at the beginning of the down stroke of the keys, while at the end of the down stroke or the beginning of the return of the keys this totalizer is again disengaged from the actuating segments.

5 Whenever it is desired to add an amount in the other totalizer, a clerk's or totalizer selecting key is operated and has the effect of causing the engagement with the actuators of the second or selected totalizer and preventing the engagement
10 of the first mentioned totalizer. Provision is further made for preventing the engagement of either of the totalizers, whenever a special key of another character, such as one designating a special transaction, is depressed. The mechanism for accomplishing the above results will now be explained.

Referring particularly to Figs. 7 and 8, it will be noted that a pair of totalizer frames 27 and 28 are provided, and these will be hereinafter
20 designated as the forward and rear totalizers, respectively. The forward totalizer 27 is provided with a pair of supporting hubs 29 which are adapted to cooperate with a pair of studs 36 (Fig. 9), projecting from each of the pair of
25 intermediate supporting frames 38 and 39, before mentioned. Similar to the forward totalizer, the rear totalizer 28 is provided with a pair of supporting hubs 30, which are adapted to cooperate with studs 37, extending from the
30 intermediate supporting frames 38 and 39. Each of the totalizer frames is provided with a totalizer wheel supporting shaft 31 on which is mounted a plurality of printing totalizer wheels 32. Adjacent each of the printing wheels of the totalizer, and secured to the latter, is mounted a
35 pinion 35, which is adapted, at times, to cooperate with an associated driving segment 203 for the purpose of rotating the totalizer wheels to enter an item. In order to prevent the possibility of an overthrow movement being imparted
40 to the pinions 35 and their related totalizer printing wheels by a sudden driving action of the segments 203, each pinion is provided with a spring urged frictional detent 56 (Fig. 7), pivoted about a related shaft 50, one of which is
45 aligned with each of the totalizer supporting studs 36 and 37. Also mounted on the shafts 50 are a series of transfer actuating pawls 57, which are for the purpose of carrying a unit into each
50 higher order wheel as its adjacent lower order wheel passes from 9 to 0. The construction and operation of the transfer or carrying mechanism are substantially the same as disclosed in applicant's co-pending application S. N. 607,609, filed
55 December 18, 1922, and, therefore, this mechanism need not be described here in detail. It is sufficient here to state that the pawls 57 are pivotally and slidably mounted upon the shafts 50 and are adapted to be adjusted by the totalizer
60 wheels as they pass from 9 to 0. During the operation of the machine a series of arms 58, normally held rearwardly by springs 580, may be rocked in succession by the cams 59, secured to the main shaft 18 in cooperation with the studs
65 581 mounted in the several arms. Rocking of the arms will cause their pins 582 to operate the various transfer actuating pawls and those which have been shifted or adjusted by the passage of related wheels from 9 to 0 will cause a unit to
70 be inserted in the next higher totalizer wheels.

For the purpose of rocking the totalizers about their supporting studs 36 and 37, in order to carry the pinions 35 into mesh with the actuating segments 203, a rockable and slidable plate 40, is provided (Figs. 8 & 9). This plate is pivoted at 41

to the upper end of an arm 42 secured to the shaft 43. The rearward end of the plate is provided with a forked projection 44, adapted to cooperate with a pin 45 carried by a rock lever 46, pivoted at 461 to the intermediate frame 38. A downwardly
80 projecting extension 47 of the rock lever carries a suitable pin or roller 48 adapted to cooperate with the raceway of a box cam 49, secured to the main operating shaft 18. This cam is so formed that
85 during the early part of the operation of the machine the rock arm will be lowered, while toward the beginning of the return stroke of the keys and the coupler the arm will be elevated to its normal position again. It will be obvious that rocking of
90 the arm 46 will impart a rocking movement to the plate 40, first, in a downward or counter-clockwise direction and then upwardly in a clockwise direction. The upper rear corner of the plate 40 is provided with a square notch 400 which provides
95 a rearwardly extending finger 401, which is adapted to engage the upper surface of the rear totalizer wheel supporting shaft 31. Similarly, toward the forward upper edge of the plate, a square
100 notch 402 is provided and forms a finger 403 adapted to be brought over the upper surface of the forward totalizer wheel supporting shaft 31. Suitable apertures are provided in the plate adjacent the totalizer frame supporting studs 36 and 37, as an aid to the mounting of the totalizers in
105 the machine, the plate, however, being in a plane to the left of these studs (Fig. 8). It will be noted that when the plate is in the position shown in Fig. 9 and the machine is operated to cause the arm 46 and the plate 40 to be rocked downwardly,
110 the finger 401 will engage the rear totalizer wheel supporting shaft and rock the pinions 35, carried by the latter, into engagement with the teeth of the actuating segments 203. However, if the plate 40 is shifted, in a manner to be described, slightly to the right of the position shown in Fig.
115 9, the finger 401 will be carried clear of the rear totalizer supporting shaft 31, while the forward finger 403 will be carried over the forward totalizer supporting shaft, so that upon a subsequent
120 downward rocking of the plate 40 about its pivot 41, the forward totalizer pinions 35 will be meshed with the actuating segments while the rear totalizer pinions will not be shifted. Movement of the plate 40, to bring about the reversal of action
125 of the fingers 401 and 403, is produced by shifting of the pivot 41 through rocking of the shaft 43 and the arm 42 against the action of the spring 420 which normally maintains the parts in the position shown in Fig. 9. Rocking of the shaft
130 43 is brought about by the operation of a clerk's or totalizer selecting key 51, which in the drawings (Fig. 2) is designated "B" and which carries a pin 510 (Fig. 9) adapted to engage a cam surface on the cam shoe 421 secured to the shaft 43.
135 It will be noted that the cam shoe is so shaped that the initial depression of the "B" key 51 will serve to rock the shaft 43, and hence move the plate 40, to cause the selection of the forward totalizer and the disablement of the rear totalizer.

It has been mentioned that, when desired, the totalizer engaging mechanism may be completely disabled, so that neither totalizer will be carried into engagement with the actuating segments. This result is brought about by the use of certain
140 of the special transaction keys 52, which are designated in Fig. 2 as "Charge" and "Paid out". Each of these keys is provided with a pin 520 (Fig. 8) which is adapted to cooperate with a cam shoe 422, also secured to the shaft 43. It will be noted from Fig. 9 that the cam formation of the
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shoe 422 is steeper than that of the shoe 421, so that operation of one of the special transaction keys will cause a further movement of the shaft 43 and arm 42 than was caused by the clerk's or totalizer selecting key. This movement of the arm 42, under the influence of a key 52, which is prior to any rotation of the shaft 18, will shift the plate 40 forwardly until its forked end 44 is disengaged from the pin 45. It will be obvious, therefore, that subsequent rocking of the arm 46 will have no effect upon the plate and will not cause the engagement of the forward totalizer even though the finger 403 will extend over its totalizer wheel supporting shaft 31.

Suitable mechanism is provided and associated with the plate 40 for preventing the rocking of one or the other, or both, of the totalizers, when they are not intended to be engaged with the actuating segments. The means, illustrated, for accomplishing this purpose, as best shown in Fig. 9, comprises a detent plate 53 pivoted at 54 to the intermediate supporting frame 38. A suitable connection is provided between the plate 40 and the detent plate 53 which, as shown, takes the form of a pin 404 extending from the plate 40 into co-operation with a slot 530 in the detent plate 53. In the normal position of the parts a detaining surface 531 of the detent plate is in engagement with the under surface of the forward totalizer wheel supporting shaft 31, and thereby effectively prevents the rocking of the forward totalizer frame during a normal operation of the machine. However, when the plate 40 is shifted forwardly, under the influence of a clerk's or totalizer selecting key 51, the surface 531 will be carried away from the forward shaft 31 while, at the same time, a surface 532 of the plate 53 will be carried under the rear totalizer wheel supporting shaft 31. Consequently, upon an operation of the machine in which the "B" clerk's key 51 has been depressed, the rear totalizer will be positively locked against rocking into engagement with the actuating segments, while rocking of the forward totalizer frame will be permitted. When the plate 40 is given the additional forward movement, under the influence of a special transaction key 52, a surface 405 of the plate 40 will be carried over a stud 55 extending from the side of the intermediate supporting frame 38. During an operation of the machine, therefore, in which a key 52 has been operated, the pin and slot connection 44-45 will not only be disabled, but rocking of the plate 40 will be positively prevented by the engagement of surface 405 with the pin 55 and the lower edges of the square notches 400 and 402 with the under surfaces of the pair of shafts 31.

It will be obvious that by varying the normal relationship between the pair of shafts 31 and the engaging fingers 401 and 403 of the plate 40, as well as the detaining surfaces 531 and 532 of the detent plate 53, the foregoing totalizer engaging mechanism may be readily modified to adapt it for use in a variety of systems of accounting.

Indicators

In the machine herein disclosed, means are provided for indicating to both the front and the rear in large letters and figures the amount of a given transaction, the clerk entering the transaction into the machine and the nature of the transaction. The amount indicators comprise a series of targets or tablets 60 (Figs. 2, 5 and 10), each having a stem 601 which is suitably bent and directed to normally stand above one of the

amount keys so that upon depression of the latter a surface 113 at the rear end of the key will engage its associated stem 601 and elevate the latter until an indicating head 602, connected with the target, is in exposed position. As clearly illustrated in Figs. 2 and 10, the indicator heads are arranged in aligned groups from front to rear of the machine so that, for example, all of the dollars indicators are one directly behind the other. The main members of the indicator targets of each group are divided into three separate groups, with three members aligned in each, while the stems extending from these members are further separated to form a file of nine stems, directly above the related key levers. The indicators associated with the clerks' keys are substantially the same as those associated with any group of amount keys. Thus, a plurality of targets 61 carrying aligned indicating heads 612, with designations to indicate the particular clerk's key which has been operated, are provided with stems 611 extending over the appropriate ones of the clerk's operating key levers.

For the purpose of maintaining the raised indicator tablets in exposed position, between operations of the machine, each indicator is provided with a rearwardly extending projection 62 which is adapted to cooperate with a bail 63 pivoted by a pair of downwardly extending arms on studs 631 mounted on the side frames 1 and 2, (Figs. 3, 5 and 6). An indicator of each group, to represent amounts and clerks, may be elevated simultaneously, and as the rearward extension 62 of each such indicator passes the bail 63 the latter will be rocked slightly rearward (Fig. 6) until the extensions clear the bail, at which time the latter will snap under the extensions and maintain the indicators in exposed position. During the next operation of the machine, however, a pitman 64, which is connected to one of the arms of the bail 63, will serve to rock the latter rearwardly by the co-operation of a pin or roller 65 on the pitman with a box cam 66 mounted on the shaft 18. Through the connections mentioned, any indicators which were exposed by the preceding operation of the machine will be released during the first part of the downward movement of the keys, so that a new set of indicators may be selected and held.

In order that the amount and clerks' indicators which are being elevated, during an operation of the machine, may not be visible to a customer or the clerk operating the machine until the entry of a transaction has been fully completed, a concealing flash has been provided and is connected for movement by the key coupler. The flash, which is designated 71 in Figs. 2, 5 and 6, is in the nature of a rectangular box surrounding all of the amount and clerks' indicators and is attached by some suitable means, such as screws, to a pair of upright supporting slides 68. The latter are each provided with a forked extension 69, adapted to engage a pin 70 carried by the extreme ends of the key coupler. Through the pin and slot connection, as the key coupler rises the pair of upright 68 and hence the flash 71 will be raised simultaneously with the selected indicators, and it is not until the key coupler is restored to its normal position of rest that the selected indicators will be fully exposed to the customer.

The present invention contemplates the use of a plurality of elongated indicator plates, bearing designations in full words of the various transactions capable of being entered into the machine. Since, by far, the greater number of trans-

actions performed on any machine are usually cash transactions, it has been found desirable to employ a pair of fixed indicators 73 (Figs. 5 and 10), extending across the machine and each provided with the word "Cash". These fixed indicators are in normally exposed position, where one will indicate to the front of the machine and the other to the rear that the last transaction was a "Cash" sale. Whenever a transaction of a different character is being registered a pair of separate indicator plates are elevated, by mechanism which will now be explained, so that the new plates will conceal the fixed normally visible cash indicators.

In the machine illustrated in the drawings three pairs of special transaction indicators 74 are provided, so that one pair may indicate a "Charge" transaction, another pair a "Paid out" transaction and still another pair a "Received on account" transaction, one indicator of each pair being visible from the front of the machine and the other from the rear of the machine. In order that the raising of each of the elongated indicators, having the full word designations, may be readily accomplished from one end of the machine (being that end at which the special transaction keys are located) each indicator is mounted on a pair of pivoted arms, so that the plate may be raised from concealed to exposed position by a parallel link motion. The arms for supporting the special indicator plates at the right hand end of the machine (Fig. 10) are formed into bails 76, each of which serves to connect the pair of arms to which are attached the associated front and back indicators representing a particular transaction. One arm of each bail member 76 is provided with a pin 761, which is in the path of movement of a vertically movable operating slide 80. The latter has a stem which is adapted to be engaged by a surface at the rear of a related transaction key in a manner similar to the stems of the amount and clerks' indicators, although the stem of this slide is somewhat shorter, as shown in Fig. 10, and the movement imparted to the transaction indicators is consequently less than that imparted to the amount and clerks' indicators. The slides 80 are, furthermore, provided with rearward projections 801, which are adapted to co-operate with the bail 63 to maintain the associated transaction indicators in exposed position between operations of the machine, similar to the amount and clerks' indicators. The opposite or left hand ends of the indicator plates (Fig. 10) are connected with arms 77 pivoted on a rod 78 and in order to permit the desired parallel movement of the indicators the connection between each and its arm 77 comprises a vertical slot 741 and a horizontal slot 742 in the indicator plate co-operating with studs 771 and 772, respectively carried by the arm. From Fig. 10, it will be clear that if the "Paid out" key is depressed, during an operation of the machine, its associated indicator operating slide 80 will be elevated and will engage the pin 761 to rock the bail 76 to which is secured, by means of a pair of pins 75, the pair of indicator plates bearing the full word designation "Paid out". Through the double pin and slot connections with the arms 77 at the left hand end of these indicator plates the latter will be elevated by a parallel movement, to expose their designations and to conceal the cash indicators. Co-operation of the projection 801 of the slide 80 with the bail 63 will serve to maintain the pair of "Paid out" indicators in exposed position until the subsequent operation of

the machine, when they will be dropped to either expose the fixed cash indicators or be replaced by another pair of transaction indicators.

For the purpose of arresting the indicators when they are dropped a plurality of blocks 72 are provided and these may be of metal or, in order to prevent any undue metallic noises in the dropping of the long transaction indicators, during an operation of the machine, they may be in the form of felt pads, extending from front to rear of the indicator supporting frame. Furthermore, for the purpose of further reducing the metallic noises, each of the indicators may, if desired, be provided with a strip of felt mounted in the channel on the reverse side of the channel-form indicating plate, as shown in Fig. 5.

Keys, latching mechanism and interlocks

As, has already been explained, the machine herein disclosed is provided with keys of several classes, including a plurality of groups of amount keys 11, a plurality of clerk's or totalizer selecting keys 51, and a plurality of special transaction keys 52. All of these keys are maintained in their normal positions by the use of the special weighted bail 13, hereinbefore mentioned. It has already been explained that, in the operation of the machine, the selected keys may be partly depressed without affecting the key coupler, due to the fact that the latter is arrested at some distance above the normal position of the keys by a pair of fixed shoulders 152 which are formed on a pair of plates 153 (Figs. 5 and 20) located intermediate the side frames 1 and 2 and each having an aperture through which the key shaft 12 is passed and a notch which engages a rod 254. A foot formed at the forward end of each plate rests on the base plate 5 while a rearwardly extending tail of each plate is provided with a shoulder to engage the raised ridge at the rear of the base plate. The upper edges of the plates follow the contour of the keys under the bail 13 while the lower edges of the plates follow quite closely the contour of the lower edges of the keys.

Provision has been made for the successive partial depression and latching of desired ones of the keys of each group, so that full depression of any one of the keys may subsequently result in the complete operation of all of the partially operated keys. The mechanism for accomplishing this result is, furthermore, so designed that the operation of a clerk's key may be compelled before a full operation of the machine may be effected. The construction is such, however, that no pre-determined sequence of operation of the keys is enforced. In order that the several keys may be partially depressed, as explained, and then carried by the key coupler for a full operation, and also to prevent the depression of additional keys after the coupler has been shifted, it has been found desirable to provide the rear ends of each of the key levers with a compound surface adapted to co-operate with the lip of the key coupler, the surface being composed of two arcs generated about two distinct centers. Taking the amount keys, for example, as shown in Fig. 4, a surface 110, which is in an arc about the key shaft 12 as a center, is provided to permit the first partial depression of selected keys, whereas the longer surface 111 which constitutes an arc about the center or pivotal point 150 of the key coupler, is such that as the coupler swings during an operation of the machine, it will not interfere with undepressed keys but will serve to prevent the de-

pression of any additional keys after the coupler has commenced its movement.

It will be apparent that if a key were partially depressed and released it would be immediately restored to normal by the bail 13, if suitable means were not provided for holding it in partially depressed position. The latching means, for preventing this return (Figs. 4 and 11 to 15) comprises a hooked extension 82 toward the rear end of each of the keys, which is adapted to co-operate with one of a series of bail members 83 pivoted about a shaft 84 mounted in upwardly extending arms 681 of the previously mentioned upright members 68 associated with the indicator flash mechanism. The number of bails 83 which are required depends upon the number of groups of keys, there being one bail for each group of amount keys, such as the dollars, dimes and cents groups, one bail for the clerk's keys and one bail for the special transaction keys. All of the bails 83 are normally urged in a counter-clockwise direction (Figs. 11 and 13), by means of springs 85 extending between projections on the bails and projections on a pair of separate retaining bails 86 secured to the shaft 84.

As is best shown in Fig. 4, whenever an amount key is depressed sufficiently to carry the rear upper surface 14 into engagement with the lower surface of the key coupler lip 151, the hook 82 will first rock the bail 83, associated therewith, rearwardly until the shoulder of the hook is carried above the lower flange of the associated bail 83, at which time the bail is returned by the spring 85 to engage its flange under the hook, so that return to the key to its normal position will be prevented. Operation of a special transaction key will result in substantially the same latching action.

In order that depression of a clerk's key may be enforced, prior to any movement of the key coupler, the bail associated with the clerks' keys is of a slightly different form and differs slightly in its action. Attached to one end of the clerk's key bail 83 is a downwardly extending arm 89 (Fig. 12) carrying a pin 891, which is adapted to co-operate with a hook member 93 which is pivoted at 94 to a frame plate 941 secured to the under side of the base plate 5 (Figs. 11 and 12). A spring 95, attached to the hook member by a pin 930 and to the frame plate 941 by a pin 96 tends to rock the hook member until a rearwardly extending tail 931 engages the pin 96. When the machine is at rest a pivoted detent pawl 90, which is carried by the key coupler through a pivot pin 91 mounted on a plate 92, secured to the coupler, serves to hold the clerk's key latching bail rearwardly by the engagement of the surface 901 of the detent pawl with the lower overturned flange of the bail. When the bail is so held in rearward position the pin 891, carried by its arm 89, engages under the shoulder 932 of the hook member 93. A plurality of arms 88 secured by some suitable means, such as pins, to the shaft 84, are located between the several amount and transaction key bails and each has an over-turned foot which engages over the lip of the key coupler, so that as the latter is rocked, during an operation of the machine, its movement will be transmitted to the shaft 84. It will also be recalled that this shaft is carried by an extension of each of the uprights 68, which are raised by the key coupler through the co-operation of the forked ends 69 with the pins 70. It will be apparent, therefore, that when the hook member 93 is engaged over the pin 891 upward

movement of the shaft 84 is prevented and the key coupler is locked against operation.

Each clerk's key is provided with a laterally extending pin 512 (Figs. 11 and 12) which has its end in the plane of the detent pawl 90 to the rear of the pivot 91 of the latter, so that as any clerk's key is depressed to engage its upper surface with the under side of the key coupler lip, the detent pawl will be rocked to carry its surface 901 above the lower overturned flange of the clerk's bail 83. This rocking of the detent pawl will permit the spring 85 to rock the clerk's key bail to engage the shoulder of the hook 82 of the depressed clerk's key and, at the same time, to carry the pin 891 from under the shoulder 932 of the hook member 93, with the result that the shaft 84, as well as the key coupler, is unlocked for operation.

The latch retaining bails 86, heretofore mentioned, are normally held against movement, independently of the rocking of shaft 84 by jaws 87 on a pair of the arms 88. The left hand one of these bails (Fig. 3), furthermore, is provided with a finger 861 which serves both to limit the rocking of the clerk's bail 83 under the influence of spring 85, when this bail is released by the pivoted pawl 90 and to aid in the restoration of this latch bail in a manner which will be described. A similar function is performed with respect to the remaining bails 83 by the arms 88, each of which is formed with a flat rear surface 880 which is adapted to cooperate with an extension 830 of the overturned flange of each of the adjacent bails 83 (Figs. 3, 4A and 15). Thus, that arm 88 which is between the transaction and dollars groups key latching bails will normally arrest the forward swing of these bails, under the influence of springs 85, due to the engagement of the flange extensions 830 of the bails with the rear edge 880 of the arm. So also the other arms 88 will serve to normally arrest the adjacent latch bails. The means whereby the arms 88 and the finger 861 serve to restore the bails 83 to key releasing position will now be described.

Secured toward the right hand end of the shaft 84 is a double lever 98, 99 (Fig. 14) which is normally rocked by a spring 100 until a pin 981 carried by the upper arm engages a finger 682 extending upwardly from the forward arm 681 of the right hand upright member 68. A shoulder 991 of the lower arm 99 of the double lever stands normally above an upwardly extending finger 1013 of a slidable and pivoted member 101, which has a slot 1012 surrounding the key shaft 12 and an enlarged opening 1011 surrounding a pin 131 extending from the right hand side of the weighted bail 13. In the normal position of the parts the pin 131 rests on the lower edge of the opening 1011 of the member 101, so that a shoulder 1010, formed at the rear of said member, normally rests upon the upper surface of the base plate 5, as shown in Fig. 4. As the weighted bail 13 is rocked by the depression of an operating key and the pin 131 is raised, a spring 102 attached to the forward end of the member 101, serves to rock the latter and tends to maintain the engagement between the lower edge of opening 1011 and the pin 131. Rocking of the member 101, however, under the influence of spring 102, is limited by the engagement of the upper end of finger 1013 with the shoulder 991. Now, as the operation of the machine continues and the key coupler is elevated, the arm 99 and hence shoulder 991 will be raised in a vertical rectilinear path, whereas the upper end of finger 1013 will

travel in an arc about the shaft 12 as a center. At some point in the upward movement of these parts the finger will become disengaged from the shoulder 991, and due to the action of spring 102, a slight extra amount of rocking movement will be imparted to the member 101. When the parts are returned toward normal the rearward surface of the finger 1013, being in engagement with the forward surface of the arm 99, will serve to rock the latter and the shaft 84 against the tension of spring 100, as the paths of movement of the finger and arm converge. Rocking of the shaft 84, as before explained, will result in the rocking of the arms 88 as well as the releasing bails 86, due to the clamping engagement of the jaws 87, so that the finger 861 and the rear edges of the arms 88 will engage their respective bails 83 and rock the latter rearwardly to a gradually increasing extent to maintain the lower overturned flanges out of engagement with the hooks 82 of the latched keys. It will be understood that as the forward ends of the keys are depressed their rear hooked ends will travel away from the flanges of the bails 83 and the coaction between the finger 1013 and arm 99 is such as to entirely prevent the re-engagement on the return stroke of the bails 83 and hooks 82, which became disengaged, due to divergence of path on the up-stroke. As a result, the weighted bail 13 may continue the restoration of the keys to their normal positions without interference between the bails and hooked ends of the keys. The final movement of the bail 13, through the pin 131, will serve to restore the member 101, likewise, to its normal position, in which the finger 1013 stands directly below the shoulder 991 of arm 99. It has already been mentioned that, during the entire movement of the coupler, all of the latched keys engage their squared notches 141 with the lip 151 of the coupler to maintain all of the depressed keys in coupled relation in the manner well known in the art, but this coupling action, which is all that holds the keys in coupled relation on the return stroke, of course, ceases upon return of the coupler to its normal position.

In order that the pin 891 carried by the arm 89 integral with the clerk's key bail 83, may be properly restored to its normal position under the shoulder 932 of the hook 93, the latter is pivotally mounted, as explained before. The hook is, furthermore, provided with an upper cam surface 933, so that even though the clerk's key bail 83 is rocked rearwardly, the pin 891 will not be blocked against movement but by cooperation with the cam surface 933 will merely rock the hook against the action of spring 95. Upon full restoration of the shaft 84, spring 95 will, of course, rock the hook to engage its shoulder over the pin 891.

In order that only a single key of each group of keys may be depressed and latched to the coupler, during an operation of the machine, the usual single-key pendants 81 (Fig. 10) are provided at the rear of the machine for co-operation with the rear beveled ends 114 of the several operating keys.

Provision has been made, in accordance with the present invention, for the manual release of any keys which have become latched to the coupler, whenever it is desired to release them, without an operation of the machine, due to some error. In providing this function, use has been made of the various elements, above mentioned, which are associated with the automatic release of the latched keys. This manually operable

means comprises a release key 105 (Figs. 2 and 14), the rear end of which is fastened to an arm 103, which is loosely pivoted on the shaft 431. The lower end of the arm 103 is provided with a laterally extending finger which is adapted to co-operate with the curved forward end or finger 1014 of the member 101. Depression of the release key 105 will therefore cause the member 101 to be slid rearwardly on the shaft 12 and the finger 1013 of this member will engage the rear shoulder of arm 99 to rock the shaft 84, and hence all of the bails carried by the latter, to cause the release of the latched keys.

For the purpose of preventing the operation of the release key, after the key coupler and the main rotation shaft have commenced their operation, a lug 104 is provided on the side frame 2 (Fig. 14) in a position to co-operate with the finger 1014 of the slide 101. It will be seen that when the slide is rocked by the action of the pin 131 upon the upper surface of the opening 1011, just at the commencement of movement of the key coupler, the finger 1014 will be carried in front of the lug 104 and thereby prevent rearward movement of the slide by the release key 105. The slight rocking of the slide by spring 102, upon the initial depression of a key, to carry the upper end of finger 1013 into engagement with the shoulder 991, however, is not prevented since this is prior to any movement of the coupler. As will be apparent, the lug 104 and finger 1014 serve, also, to form a converse interlock, since, if the release key 105 is first depressed, the lower end of finger 1014 will be carried over the lug and the pin 131 of the weighted bail contacting the opening 1011 of the slide will prevent sufficient movement of the latter to allow the depressed key to rock the key coupler.

Clerk's key locks

In order that the operation of one or the other of the totalizers may be prevented during the absence of a particular clerk or person responsible for the entries on a totalizer, each clerk is provided with an individual lock to control the operation of his key. Due to the locking mechanism, already described, which compels an operation of one or another of the clerk's keys, to release the coupler, it will be apparent that the locking of one will compel the operation of the other during the entry of all amounts into the machine. The pair of locks, associated with the pair of clerk's keys for this purpose, are designated 106 and 107 (Fig. 6) which, when operated, serve to project their bolts to engage upwardly extending arms of the levers 116 and 117, respectively. Springs 1161 and 1171, attached at one end to the levers 116 and 117, respectively, and at their opposite ends to a portion of the frame, serve to maintain the levers in engagement with the bolts of the locks. At its lower end, each lever is provided with a hook formation which terminates in a surface or shoulder 118 adapted to co-operate with a pin 119 on the corresponding clerk's key 51. In the normal position of the parts the surface 118 is in rear of the pin 119, so that it will not interfere with the depression of the key 51. Rocking of the lever 116 or 117, by the turning of its lock, will serve to carry its surface or shoulder 118 directly under the pin 119 and thereby positively prevent the operation of the associated clerk's key. If A's lock 106 happens to be operated, depression of A's key 51 will be prevented and in order that an item may be entered in the machine it will be necessary to operate the B key

to release the key coupler and at the same time select the B totalizer to receive the entry. On the other hand, if B's lock 107 is operated B's key will be locked against operation and it will be necessary to operate the A key to release the key coupler and operate the A indicator as well as permit the engagement of A's totalizer with the actuators.

Item printing mechanism

Suitable means have been provided for automatically recording the items entered into the machine and the record so formed comprises a detail strip on which is printed the amount of a transaction, the clerk who has operated the machine, and the nature of the transaction performed.

Directly geared to the actuating segments 203 (Figs. 3 and 7) which, as has been explained, are driven by the various amount keys through the differential cams 19, are a series of intermediate pinions 23 mounted upon a shaft 24 and these pinions are constantly in mesh with a series of pinions adjacent and attached to a series of printing wheels 25 mounted on a shaft 26 (Fig. 8). It will be apparent that upon rocking of the segments 203 by the depression of selected keys 11, the connected printing wheels 25 will be turned to set up a desired amount, and upon return of the keys and segments to normal these printing wheels will be restored to their normal or zero positions. On the same shaft 26 which supports the amount printing type wheels 25, are mounted a pair of type wheels 133 and 145 which are adapted, respectively, to print characters designating the clerk's key and the transaction key, which have been depressed during an operation of the machine. Normally, the clerk's printing wheel 133 stands in a position to print the letter "A", whereas, upon depression of the B key, this type wheel is slightly rotated to present the letter "B" at the printing line. The connections, for this purpose, comprise a pin 122 (Figs. 6, 8 and 16) mounted on the side of the B clerk's key 51 and adapted to co-operate with a cam slot in a plate 123, secured by some suitable means, such as a pin, to a shaft 125. Toward the center of the machine the shaft 125 carries, secured thereto, an arm 126 (Figs. 6-16) to which is pivoted the lower end of a link 127, whose upper end is pivotally connected to an arm 128 (Fig. 7) which is secured by means of a clamp 129 to a sleeve 130, mounted on the shaft 24. At the opposite end of the sleeve 130 is secured a pinion 134 which co-operates with a pinion 132 fastened to the clerk's printing wheel 133 (Figs. 7 and 8). It will be clear that depression of the B clerk's key 51 will, through its pin 122, rock the plate 123 and arm 126 to elevate the link 127, thereby rocking the arm 128 and through the pinions 134 and 132 rotating the printing wheel 133 to present the letter "B" at the printing line.

Similar connections are provided from the several transaction keys to the type wheel 145, which normally stands in a position to print a star, representing a cash transaction. Each of the transaction keys 52 is provided with a pin 142 (Figs. 8 and 19) which is adapted to co-operate with a cam slot in a plate 135 (Fig. 16), which is secured by some suitable means, such as a clamp 136, to a sleeve 137, surrounding the shaft 125. At the opposite end of the sleeve 137 is carried an arm 138 (Figs. 5 and 16) to which is pivoted the lower end of a link 139 which, at its upper end, is connected to an arm 140 (Fig. 8) secured by some

means, such as a collar and pin, to the shaft 24. A pinion 143, secured to the shaft 24, engages a pinion 144, which is attached to the transaction printing wheel 145. It will be apparent that through the train of mechanism described the wheel 145 will be slightly rotated by the depression of any one of the transaction keys 52. The amount of rotation of the type wheel 145 will depend upon the formation of the cam slot in each plate 135, these slots being suitably graduated, as shown in Fig. 16, to provide the proper amount of rotation of the type wheel 145 to present the character at the printing line which corresponds to the transaction key depressed. Since all of the cam plates 135 are secured to the sleeve 137 it is necessary that the upper rear edges of the cam slots be cut away so that rocking of the sleeve, by the depression of one transaction key, will not be prevented by the cam walls of the inactive plates 135 striking the pins 142 on the inactive transaction keys.

Suitable means, including a platen 154, which will be more fully described hereinafter, are provided for automatically taking an impression from the positioned type carriers 25, 133 and 145 upon a record medium 146 (Figs. 5, 9, 26 and 28), which is led from a supply roll 147 mounted on a rod 1471 carried by a liftable printer frame comprising a pair of supporting arms 160 and 1600 (Figs. 24 and 25) which are secured to a shaft 161 passing through the pair of intermediate frame plates 38 and 39. From the supply roll the record strip is passed over a guide roller 148 across a guide plate 149, around the relatively flat platen member 154 and over a guide roller 156 to a storage roll 157 which is mounted on a rod 1571, carried by the liftable frame arm 160. Upon each operation of the machine the record strip is advanced a step by means of a pawl 159 (Figs. 25 and 27) mounted upon an ear of a rock plate 158. The pawl is normally urged by a spring 162 into engagement with the teeth of a ratchet wheel 1572, which is secured to the storage roll. For the purpose of oscillating the pawl 159, to provide the necessary line spacing action, the plate 158 is connected, by means of a link 163, (Fig. 5) with an operating lever 167, a pin 165 on the link being normally held in engagement with the lever by a spring 164. Lever 167 is pivoted at 168 and is provided in a lower extension with a roller 169 co-operating with a box cam 170, mounted on the main shaft 18. Rotation of the main shaft, accordingly, causes clockwise movement of the lever 167 (Fig. 5), and as the forward end of the lever is depressed the spring 164 will carry the pin 165, mounted in link 163, downwardly in a slot 166 formed in the liftable frame arm 160. This movement of link 163 will cause the pawl 159 to engage the next tooth of the ratchet 1572 and upon the restoration of the parts, during the second half of the rotation of shaft 18, the pawl will serve to rotate the storage roll and feed the record medium an increment.

For the purpose of supplying ink for the taking of an impression from the series of item type wheels 25, 133 and 145, any suitable means may be provided and that shown in the drawings takes the form of an endless inking ribbon 172 (Figs. 2, 28 and 29) which, at one end of the item type carriers, is passed over guide rollers and around an ink supplying roller 173, supported by an extension of a frame member 171. This frame member, as best shown in Figs. 5, 8 and 9, is secured at its front end to the intermediate frame 38 by some suitable means, such as screws pass-

ing through overturned feet 1711 of the member, while at its rear end the frame 171 is provided with an ear which is connected to a forward extension of the rear supporting frame 3 by means of a stud 218 (Fig. 5). At its opposite end the ribbon is passed around a suitable guide pin or roller 174, extending from a tension arm 1741 pivoted on a bracket 175, secured to the intermediate frame 39 (Figs. 8 and 29), and both of the courses of the ribbon, from one end to the other, are passed through a slot in a guide member 1720 suitably suspended between the type elements and the record medium at a point where the latter is passed below the platen member 154. A spring 1742 (Fig. 29) normally urges the arm 1741 to the right and places the ribbon under a desirable tension. For the purpose of feeding the endless ribbon step by step, upon successive operations of the machine, the ink supplying roller is provided with a driving ratchet wheel 176, which is adapted to be engaged and rotated by a pawl 177 (Fig. 28) mounted on a lever 178 pivoted on a stud extending from the frame 171. A spring 179 extending between pins on the pawl 177 and lever 178 tends to hold the pawl in engagement with the ratchet. The rearwardly projecting arm of the lever 178 is slotted to engage a pin 1670 carried by the cam operated lever 167, which operates the paper feeding mechanism. It will be clear that upon each operation of the machine the lever 178 and pawl 177 will be oscillated to feed the inking ribbon an increment.

The relatively flat platen member 154, which has already been mentioned, is integral with a pair of arms 1541 (Fig. 25), which are secured to a rod 155 supported by the liftable printer frame arms 160 and 1600. Connections from the main operating shaft 18 to the platen member, for rocking the latter upon operations of the machine, include a spring propelled driving hammer 184 (Figs. 24 and 25) which is pivoted at 1840 on a stud mounted in the rear supporting frame 3. Intermediate the ends of the hammer is attached, by means of a pin 1841, a downwardly extending link 185 which has a forked end surrounding the main operating shaft 18 and having, at its extreme end, an overturned shoulder 1850, which is in the path of and adapted to co-operate with a cam 186 secured to the shaft 18. Upon an operation of the machine the cam 186 will force the link 185 downwardly, thereby rocking the hammer 184 counter-clockwise (Fig. 24) and compressing spring 1844 which surrounds a rod engaging the under side of the hammer and slidable through an aperture in a lug 391, extending from the intermediate frame 39. When the abrupt shoulder of the cam 186 reaches the projection 1850 of link 185, the hammer will be suddenly released for operation by the compressed spring 1844, so that the surface 1842 (Fig. 26) of the hammer will sharply engage a block 1871 fastened at the rear end of an arm 187. This arm, in turn, is secured by some suitable means, such as rivets, to a slidable clutch member 1872 (Fig. 25), pivotally mounted upon the platen operating shaft 155. A spring 1873 normally urges the clutch member to the left (Fig. 2), so that a groove 1874 of the clutch member is in active engagement with a rib 1542 of the right platen supporting arm 1541. It will be apparent that, through the connections described, the operation of the hammer, by the spring 1844, will force the rear end of the arm 187 upwardly and thereby rock the clutch member 1872 in

a counter-clockwise direction (Fig. 24), so that the platen 154, positively connected therewith, will be rocked sharply downward. Clutch member 1872, as stated above, is slidably mounted on shaft 155. Therefore, when it is desirable to lift platen 154 so that access may be had to the parts normally concealed thereby, clutch member 1872 is manually shifted on shaft 155 against the tension of spring 1873 (Fig. 25) so as to disengage groove 1874 of the clutch member from rib 1542 of the platen.

In order that the platen 154 may be normally locked against any accidental or intentional operation, by striking it with the hand or a tool, without an operation of the machine, or prematurely during an operation of the machine, certain safety devices are provided. These devices include a two-armed member 188, pivoted at 1880, and provided at its forward end with a squared notch 1881 which is adapted to receive a lug 1875 formed on a downwardly extending projection of the platen operating arm 187 (Fig. 24). It will be apparent from Fig. 24 that so long as the notch 1881 is in engagement with the lug 1875 no movement of the platen operating arm and hence of the platen itself is possible. During an operation of the hammer 184, however, a pin 1843, carried by the latter, is brought into engagement with a tail 1882 of the downwardly extending arm of the member 188 and the latter is, accordingly, rocked about its pivot to disengage the notch 1881 from the lug 1875, to permit the rocking of the platen upon the driving stroke of the hammer. A detaining hook 189, pivoted at 1890 to the arm 1600 of the liftable printer frame, has a rear nose 1891 which normally rests upon a shoulder 1883 of the member 188. However, when the latter is rocked by the downward movement of the hammer the shoulder 183 is carried to the front of the nose 1891 and a hook shoulder at the front of the nose is rocked by a spring 1893 into latching engagement with the shoulder 1883. Now, as the platen arm 187 is rocked, under the force of the hammer 184, an extension 1876 towards the front of the arm (Figs. 24 and 25) is brought into engagement with a forwardly projecting finger 1892 of the hook 189, thereby rocking the latter to disengage its nose 1891 from the shoulder 1883.

The spring 1893 (Fig. 26) which is connected to pins carried by the members 188 and 189 will then rock the member 188 to restore these parts to their normal positions, wherein the notch 1881 engages the lug 1875 to again lock the platen against operation.

It will be understood, from the foregoing description, that after the various item type printing elements have been brought to the proper positions for setting up the selected type at the printing line, the platen member 154 is rocked sharply downwardly about its pivot 155 to carry the record material against the surface of the ink ribbon 172 and the latter against the surface of the positioned type. Subsequent to this printing operation, the rock lever 167 is restored to its normal upper position and as it is so moved it will shift the link 163 to rock the plate 158 and feed the record strip sufficiently to carry the printed entry from a point directly below the platen member to a point directly above the latter, where it may be visible through a suitable opening 180 in the lid 7. As best shown in Fig. 24, this opening may be of sufficient length to expose a number of the preceding entries, all of the entries being protected by a transparent ele-

ment, such as a piece of glass 1800, while, to the left of the last entry, the strip is completely exposed to permit the insertion of a pencil for the purpose of making any suitable notation relative to the entry. If, for any reason, such as to aid in the replacement of the record material or the inking ribbon or to clean the type carriers, it becomes desirable to lift the forward end of the platen 154, this may be accomplished when the lid 7 is open by, first, sliding the clutch member 1872 to the right (Fig. 2), to disengage the groove 1874 from the rib 1542 of the platen arm 1541 and then raising the platen by grasping a short forward extension of the opposite arm 1541.

Total printing

The present invention further contemplates the printing of the totals registered on the several totalizers and, for this purpose, manual means is provided for causing the impressions of totals to be taken upon the same record strip which receives the items. A double platen member 194 (Figs. 5 and 9), pivoted on a rod 195, supported by the liftable printer frame arms 160 and 1600, (Fig. 26) is provided with a pair of impression blocks 196, one being carried by each arm of the platen and being maintained directly over the printing type of one of the pair of totalizers. Toward the right end of the supporting rod or shaft 195 of the total platen (Fig. 2) is secured an operating lever 197 (Figs. 24 and 25) which, when the machine is in condition for total printing, as will be later explained, may be rocked in either direction, by means of the thumb plates 1971 and 1972 at opposite ends of the lever, to cause an impression to be taken from either the forward or the rear totalizer. A pin 198, which cooperates with a pair of shoulders formed by a notch below the pivot of lever 197 serves to limit the rocking movement of the latter. As illustrated in Fig. 5, the record medium is passed between the totalizer elements and the pair of impression blocks and after passing around the item printing platen 154, it passes completely above the double platen member 194.

The means for supplying ink in the taking of impressions from the total printing elements comprises a pair of separate inking ribbon plates 207, which may be inserted in suitable guiding slots in an inking ribbon frame 208. Frame 208 (Figs. 28 and 30) is provided with a pair of downwardly extending arms, one of which is formed into a fork 2080 at its lower end to engage a pin 1712 carried by the frame 171 and carries a lug 2081 which fits into a fork 1713, formed in an extension of the frame 171, while the arm at the opposite end of the ribbon frame is forked at 2082 to engage a stud 392 on the intermediate frame 39 and is provided with a lug 2083 cooperating with a recess formed in the intermediate frame 39. Whenever the printer frame is lifted, as will be explained, the inking ribbon frame may be lifted bodily as a unit to give more ready access to the inking members. As best shown in Figs. 30 and 31, the guide rod or roller 148 for the record strip is mounted directly in the side plates of the ribbon frame.

In order to permit the necessary relative movement between the ribbon plates and the supporting frame 208, when an impression is being taken from the totalizer wheels, the plates 207 are mounted in guide-ways formed in a pair of ribbon supporting members 210 (Figs. 30 and 32). Each of these members has integral therewith at

its opposite ends an upwardly extending projection 2100, preferably formed as a bent-up portion of the member and provided with an enlarged upper end 2101 to form suitable shoulders to arrest one end of a compression spring 2102. In assembling the ribbon supporting member in the ribbon frame the projections 2100 are passed through suitable apertures in the frame 208 and the springs 2102 are compressed between the heads 2101 and the upper surface of the frame, so as to normally hold the ribbons away from the total printing type wheels. As best shown in Figs. 30 and 31 the frame 208 is cut away at points directly below the impression platens 196 and the ribbon plates are, at the corresponding points, cut out to leave the inking ribbon 2071 exposed on one side to the record material and platen and on the other side to the type wheels. The ribbon plates 207 may be formed of thin sheet metal, with the edges overturned to grip a small section of ribbon and hold it stretched across the cut-out opening in the plate. When a ribbon becomes dry and useless, it may be removed by merely forcing a new plate into the support member 210 and thus pushing out the old.

During total printing operations the automatic line spacing mechanism is, of course, not operated, since the shaft 18 is at rest during such operations of the lever 197 and platen 194. In order that the impressions of the totals which have been printed may be carried forwardly into visible position below the opening 180 in the lid 7, a manually operable feeding lever 214, (Figs. 5, 24 and 27) pivoted about the storage roll support 1571 and normally spring urged into a forward position by the spring 215, is provided. Movements of the lever 214 are limited by a pin 2140 projecting laterally from the lever and adapted to co-operate with a pair of ears 1602, projecting from the side of arm 160 of the liftable printer frame. Rearward movement of the lever 214 about its pivot will cause the pawl 217, (Fig. 27) connected with the lever, to engage the ratchet wheel 1572 to rotate the storage roller 157 and advance the record strip one step. By operating the lever 214 any number of times the record strip may be advanced to any desired extent. A spring pressed detent pawl 1573 (Fig. 27) serves to prevent rotation of the storage roll in the opposite direction. For the purpose of maintaining a slight tension on the record strip as it leaves the supply roll and thus prevent the development of too much slack in the strip a bail 213 is pivoted upon a rod 2131 (Figs. 24 and 25) and is urged by a spring 2130 into engagement with the record material on the supply roll 147.

Liftable printer frame

Mention has already been made of the printer frame, comprising arms 160 and 1600 (Figs. 5, 24, 25 and 26) which are pivoted on the rod 161, supported by the intermediate frame plates 38 and 39. The side plate or arm 160 of the frame is provided at its rear with a forked extension 1601 (Fig. 5) which is adapted to engage a stud 218 supported by a forwardly extending flange of the rear frame member 3. Whenever it is desired to replenish the supply of the record material, the liftable printer frame may be raised by a rocking movement about its pivot 161, the fork 1601 being at this time disengaged from the stud 218. When the printer frame is so elevated into the position shown in Fig. 26, the old record may be readily removed from the storage roll

157 and a new supply roll 147 may be mounted on the rod 1471. Threading of the record strip 146 may, at this time, be likewise very readily effected, it being merely necessary to lead the strip around the guide rollers and platen members, already described, and thence back to the storage roll 157.

Referring particularly to Figs. 5, 9 and 24, it may be noted that when the printer frame is in its normal position, within the machine, and the record strip is properly threaded around the various guide rollers and impression platens, this entire organization of printing mechanism constitutes a shield for the totalizer elements, to quite effectively prevent the insertion of a wire or other instrument to improperly manipulate the wheels. However, when the printer frame is lifted, as above explained, this protection to the totalizer wheels is largely removed and, for this reason, a special shield, 317, normally inactive, is mounted on each of the totalizer wheel supporting shafts 31 and extends across the entire width of the totalizers. Means, which will now be described, are provided for the purpose of rocking these shields into active totalizer concealing position, prior to the lifting of the printer frame out of its normal position. For this purpose a hook member 219 (Figs. 24 and 26) is pivoted on a stud 2190, extending from the intermediate frame 39. At its upper end the hook member is provided with a jaw 2191, which as shown in Fig. 24, surrounds the shaft 195 supporting the total printing platen 194 and rigidly secured in the printer frame. It will be apparent that so long as the jaw of the hook is engaged with the shaft 195, it will be impossible to lift the printer frame. In order to release the hook from the shaft a slide member 220 is provided, this member having a pair of slots 2200, which are adapted to co-operate, respectively, with the shaft 161 and the stud 2190. A spring 2201 normally holds the slide to the left (Fig. 24), but by means of a handle 2202, secured to the side of the slide member, the latter may be forced rearwardly. When the slide is so moved a pin 2204 extending laterally from its side will co-operate with the rear edge of an enlarged opening 2192 formed in the body of the hook member and toward the end of the rearward movement of the slide the hook will be completely disengaged from the shaft 195. A pair of slots 2203 are also cut into the slide and these are adapted to co-operate with pins 3170 extending laterally from a downwardly projecting arm connected with each of the totalizer shields 317. Rearward movement of the slide, to effect release of the hook will, through the pin and slot connections mentioned, rock the shields into active totalizer concealing position. Due to the fact that the opening 2192 in the hook 219 has an elongated formation the movement of the shields to conceal the totalizers will be effected prior to the disengagement of the hook from the shaft 195.

As an additional precaution against tampering with the totalizers the movement of the shields into concealing position is made to positively lock the wheels against turning. Referring to Fig. 7, it will be noted that when the shields 317 are shifted into the dotted line positions indicated their forward edges will engage the series of detent pawls 56 and positively hold them, as well as the pinions 35, against movement. Thus, whenever the printer frame is elevated, the shields 317 are not only shifted to conceal the totalizer elements but this shifting movement serves to lock the wheels against rotation.

An upper surface 2205, at the forward end of slide 220, normally co-operates with a lateral extension on an arm 1610, secured to the printer frame pivot shaft 161, so that upward movement of the printer frame is by this means additionally prevented until the slide has been forced to its extreme rearward position. The extension on the arm 1610 serves, also, to co-operate with a shoulder 2206 at the rear end of the slide, to hold the latter in its rearward position against the tension of spring 2201, so long as the printer frame remains out of its normal position and the co-operation of these parts, furthermore, serves to hold the printer frame in its elevated position (Fig. 26). In order to restore the printer frame to its normal position it will, of course, merely be necessary to force the slide 220 a slight additional amount to the rear, to disengage the shoulder 2206 from the extension of arm 1610. As the slide 220 is now moved forwardly under tension of its spring 2201 the pin 2204 engages the forward end of the opening 2192 and restores the hook into engagement with the rod 195 and holds it there.

By reference to Fig. 5, it may be noted that, when the printer frame is lifted and its arm 160 is rocked upon its pivot 161, the paper feed link 163 will be carried with the frame, and the pin 165 will be carried out of contact with the operating arm 167. During the initial movement of the frame, however, the spring 164 will tend to maintain the engagement between the pin 165 and the arm 167, so that the pin will have a relative movement to the slot 166 until the bottom of the latter strikes the pin and carries it along with the frame. This relative downward movement of pin 165 and link 163 will rock the plate 158 and pawl 159, so that upon return of the frame arm 160 to normal and the consequent return relative movement of the link 163 a line space action will take place with respect to the storage roll 157.

The lid 7, which conceals the various features of the printing mechanism is normally locked but is adapted to be released by a key which may be accessible to all of the clerks who are intended to operate the register, so that they may be able to replace the record material when exhausted, in the manner above described. For this purpose the lid is provided with a downwardly extending lug 711 (Fig. 5), secured by some suitable means to its under side. This lug has cut through it an elongated slot which is adapted, normally, to receive the upper end of a hook or latch member 712 which is pivoted at 713 on a bracket 714 fastened to the front of the printer hood, which is integral with the casing. A spring 715, connected at one end to the latch member 712 and at its other end to a pin carried by the bracket 714, serves to hold the latch in locking engagement with the lug 711. A lock 716, secured in the front surface of the printer hood, is adapted to be turned by an inserted key and, when so turned, is adapted to project its bolt into engagement with the surface 717 of the hook member, so that the latter will be tilted rearwardly (Fig. 5) against the tension of spring 715 to release the printer lid.

A form of invisible hinge mechanism is provided for the printer lid 7 and comprises duplicate mechanism at opposite sides, including a link 703 (Fig. 26) which is pivotally connected to the lid at 702, on its under side toward the rear, and to the side of the printer hood at 704. Also pivoted to the side of the printer hood at 707 is

a plate 706 an arm of which carries a pin 705 cooperating with a cam slot 701 in a bracket 700 fastened to the under side of the lid. A cam slot 708 is also formed in the plate to cooperate with a pin 709 carried by an extension of the link 703. It will be seen that the link and plate serve to constrain the movement of the lid and the recesses at the ends of cam slots 701 and 708 serve to maintain the lid in raised position. To close the lid it may merely be raised slightly to the position shown in Fig. 26 to disengage the pins 705 and 709 and then it may be lowered without interference.

Resetting

Suitable means are provided for resetting the elements of the several totalizers, individually, to their zero or normal positions. The means herein disclosed, for this purpose, are substantially the same as disclosed in applicant's copending application, S. N. 35,599, filed June 8, 1925, and, therefore, need not be described in detail here. In general, the resetting mechanism comprises a pair of pinions 221 (Fig. 2), one of which is secured to each of the totalizer wheel supporting shafts 31. A resetting lever 222 (Figs. 7 and 23) is provided with a handle which may be grasped by the operator of the machine and is provided, further, with a rack segment which is adapted at times to engage and rotate the pinions 221. Normally, the pinions are in a plane to the left (Figs. 2 and 8) of the resetting rack segment but either of the shafts 31 may be slid longitudinally to the right by means of knurled knobs 310. When either shaft is so shifted the pinion 221 carried thereby will be brought into the path of the resetting segment 222, so that when the latter is drawn forwardly by means of its handle, the pinion as well as the shaft to which it is secured, will be given a complete rotation. Now, each shaft is provided with a series of notches 223, which are shown in Fig. 22A and one of which is associated with each of the totalizer wheels, as in Fig. 30, and is adapted to co-operate with a pawl 224 mounted on its associated totalizer wheel. Normally, the pawls and notches are out of line but when the shaft 31 is shifted longitudinally, as explained, to carry its pinion 221 into engagement with the resetting rack, the notches 223 will simultaneously be brought into co-operation with the pawls 224. It will be understood that, as customary in this type of resetting mechanism, the notches are each provided with an abrupt shoulder on one end and a gradual incline at the other end, so that only one direction of rotation of the shaft will serve to engage the shoulders of the notches with the associated pawls to rotate the wheels backwardly to zero, while rotation of the shaft in the opposite direction will be ineffective and will merely cause the notches to slip idly by the pawls 224. In order to prevent either of the totalizer shafts from being slid longitudinally, after the resetting segment has been partially operated, and to prevent the return of a shifted shaft, after the beginning of the movement of the resetting segment, suitable means are provided, which, as shown, include a plate 2221 (Fig. 23) secured to the resetting segment in a position to co-operate with the sides of the teeth of the rear totalizer resetting pinion 221, after the segment has been slightly shifted and this cooperation continues throughout the movement of the segment. A somewhat different construction, including a lug 2211, formed as an extra wide tooth on the forward

totalizer resetting pinion and normally co-operating with a cut away portion 2222 of the resetting rack but adapted to cooperate with the side of the rack teeth when the rack is shifted is provided for the forward totalizer.

In order to insure a complete operation of the resetting segment, after its operation has once been begun, a full stroke mechanism is provided and is shown in Figs. 7 and 23. This mechanism comprises a pair of pivoted pawls 227 and 228, which are both mounted upon the resetting segment. A fixed lug 229, which is secured to a portion of the intermediate frame 39, is adapted to co-operate with both of the pawls. Normally, a rear upper shoulder formed on the pawl 228 engages with the under surface of the fixed lug, whereas a rearward extension at the lower end of the pawl 227, normally engages the forward surface of the lug. A spring 231, extending between an arm of each of the pawls normally tends to rock them clockwise. Now, as the resetting segment is drawn forwardly a short distance the pawl 228 will be rocked until its rear upper shoulder engages the downward extension of the pawl 227 and if an attempt were made, at this time, to restore the resetting segment, this effort would be blocked by the engagement of the rear edge of pawl 228 with the forward surface of lug 229. In order to readjust these parts, so that the resetting segment may be fully restored, it is necessary to bring the shoulder 2280, formed at the upper end of pawl 228, into engagement with a pin 230 extending from the side of the intermediate frame 39. Upon engagement of the shoulder 2280 with the pin 230 the pawl 228 will be rocked counter-clockwise sufficiently to allow the spring 231 to rock the pawl 227 clockwise, until its extension 2271 strikes the upper end of pawl 228. In this position of the pawls the lower nose of the pawl 227 will be directly over the rear upper shoulder of the pawl 228, so that the latter when free may be rocked only a slight extent under the influence of spring 231. With the pawl 228 so held by pawl 227 the resetting segment may be fully restored and, toward the end of the return movement of the segment, the rearward projection of pawl 227 will engage the lug 229 to release this pawl from the pawl 228, so that the parts will resume the normal position shown in Figs. 7 and 23. From these figures it will be noted that a slot 2220, formed in the resetting segment, co-operates with the pin 230 to permit the necessary movement of the resetting segment.

Drawer release by operation of the machine

For the purpose of releasing the cash drawer, to permit it to be projected under the influence of its spring 1000, a cam 232 (Fig. 16) is secured to the main rotation shaft 18 and is adapted to co-operate with a stud mounted in the upper end of a hooked link 233. A slot in the lower end of the link 233 (Fig. 6) co-operates with a pin carried by the forwardly extending arm of a bell crank 234. Rotation of the main shaft will, through the connections described, cause the link 233 to be elevated toward the end of an operation of the machine and will cause the bell crank 234 to be rocked counter-clockwise (Figs. 6 and 23). A pin 268 serves to connect the upper arm of the bell crank with a latch plate 235, pivoted about a stud 266 and provided with a hook 236, normally engaging a rearward shoulder of a retaining catch 237 pivoted on a rod 238. As the hook 236 is withdrawn from the shoulder of the retaining catch, the latter may be rocked counter-clockwise

by the forward movement of the cash drawer, under the influence of its propelling spring 1000. On the return of the cash drawer, the flange, which is normally engaged by the retaining catch, will, in turn, engage the catch and restore it to its normal position, as shown in Fig. 6, where it will again be engaged by the hook 236.

Bell sounding and muffler

In order to attract attention, upon an operation of the machine, and announce to those present in a store that the machine has been operated, the usual bell sounding device is included in the present machine. As shown in Figs. 3 and 6, it comprises an operating cam 239, mounted on the main rotation shaft 18, and adapted to cooperate with a downwardly extending tail of a striker or bell hammer 240, which is pivoted about a stud 241 and is normally held by a spring 242 with its striking head slightly removed from the surface of a bell 243. Rotation of the main shaft will cause the cam 239 to rock the striker 240 and place it under the tension of its spring 242, until the abrupt shoulder of the cam is reached, at which time the spring will drive the striker, or hammer, to sound the bell. When it is desired to dispense with the ringing of the bell, the connections described may be disabled by the mere shifting of the manipulative lever 244, which is provided with a shoulder at its lower end to cooperate with the upper surface of the striker to rock it and hold it in a position, in which its downwardly extending finger is out of the path of the operating cam 239.

General control mechanism

As explained at the outset of the specification, the machine herein disclosed is provided with a system of control mechanism, which will place certain functions of the machine under the full control of only authorized persons having a key for the purpose, whereas other functions of the machine are open to the control of any operator of the machine. Whenever it is desired to print the total standing on either of the totalizers or to reset the elements of either of the totalizers to their zero positions, it is necessary to insert a special key into the lock 245 (Figs. 1 and 2) and turn the latter clockwise. Turning of the barrel of the lock will, through an eccentric pin 2451 (Fig. 4) shift the connecting link 246 longitudinally toward the front of the machine (Figs. 4 and 33). At its forward end this connecting link carries a stud 248, which is adapted to slide in a slot cut into the surface of an overturned shoulder of a bracket 247, secured to the side frame 2. Connected with the stud 248 is a link 249 which, at its rear, is pivotally connected to a bell crank 250 mounted on the shaft 21. It will be apparent that turning of the barrel of the lock in causing the forward movement of the stud 248, will cause a similar movement of the link 249 and hence will rock the bell crank 250 in a clockwise direction (Fig. 4). A pin, mounted in the forward arm of the bell crank, co-operates with a slot in an arm 251, secured to the shaft 431, which is mounted in a pair of rearwardly extending ears integral with the front tie bar, the shaft 431 being in direct alignment with the shaft 43, as previously mentioned, but being free to turn independently of the shaft 43. Toward the rear end of the arm 251 is connected a link 252 which, at its lower end, is pivotally connected to a two-armed lever 253, loosely mounted on a shaft 254. A pin 255, mounted in the rear arm of the double

lever 253, engages the under side of a finger 256 secured to a shaft 257. Also secured to the shaft 257 are a pair of hook arms 258 which are adapted to engage their hooks over the upper edge of the weighted bail 13 (Figs. 5 and 20). These hooks, as best shown in Figs. 20 and 33, are spaced some distance apart and when carried into engagement with the bail 13, by the rocking of shaft 257, serve to lock the machine against any operation by the operating keys, since any one of the latter would have to elevate the bail during an operation.

For the purpose of releasing the cash drawer, upon the turning of the lock 245 and the rocking of shaft 431, the latter has secured to it an arm 260 (Figs. 5, 20 and 33). At its lower end the arm 260 is pivotally connected with a sliding member 261, which is provided with a forked end to engage the shaft 254. Mounted at the rear extremity of the upper branch of the fork is a pin 262 (Figs. 23 and 33) which is adapted to cooperate with an upwardly extending arm of a double lever 263 loosely pivoted on the shaft 257. Connected by a pin 264 to the lower arm of the lever 263 is a link 265 which is provided at its rear with a slot which surrounds and is guided by a stud 266. A downwardly extending finger 267 of the sliding link 265 (Figs. 6 and 23) is adapted to engage a pin 268 which, as previously mentioned, serves to connect the upwardly extending arm of the bell crank 234 to the drawer latch plate 235. It will be apparent that forward movement of the slide 261, due to the counter-clockwise rotation of shaft 431, will rock the double lever 263 clockwise and carry the link 265 rearwardly, thereby causing its finger 267 to rock the latch plate 235 to disengage its hook 236 from the retaining catch 237, so that the latter may be rotated by the forward movement of the cash drawer under the influence of its propelling spring. A spring 269, connected at one end to a pin extending downwardly from the base plate 5, and at its other end to the pivot pin 264 of the slide 265, normally tends to draw the latter forwardly until the surface 270, formed on the lower arm of the lever 263, is brought into engagement with a finger 271, secured to the shaft 254.

Connections are also provided from the shaft 431, which, as previously stated, is rocked by the turning of the barrel of the lock 245, to latch members which normally hold the lids 7 and 8 locked. The latch member 712, associated with the lid 7, has previously been described in connection with the replenishment of the record material by any clerk, through the use of a key inserted in the lock 716. An upwardly extending arm 273 (Figs. 5, 23 and 33) secured to the shaft 431, is adapted to engage a lateral shoulder 274 of the latch 712 upon rocking of the shaft 431, with the result that the latch will be disengaged from the slot in the lug 711 and the lid 7 may be lifted for the purpose of printing a total and resetting the totalizer wheels to zero. An arm 279 (Figs. 22, 23 and 33), also secured to the shaft 431, has its upper end slotted to engage a pin extending from the upper end of an arm 278, the latter being secured at its lower end to a rod 276, which is supported by a projection extending rearwardly from the tie bar 4. At its extreme left hand end (Figs. 20 and 33) the rod 276 has secured thereto an arm 275, which is provided with a forwardly extending hook, normally in engagement with a lug 800 secured to the under side of the special lid 8. As the shaft 431 is rocked by the turning of the barrel of lock 245, the rod 276 will be rocked counter-clockwise (Fig. 22) and the

hook of the arm 275 will be disengaged from the lug 800 to release the lid 8, so that it may be lifted and pivoted about its rear invisible hinge (Fig. 23), comprising levers 802 mounted on a rod 803 carried by the under side of the casing.

One of the prime functions of the controlling lock 245 is to condition the machine for the printing of totals and the resetting of the totalizer elements to zero. The functions, already mentioned, as being directly effected or controlled by the turning of the lock, are intimately associated with total taking and resetting. A direct control, furthermore, is provided from the shaft 431 to the means for permitting a total printing impression as well as a resetting operation. An arm 280 (Figs. 20, 23 and 33) is secured to the shaft 431 and extends rearwardly and upwardly from said shaft. At its rear upper end this arm is provided with an offset head which has a surface or shoulder 281 normally in the path of a pin 283, extending laterally from the resetting segment 222. When the lock 245 is in its normal condition the shoulder 281 will prevent any operation of the resetting segment. However, upon turning of the barrel of the lock the counter-clockwise movement of the shaft 431 (Fig. 23) will carry the shoulder 281 away from the pin 283 and will place a curved surface 282 for co-operation with the pin 283. It will be apparent that this curved surface provides an interlock which will prevent the reverse operation of the barrel of lock 245, after the resetting segment has been shifted partially and before it has been fully restored.

A somewhat similar arm 284 is secured to the shaft 431, for the purpose of controlling the operation of the total printing platen 194. As may be best seen from Figs. 23 and 26, the arm 284 is provided with an upper rear shoulder 285, normally in engagement with a pin 286, extending laterally from a platen control plate 287. A spring 288 (Fig. 33), connecting the arm 284 and the plate 287, serves to normally hold the pin 286 in engagement with the shoulder 285. Now, as the shaft 431 is rocked by the turning of lock 245, the shoulder 285 is carried away from the pin 286 and the spring 288 is permitted to rock the plate 287 to carry the shoulders 289 from under a pair of studs 290 (Figs. 2, 24, 25 and 26), carried by the two armed lever 197 which, as before explained, is secured to the total-platen supporting shaft 195 for the purpose of rocking the latter. The shoulders 289 which, normally, in co-operation with the studs 290, will prevent the rocking of the platen 194 in either direction, will, upon rocking of the plate 287, permit the operation of the platen in either direction to print a total from either totalizer. The formation of the upper end of the arm 284 is such as to permit the restoration of the arm to its normal position, shown in Fig. 23, and its movement to this position will cause the upper surface 291 of the arm (Figs. 23 and 26) to cam the plate 287 rearwardly against the tension of spring 288, to restore the parts to normal and prevent further operation of platen 194. It will be seen, therefore, that the turning of the lock 245 accomplishes a number of functions, including the release of the cash drawer, the locking of the operating keys by preventing movement of the bail 13, the release of the pair of lids 7 and 8, and the unlocking of the resetting lever as well as the total printing platen. An additional function of adding a unit upon a special counter will be explained herein-after in a section designated "Special counters".

Under the lid 8, which is released only by the

turning of the control lock 245, as above explained, is the bell muffler control lever 244, already described. There is, furthermore, located under this lid a general control lever 295 (Figs. 6, 16 and 17), which extends a slight distance beyond a curved portion of the casing 6, which is provided with a slot through which the lever 295 extends. One edge, 296, of this slot is provided with a series of legends (Fig. 17), designating the various functions of the machine which the lever is adapted to control. For example, when the lever is in the position shown (Fig. 17), the machine is adapted to operate on the "Open drawer", and when in this condition it is not necessary that the cash drawer be closed between successive operations of the machine. However, when the lever is shifted to the "Closed drawer" position it becomes necessary to close the drawer after each operation of the machine, before a subsequent operation may be performed. When the lever is moved to the lowermost or "Lock" position the machine will be locked against any operation by the operating keys while, when the lever is shifted to its uppermost or "Unlock clerk" position the machine may be operated by the depression of either of the clerk's keys 51, regardless of whether one or both of the locks 106 and 107, previously mentioned, may have been turned to normally prevent the operation of one or both of the clerks' keys.

To carry out the various functions mentioned, the lever 295, which is mounted upon the shaft 21, is provided with a rearward extension 297 (Figs. 6, 16 and 33) to which is attached the upper end of a link 298. At its lower end this link is connected with a rock plate 299, secured to the shaft 254. A detent plate 300, likewise secured to the shaft 254, (Figs. 16 and 20) is provided with a series of corrugations or notches which are adapted to be engaged by a finger 301 of an arm 302, pivoted about the key shaft 12 and spring tensioned by a spring 303 to serve as a frictional detent, for the purpose of holding the control lever and the rock plate 299 as well as shaft 254 in any set position. A nose 304, extending from the plate 299, is adapted to co-operate with an arm 305 (Fig. 6) of a double lever pivoted about the key shaft 12 and having an upwardly extending arm 306, carrying a pin 307 adapted to co-operate with shoulders on the pair of clerks key locking members 116 and 117. The construction is such that when the lever 295 is shifted to its uppermost position the plate 299 will be rocked to carry its nose 304 into engagement with the arm 305, to rock the double lever sufficiently to cause the pin 307 to shift the members 116 and 117 forwardly until the open spaces in rear of the shoulders 118 are in the path of the pins 119. This action will take place regardless of whether one of the members 116 and 117 may have been shifted to carry its shoulder 118 below the corresponding pin 119 by the turning of one of the locks 106 and 107. By the means described, therefore, the party having access to the lever 295 may unlock either or both of the keys A and B, if they have been previously locked by one or more of the clerks.

Secured to the shaft 257, to which is fastened the pair of locking hooks 258, previously mentioned, is a two armed member 308, 309. The horizontal arm 308 of this member (Figs. 20, 23 and 33) is in the path of movement of the finger 271 which, as explained in connection with the release of the cash drawer by the turning of lock 245, serves to limit the rocking movement

of double lever 263 under the influence of spring 269; the finger 271 being secured to the shaft 254 will turn with the latter upon the shifting of the control lever 295 and as the latter is brought to its extreme downward position the finger 271 will be carried clockwise (Fig. 23) into engagement with the arm 308 to rock the shaft 257 counter-clockwise. This movement of the shaft will, of course, carry the pair of hooks 258 over the upper surface of the weighted bail 13 and thus prevent operation of any of the operating keys, so that the machine may be effectively locked even though the barrel of lock 245 may be returned to its normal position. Figs. 23 and 33 illustrate the position of the various elements when the control lever 295 is in "Open drawer" position. The operation of the machine when lever 295 is in this position will now be described. A laterally projecting finger 311, formed at the lower end of arm 309 of the two armed member, has attached thereto a spring 312 which, at its other end, is connected by a pin to the slide 265 pivoted to the lower end of lever 263. As a result of this spring the projection 311 is normally maintained in engagement with a shoulder at the lower end of the two armed lever 263. The spring 269 (Fig. 23) will, furthermore, tend to move all of these elements to the right until stopped by the engagement of the surface 270 with the finger 271, or by means controlled by the cash drawer, as will be described. When the finger 271 is in the position shown in Fig. 23, it will prevent any further counter-clockwise movement of the lever 263 and, due to the action of spring 312, the arm 309 as well as the shaft 257 to which it is secured, will be normally held in a position in which the hooks 258 are out of engagement with the bail 13. The shaft 257 may, at this time, be positively rocked, as explained before, by the action of pin 255 on finger 256, due to the turning of the barrel of lock 245, and when it is so rocked the spring 312 will merely be placed under additional tension. However, if the finger 271 is shifted from the position shown in Fig. 23 to "Closed drawer" position the finger 271 is moved to a point above the upper end of the surface 270, the spring 269 may rock the lever 263 still further and, through the engagement of the shoulder of this lever with the projection 311, may rock the arm 309 and shaft 257 to engage the hooks 258 over the bail 13. Movement of the parts, as explained, under the influence of spring 269 will, at this time, be under the control of a pin 314, mounted on the slide 265, and adapted to co-operate with the edge of the drawer retaining catch 237. The co-operating edge of this retaining catch is in the form of a cam surface which, when the catch is in the position shown in Figs. 6 and 23, where it is held by the hook 236, will hold the pin 314 against any forward movement and the lever 263 will, accordingly, not be rocked further by the spring 269, even though the finger 271 may be out of the path of the surface 270. When the retaining catch is released from the hook 236, however, and the catch is rotated about its pivot 238 by the outward movement of the cash drawer, the cam edge 315 of the catch will permit the additional forward movement of the pin 314 and will, therefore, permit the further rocking of the lever 263, under the influence of spring 269. This movement of the lever 263 will then serve to rock the arm 309 and shaft 257 to engage the hooks 258 over the upper edge of the bail 13. All of the operating keys will

thus be effectively locked against any subsequent operation until the retaining catch 237 has been restored to its normal position by the return of the cash drawer. When the cash drawer is returned to its latched position the rear upper flange of the drawer will engage and rotate the retaining catch 237 and in so doing will cause the cam surface 315 of the latter to force the pin 314 and slide 265 rearwardly, until the catch is engaged by the hook 236. Rearward movement of the slide 265 will, of course, rock the lever 263 clockwise and the spring 312 will, in turn, rock the arm 309 and shaft 257 clockwise (Figs. 6 and 23) to carry the hooks 258 away from the bail 13. The connections from the control lever 295 are such that when the latter is shifted to the "Closed drawer" position (Fig. 17), the finger 271 will be carried clockwise out of the path of the surface 270 to accomplish the results explained. When the lever 295 is in the "Open drawer" position, on the other hand, the finger 271 will be in the path of the surface 270 and prevent the rocking action of the hooks 258 even though the cash drawer may be left in its open position.

Summarizing the operation of the control lever 295, it will be seen that it is located under the special lid 8, which is normally locked and may be released only by the turning of the barrel of the control lock 245. When the lid 8 has been released and raised, access to the lever 295 is provided and this lever may be set to any one of its four positions of adjustment. If shifted to its uppermost position, it will serve to unlock the clerks or totalizer selecting keys 51, so that either of these keys may be operated, regardless of whether one or both of the clerks' locks 106 and 107 may have been operated to lock up the key or keys. When the control lever is shifted to its second or "Open drawer" position, it is possible to operate the machine successively without the necessity of closing the cash drawer between operations. This is due to the fact that the finger 271 will prevent the spring 269 from forcing the locking hooks 258 over the bail 13. Upon movement of the control lever to the "Closed drawer" position, however, the finger 271 is carried away from the surface 270 and the spring 269 is permitted to rock the lever 263 as well as the shaft 257 and hooks 258, whenever the cash drawer is in an open position so that the pin 314 of slide 265 is not blocked by the cam surface 315 of the retaining catch 237. Return of the cash drawer, however, to its closed position serves to rock the retaining catch and causes the cam surface 315 of the latter to cam the pin 314 and slide 265 rearwardly against the action of spring 269 and thereby release the hooks 258 from the bail 13. Finally, if it is desired to completely lock the register against any operation by the operating keys the lever 295 may be shifted to its lowermost or "Lock" position and in so moving the lever, the finger 271 will be brought into engagement with arm 308 to positively rock the shaft 257 and engage the hooks 258 over the bail 13.

Another lever may be provided, with its upper end normally concealed below the lid 8, for the purpose of determining whether the machine is to operate on the "Open" or the "Closed" keyboard. Thus, a lever 316, (Figs. 2 and 34) pivoted about the segment shaft 21 may be provided with its upper end extending through a slot in the main casing of the machine, so that when the lid 8 is raised, this lever may be set in

either of its two positions, indicated by the notches in the casing. At the lower end of the lower arm of the lever 316, is pivotally carried one end of a slide 318, whose rear end is slotted to permit sliding upon the stud 94 which supports the locking hook 93. A cam opening 3181 in the slide 318 is adapted to co-operate with a pin 934, which may be mounted in a forward extension of a modified form of the locking hook 93. When the lever 316 is in the position shown in Fig. 34, the pin 934 is free to rise, vertically, in the forward end of the opening 3181, so that the hook 93 may normally be rocked by the spring 95 to engage its shoulder 932 over the pin 891 to lock the key coupler against operation until a clerk's key has been latched and has permitted the clerk's key bail to rock forwardly. The pin 934, at this time, co-operating with the bottom of the opening 3181, serves to limit the rocking movement of the hook 93. At the same time, the vertical rise of the opening 3181, at this point, will permit the rocking of plate 93 counter-clockwise upon the return of the pin 891 toward the end of an operation of the coupler. Now, if the lever 316 is shifted to its upper position the slide 318 will be moved forwardly and the lower cam edge of the opening 3181 will positively rock the hook 93 to disengage its shoulder 932 from the pin 891. Obviously, when the hook is in this position, it will not be necessary to operate the clerk's key, to release the machine, and there results what is known as the "Open keyboard" arrangement.

Special counters

In accordance with the present invention, the machine herein disclosed is provided with a series of special counters, each adapted to register consecutive numbers and all arranged in a vertical tier within the machine, directly beneath the special lid 8, (Fig. 1), which conceals the general control lever, the keyboard control lever, and the bell muffler lever. The series of special counters and the major portion of their operating connections are supported by a pair of spaced plates 320 (Figs. 2, 6 and 16) which are removably secured in the machine, directly below the lid 8. At their forward ends these plates are provided with forked extensions which are adapted to co-operate with a rod 322, supported by a pair of rearwardly and upwardly extending ears projecting from the tie bar 4 (Figs. 6 and 16). The rear upper ends of the plates 320 are supported by means of screws 321 which are adapted to attach the plates to a pair of forwardly extending lugs formed on the rear frame member 3. By merely removing the pair of screws 321 the supporting plates 320 and all of the special counter mechanism directly supported thereby may be readily removed from the machine, whenever the lid 8 is open. Supported at opposite ends by the plates 320 are a series of shafts 323 on which are mounted the counting wheels and driving ratchets of the various special counters. All of the counters are of the well known deep notch transfer type, in which the wheels are adapted to be driven by means of a multi-tined pawl 325 (Fig. 18) mounted on a rod 326 extending between the sides of a bail member 324. Rocking of the bail, by means which will be described, will serve to cause the prongs of the actuating pawl 325 to engage ratchet wheels adjacent each of the number wheels of the counter, and upon each operation of the bail will serve to add a unit in the counter.

The illustrative machine is provided with four consecutive number counters 319 which are con-

nected for direct operation by certain of the special clerks and transaction keys. Connections from each of the bails 324, associated with these four counters, comprise a series of actuating arms 327 (Fig. 16) mounted at one end upon a series of rods 328, which are supported at opposite ends by the pair of plates 320. At their upper ends the arms 327 are provided with suitable slots to engage an extension of the pin 326, which supports the multi-tined pawl. Secured to each of the rods 328, at some suitable point, is an arm 329 which extends downwardly and carries at its lower end a pin 330 which is adapted to co-operate with a slot 331 in an operating plate 332 mounted upon the key shaft 12. A forward extension of the operating plate is provided with a notch 333 which co-operates with a pin 334 on the associated special clerk's or transaction key 51 or 52. The four counters, which have been mentioned, are connected by the means described to the three transaction keys designated, "Charge", "Paid out" and "Received on account" and to the "B" clerk's key. In order to permit the use of uniform operating plates 332, each is provided with a pair of slots 331, and the arms 329 are so formed and directed that the pins 330, carried thereby, may co-operate with one or the other of the slots 331. It will be understood that the arms 329 are suitably located on their rods 328 so as to place the pins 330 in the proper planes of the operating plates 332. Through the connections described, it will be seen that the operation of any one of the four special keys, "Charge", "Paid out", "Received on account" and "B", will serve to add a unit in the related special counter.

Another consecutive counter 335 is provided, for the purpose of counting the total number of operations of the machine. For this purpose, the pin 326, which supports the actuating pawl 325 of this counter, is engaged by the slot in the upper end of a bell crank lever 336, which is pivoted about the shaft 21. The rear arm 337 of this bell crank is forked to engage the opposite sides of a cam disk 338 mounted on the main rotation shaft 18. Accordingly, upon each rotation of the shaft 18, the bell crank 336 will be rocked and a unit will be inserted into the counter 335, which is designated the "Customer's counter".

Another counter, 340, (Figs. 16 and 23) is provided, for the purpose of registering the number of operations of the control lock 245, so that the amount indicated upon this counter may be fairly taken as an indication of the number of times that a resetting operation has been performed. Connections for operating the "Resetting" counter 340 include a slide member 341 having a vertical slot at its rear end, which is adapted to engage the pin 326, mounted in the bail 324 and supporting the operating pawl 325, associated with this counter. A substantially horizontal slot 342, formed in the member 341, is adapted to co-operate with the shaft 323 of the "Customer" counter, for the purpose of supporting and guiding the slide member. At its forward end the slide 341 is pivoted at 343 to the upper end of the hook member 275 which, as previously described, is for the purpose of locking the special lid 8 and is adapted to be rocked by the turning of the barrel of lock 245. Thus, as the hook is rocked rearwardly to release the special lid 8, a unit will be added in the special "reset" counter 340.

Finally, a counter 344 is provided for registering the number of "No sale" operations of the ma-

chine. Since no "No sale" key has been provided, in this machine, suitable connections are employed for operating the "No sale" counter whenever a clerk's key is operated, without the depression of either an amount or a transaction key. As best shown in Fig. 34, the counter 344 is provided with the usual operating ball 324 and multi-tined pawl 325. A pair of levers 345 and 346, mounted upon a rod 328, constitutes the connection from the operating mechanism to the counter operating devices. A pin 347, mounted in the arm 346, is adapted to co-operate with a slot in the upper end of an operating rock plate 348. At the rear of this rock plate a notch 349 is provided to co-operate with the lip of the key coupler during "No sale" operations, and a spring 350 is provided for connecting the rock plate with the key coupler and tending to cause their joint movement during the initial movement of the coupler. Whenever an amount or transaction key is operated, however, a bar 352, connected to the single key pendants 81, associated with these keys (Fig. 35) is carried to the right, so that its end lies over the tail 351 of the operating rock plate. When the bar is so shifted the spring 350 will be tensioned upon movement of the coupler but will not be able to carry the rock plate along with the key coupler and the notch 349 will not be engaged with the lip of the coupler. A spring 353, extending between the bar 352 and a pin 354 projecting from the base plate serves to maintain the bar in its normal position, shown in Fig. 35. It will be apparent that, upon each operation of the key coupler, in which the bar 352 is not shifted, a unit will be added in the "No sale" counter 344.

In order that the various special counters may be restored to their zero positions, whenever desired, at the end of some particular accounting period, a finger wheel 355 (Figs. 2, 6 and 16) is secured to each of the shafts 323 and these wheels extend a slight distance above the surface of the casing 6 but are concealed by the lid 8. By the well known pawl and notch connection between the shafts 323 and the several special counter wheels mounted thereon, rotation of the shafts through the finger wheels 345 will serve to turn the counter wheels forwardly to their zero positions.

Summary of operation

In order that the operation and co-ordination of the various sections of the machine may be more readily understood, a brief summary will now be given of typical operations of the operating portions of the machine.

Let it be assumed that the machine is in condition for the entry of transactions, so that the general control lever 195 is, for the sake of example, in the "Open drawer" position and the lock 245 is turned to its normal position. Suppose that a cash transaction is now to be entered by clerk "B" in the amount of \$5.51, the amount keys may first be depressed, successively, to their latched or coupling positions. For example, the \$5 key may first be operated to rock the weighted bail 13 until its upper edge is substantially in engagement with the under side of the key coupler, at which time the surface 14 of this key will have been brought into engagement with the lower edge of the lip of the coupler. This partial depression of the \$5 key will have brought its hook 82 (Fig. 4) above the over-turned flange of the bail 83, associated with the dollar keys. Movement of the key coupler is, at this time, prevented by the co-operation between the hook

member 93 and the stud 891 carried by the arm 89, which is connected with the clerk's key bail, which in turn is mounted on the shaft 84 connected to the key coupler through the uprights 68 and arms 88 and, accordingly, further movement of the \$5 key is also prevented. The 50¢ key and the 1¢ key may then be depressed in succession to carry their hooks 82 over the flanges of their associated bails 83. Depression of all of the amount keys, specified, will have served to rock the associated cam plates 19 to a slight extent but, due to the formation of the cam slots in these plates, no movement will have been transmitted to the segment frame. Up to this time the key coupler will have remained locked, as explained, by the engagement of the hook 93 over the pin 891 carried by the clerk's key bail. Now, in order to release the machine for full operation, the "B" clerk's key 51 is depressed and is given a full operation to cause a complete entry of the transaction in the machine. During the initial movement of this clerk's key a pin 512, extending laterally from it, will co-operate with a pivoted dog 90 (Fig. 12) and rock it sufficiently to carry the surface 901 above the flange of the clerk's key bail 83 and, at the same time the hook 82, at the rear of the clerk's key, will have been carried above this flange. The spring 85 which is compressed between a lug on the restoring bail 86 and a lug on the clerk's latching bail 83, will now serve to swing the latter, not only to retain the clerk's key in its depressed position, but to carry the pin 891 from under the locking surface 932 of the hook 93, with the result that the key coupler is no longer locked against operation and a full depression of the clerk's key will be transmitted to carry all of the latched keys through a completed cycle of operation. During the movement of the key coupler the several cam plates 19, associated with the latched keys, will rock their related segment frames 20 to extents corresponding to the keys depressed, due to the co-operation between the cam slots 191 and the segment frame rods 200. Attached to each of the several segment frames is a driving segment 203 (Figs. 3 and 7), which is continuously in mesh with a pinion 23 connected to rotate an item printing type wheel 25. At the same time, suitable connections from the clerk's key, comprising a cam plate 123 (Fig. 6), secured to a rock shaft 125 and an arm 126 secured at the opposite end of said shaft and connected by a link 127 to an arm 128, which is suitably connected through a sleeve and pinions 134, 132 to the clerk's printing wheel 133, will serve to turn the latter from its normal A position to the B printing position. Since no transaction key has been depressed, the transaction type wheel 145 will remain in its normal position for printing a star or other symbol of a cash transaction. If some other type of transaction were being entered this transaction type wheel would be turned, however, by connections similar to those operated by the clerk's key.

At the same time that the actuating segments are being driven to differential extents, the main shaft 18 of the machine is being rotated by the usual connections from the key coupler to perform the various timed functions of the machine. Referring to Fig. 9, it will be noted that at the very beginning of the rotation of shaft 18, the totalizer engaging arm 46 will have been rocked downwardly to cause a rocking movement of the totalizer engaging plate 40 about its pivot 41. During the initial depression of the "B" clerk's

key 51, and prior to any rotation of shaft 18, the pin 510, in co-operation with the shoe 421, will have rocked the shaft 43 and pitman 42 to shift the pivot 41 slightly to the front, so that the finger 401 will have been carried away from the rear totalizer shaft 31 and the finger 403 will have been carried over the forward totalizer shaft 31. Due to this shifting of the plate it will be apparent that the rocking of the latter by means of the cam 49 will serve to carry the forward totalizer into engagement with the actuating segments 203. In order to prevent any accidental rocking of the rear totalizer, at this time, a plate 53, which is connected by means of the slot 530 and pin 404 to the plate 40 will have been rocked to carry its shoulder 532 under the rear totalizer shaft 31, while, at the same time, its shoulder 531 will have been carried away from the forward totalizer shaft 31. The formation of the cam 49 is such that the selected totalizer will be held in engagement with the actuating segments 203, during the entire positive upward and rearward movement of the latter and will be disengaged from the actuators prior to their return movement. Toward the end of the down stroke of the keys the cam 186 (Fig. 24), carried by the main operating shaft 18, will serve to release the printing hammer 184, which has been placed under tension by the rotation of the cam, and will permit this hammer to drive the platen 154 downwardly to take an impression from the item printing type wheels. The connections from the printing hammer to the platen include an arm 187 which carries a hammer block 1871, adapted to be struck by the hammer, and this arm is connected by means of a clutch member 1872 to the arm 1541 of the platen. In order to prevent accidental or intentional operation of the platen prematurely, the latter is normally locked against movement by a two-armed hook member 188 which co-operates with a lug 1875 carried by an arm integral with the platen. During the downward movement of the hammer, in the act of placing it under tension, a pin 1843 co-operates with a tail 1882 of the two-armed latch and rocks the latter to release the platen for operation, so that it may be driven by the connections mentioned on the spring propelled upward movement of the hammer. A hook 189 serves to hold the latch 188 in platen releasing position, but when the latch is rocked and the platen is operated, by the force of the hammer, a lug 1876, connected with the platen, co-operates with an arm 1892 of the hook to disengage the latter from the two armed latch. After an impression has been taken upon the record material 146 by the rocking of the platen, as explained, the storage roll 157 is rotated slightly to feed the strip and thus carry the last impression from a position directly above the type wheels and under the platen to a position directly above the platen, where it is exposed to view under the glass covered opening 180 in the lid 7. The means for thus feeding the record strip from the supply roll 147 around the platen and suitable guide rolls to the storage roll, is best shown in Fig. 5 and comprises a cam operated lever 167 which, during the first half of the rotation of shaft 18 permits the downward movement of link 163 under the influence of spring 164 to rock the plate 158 and carry the feed pawl 159 below the next tooth of the ratchet 1572 (Fig. 27). On the second half rotation of the shaft 18 the cam lever 167 will then serve to restore the

link 163 and effect a slight rotation of the storage roll 157.

Indicator mechanism, for the purpose of displaying to the front and rear of the machine the nature and amount of the transaction which is being entered into the forward totalizer and printed upon the record strip, comprises a plurality of amount indicator targets 602 placed in aligned groups and having stems 601 which terminate just above the rear ends of the several amount keys, so that upon depression of the forward ends of the latter and the consequent elevation of the rear ends, the associated target indicators will be elevated into view. A similar target indicator 612 will be raised by the co-operation of its stem 611 with the clerk's key. A bail 63, which is adapted to co-operate with over-turned lugs 62, carried by the several indicators, will serve to maintain the latter in elevated position until, during the next operation of the machine, the bail is rocked by means of a pitman 64 (Fig. 6) operated by a cam 66. The fact that the particular transaction entered is a cash sale, is indicated by a fixed indicating plate 73 bearing the word "Cash", just below the line of the exposed amount indicators. A fixed "Cash" indicator is provided at both the front and rear sides of the machine, to indicate the nature of the transaction to both sides. If some other type of transaction had been involved in the entry, the depression of the related key, such as a "Charge" key, would have brought the rear end of such key into co-operation with the stem of a slide 80 to lift the latter, about half the distance that the "Amount" targets are elevated, until the lug 801 would have engaged over the top of the detaining bail 63. The upper end of the slide 80 will, during its operation, engage a pin 761 extending from a bail 76, whose forward free arms are connected by pins 75 to a pair of transaction indicator slides 74 which, at their opposite ends, are connected by double pin and slot connections to an arm 77 pivoted upon a shaft 78. The result of the upward movement of the slide 80 is to carry the transaction indicators, by a parallel link movement, from a concealed to an upper exposed position, where they will conceal the cash indicators 73. In order to conceal the indicators during an operation of the machine, as is customary, an indicator flash is provided in the form of a rectangular box 71, mounted at opposite ends upon a pair of uprights 68 which, by pin and slot connections 69, 70, are adapted to be lifted and lowered in accordance with the movement of the key coupler 15.

Another function which is performed during an operation of the machine, such as now being described, is the insertion of a unit in a plurality of special consecutive counters. Thus, upon every operation of the machine, the customer counter 335 is operated by means of a cam 338, mounted on the main shaft 18, co-operating with a double lever 336, 337, whose upper end is slotted to engage a pin extending from the operating bail for this counter. Upon each rotation of the main shaft a unit is added to the customer counter, through the connections mentioned. One of the counters 319, furthermore, is operated during the entry of the assumed transaction and this is the counter which is associated with the "B" clerk's key. The connections for inserting a unit into this counter, as best shown in Fig. 16, includes a multiple tined pawl 325, mounted in a bail 324, which is adapted to be rocked by a lever 327, secured to a cross rod 328 which, in

turn, is rocked by means of an arm 329, which co-operates with a slot in a plate 332 connected with the B clerk's key 51. If one of the special transaction keys 52 had been depressed, during the operation of the machine, similar connections would have affected the entry of a unit in a related special counter 319.

In order that the keys which have been active, during an operation of the machine, may be fully restored to their normal positions, below the under surface of the key coupler, certain key releasing elements must come into play to effect the automatic uncoupling of the keys, prior to the return of the key coupler to its normal position of rest. As best shown in Fig. 14, the mechanism provided for this purpose comprises a double lever 98, 99, secured to the shaft 84, which supports the series of key latching bails 83 as well as the releasing bail 86. This shaft is mounted in the upright indicator flash supports 68 and is, hence, connected for movement with the coupler at all times, but in a vertical, rectilinear path instead of in an arcuate path, such as followed by the end or lip of the key coupler. A pair of arms 88, secured to the shaft 84, and having a foot extending over the lip of the key coupler also serves to transmit the movement of the latter to the series of latching bails. A spring 100, attached to the upper end of arm 98, serves to normally rock the shaft 84 counter-clockwise until a pin 981, carried by the arm, engages a fixed finger 682 on the supporting frame. Co-operating with a shoulder 991 at the lower end of the arm 99 is the upper end of finger 1013 of the pivoted and slidable member 101 which is provided with an opening 1011, adapted to co-operate with a pin 131, mounted in the weighted bail 13. As one or more keys are depressed the bail 13 is lifted and a spring 102, attached to the member 101, serves to rock the latter to follow the rocking of the bail, but this movement is limited by the engagement of the finger 1013 with the shoulder 991. Now, as the key coupler is rocked and the frame, comprising uprights 68 and shaft 84, is lifted, the shoulder 991 moves away from the finger 1013 and when the abutting surfaces are completely disengaged the spring 102 will give a slight additional movement to the member 101. As the depression of the keys continues the hooks 82, at their rear ends, will move away from the latching bails 83, due to the divergence in the paths of movement of these parts. In the meantime, the usual engagement of the notch 141, in the rear ends of the keys, with the lip 151 of the coupler has taken place, to maintain a positive locking engagement between the keys and coupler. Upon the return stroke of the keys and coupler as well as the weighted bail 13, the rearward edge of finger 1013 coming in engagement with the forward edge of arm 99 will rock the latter, as well as shaft 84, clockwise (Fig. 14) to prevent the re-engagement of the bails 83 with the hooks 82 of the coupled keys. The connection between the bails 83 and the shaft 84, for this purpose, is effected for the amount and transaction bails through the pair of arms 88, whose rear shoulders engage extensions from the pair of adjacent latch bails. The releasing connections for the clerk's bail 83, on the other hand, includes the bail 86, which is rocked with the shaft 84, due to the clamping engagement of the jaw 87 of one of the arms 88, and this bail is provided with a finger 861 to engage the clerk's bail and tilt it rearwardly. Through these connections it is in-

sured that merely the engagement between the notches 141 of the keys and the lip 151 of the coupler serve to hold these elements in coupled relation, and since this engagement ceases when the coupler reaches its position of rest, there is nothing to prevent the full return of the keys by means of the weighted bail 13. In order to permit the proper return of the pin 891, carried by the extension of the clerk's key bail beneath the hook surface 932, the hook member 93 is provided with a cam surface 933, so that the member may be rocked about its pivot 94 against the tension of spring 95 to the extent necessary for the return of pin 891.

In order that any errors which may be made in the depression of keys to represent a transaction may be corrected, after the keys have been latched but prior to movement of the coupler, a manually operable release key 105 is provided, to co-operate with the pivoted and slidable release member 101. It will be apparent from Fig. 14 that depression of the release key will cause the connected arm 103 to engage the finger 1014 of member 101 and slide the latter rearwardly, to cause its finger 1013, in engagement with the lower end of arm 99, to rock the latter and the shaft 84 to release all of the attached keys, just as during the operation of the machine.

The usual functions, provided in machines of this character, of releasing a cash drawer and ringing a bell are also included in the machine illustrated. The bell ringing means, best shown in Figs. 3 and 6, comprises a cam 239 on the main shaft 18, co-operating with a striking member 240 to rock the latter and cause its hammer end to sound a bell 243. For releasing the cash drawer, as best shown in Figs. 16 and 23, a cam 232 is provided on the main shaft to operate a link 233, whose lower end is attached to a bell crank 234, whose upper end is in pin and slot connection with a latch 236. Operation of the main shaft will serve to rock the bell crank 234, to withdraw the latch from a shoulder on the retaining catch 237, so that the drawer spring 1000 may eject the cash drawer.

When the parts have been restored to their normal positions by the action of the key coupler and the weighted bail 13, a new transaction may be entered by the depression of any desired clerk's, transaction, and amount keys. It is not essential that the amount keys shall be depressed prior to the clerk's key, although this is the preferable mode of operation. In fact, the machine may be fully operated by the mere depression of a clerk's key, if desired, and if so operated it produces, in effect a "No sale" operation. Such depression of one of the clerk's keys, alone, will result in the printing of the appropriate clerk's designation and the exposure of the corresponding clerk's indicator. At the same time, a unit will be added into a special "No sale" counter and, for this purpose, the construction is such as to normally connect this counter for operation by the key coupler, upon each operation of the machine, by the engagement of the opening 349 of the spring tensioned rock plate 348 over the lip of the coupler. Whenever an amount or transaction key is depressed, however, a bar 352 is shifted into co-operation with the rear extension 351 of the rock plate to prevent the spring 350 from engaging the opening 349 with the lip of the coupler and thereby prevent the insertion of a unit into the "No sale" counter. When a clerk's key alone is depressed, the rocking of its bail 83 to carry the pin 891 away from the shoulder 932 of the hook

93, which is effected by the associated spring 85, is sufficiently tardy to prevent the rapid continuous depression of a clerk's key. This tendency has two advantageous results; the one being to prevent a whipping action being given to the totalizer control plate 40 by the "B" key, whereby it might be shifted beyond its forward totalizer selecting position into the "throwout" position, and the other being to serve as a temporary limit for the depression of a clerk's key, when it is desired to couple on other keys subsequently.

If a transaction, being entered into the machine, is of a special character, such as "Charge" or "Paid out", not involving the receipt of any money by the clerk, the totalizer engaging plate 40 is shifted forwardly (Fig. 9) somewhat further than under the influence of the B clerk's key. This is effected by the engagement of a pin 520 carried by each of these keys with a corresponding shoe 422 on the shaft 43. When the pivot 41 of the engaging plate is so shifted to the additional extent, the notch 44 at the rear of the plate is completely disengaged from the pin 45 of arm 46 and, as a result, no rocking movement is given to the plate upon an operation of the machine. As a safeguard against the accidental rocking of the plate 40, at this time, an under surface 405 of the plate is carried by the forward shifting of the latter over a fixed stud 55, extending from the adjacent intermediate plate 38.

During the successive operations of the machine suitable transfer mechanism, such as that illustrated in Fig. 7 becomes active, from time to time, to carry a unit from a lower order wheel to a higher order wheel of the totalizer. If, during the course of the entries being made during the day the record strip should become exhausted from the supply roll 147, access to the printer mechanism may be had by the clerk in charge of the machine, to insert a new supply roll. Such access may be had by the insertion of a key in the lock 716 (Fig. 5) which, when operated, projects a bolt to rock the printer lid latch member 712 to disengage it from the lug 711, extending downwardly from the lid. When the lid is now raised, it is rocked about the invisible hinge mechanism, shown in Fig. 26, and is retained in its raised position by the co-operation of pins 705 and 709 in the cam slots 701 and 708. The handle 2202 of the slide 220, which is now accessible, may be forced rearwardly against the tension of spring 2201 and as it is shifted, the slots 2203 co-operating with pins 3170, will rock the pair of totalizer concealing shields 317 to positions directly above the two totalizers, where they will not only conceal the totalizer elements but positively rock them as well. Continued rearward movement of the slide will cause the pin 2204 to engage the rear end of the opening in the hook member 219 and rock the latter out of engagement with the rod or shaft 195, so that the pivoted printer frame comprised by the pair of side arms or plates 160 and 1600, together with the intermediate connecting parts, may be rocked upwardly and forwardly about the shaft 161. At this time the overturned extension 1610, secured to the shaft 161, will co-operate with the forward end of slide 220, to prevent the return movement of the latter as well as to maintain the printer frame in its elevated position. The removal of the full storage roll and the insertion of a new supply roll, together with the threading of the strip around the guide rollers and platens, may now be readily effected. Due to the operation of the shields 317 by the slide 220 the

totalizer elements, which are normally concealed by the printer mechanism, are still protected against wrongful manipulation, even though the printer frame has been elevated. When the new record strip has been properly inserted the slide 220 may be shifted slightly rearwardly, to disengage its shoulder 2206 from the extension 1610 and the printer frame may be restored to its normal position in the machine, the spring 2201 will then draw the slide forwardly to rock the shields 317 out of active concealing position and to rock the printer latch 219 forwardly to engage the shaft 195.

At the end of the day, or any chosen period, the proprietor of a store, or any other authorized person who may be provided with a key to the lock 245, may now rotate the barrel of this lock, to prepare the machine for the printing of a total from each of the totalizers as well as to prepare for a resetting operation. As best shown in Figs. 4 and 33, rotation of the barrel of the lock will, through the pair of links 246 and 249, rock the bell crank 250 clockwise (Fig. 4), to produce a series of results incidental to the printing of a total and the resetting of the totalizers. For example, the arm 251 is rocked downwardly to cause a downward movement of link 252 to rock the shaft 257 so as to engage the pair of hooks 258 over the weighted bail 13, to prevent the depression of any of the operating keys. Downward movement of the arm 252 will, at the same time, rock the shaft 431 to which this arm is secured. Also secured to this shaft are a pair of arms 280 and 284, which normally serve to lock the operation of the resetting segment and the total printing means, respectively. Thus, when the arm 280 is rocked downwardly its abrupt shoulder 281 is carried away from the pin 283 of the resetting segment 222, to permit the latter to be operated. At the same time, the arm 284, when rocked downwardly, permits the total printing control plate 287 to be rocked by its spring 288, to carry the shoulders 289 from under the pair of pins 290, carried by the total printing operating lever 197.

Additional results of the rocking of the shaft 431 by the turning of the lock 245, are the release of both of the lids 7 and 8, which conceal the printing mechanism and the special counters, respectively. The release of the printer lid, is effected by the engagement of the upper end of arm 273, which is secured to the shaft 431 with a lateral extension 274 of the printer lid latch 712, to cause its disengagement from the lug 711. Release of the special counter lid is effected by arm 279, secured to the shaft 431, whose upper end has a pin and slot connection to an arm 278, which is secured to the rod 276 carrying, at its opposite end a special counter lid latch 275. Movement of the latch hook 275 serves, also, to operate a special counter 340, which is adapted to indicate the number of operations of the control lock and, hence, substantially indicate the number of resetting operations. The connections for this purpose comprise the slide 341, connected at 343 to the upper end of the counter lid latch 275 and having a pin and slot engagement with the bail 324, carrying the operating pawl for this counter.

A final function of the control lock, effected by the mere turning of the latter, is the release of the cash receptacle, so that, in the process of total taking the contents of the drawer may be counted. Connections for effecting the release of the drawer, at this time, comprise an arm 260 (Fig.

23), secured to the shaft 431 and having pivotally connected at its lower end the slide member 261. As the shaft 431 is rocked counter-clockwise the slide 261 will be shifted toward the front of the machine and the pin 262, carried by the slide, will engage the upper arm of a lever 263, whose lower end has attached to it the slidable member 265. The resulting rearward movement of the latter causes its finger 267 to engage the pin 268 and rock the latch 235, to release the retaining catch 237 and permit the drawer to be expelled by its spring. With the parts in the condition, specified, as a result of the turning of lock 245, the lid 7 may, first, be raised and a total may be printed from each of the totalizers by, first, rocking the platen 194 by pressure upon the finger piece 1972 of the lever 197, to engage the rear impression block 196 with the rear totalizer wheels and then, by use of the finger piece 1971, forcing the forward impression block against the forward totalizer wheels.

For supplying the necessary ink, for the performance of the total printing operations, a pair of inking strips 2071, mounted in a pair of plates 207, are provided, between the pair of impression blocks and the two sets of totalizer wheels. These ribbon plates are, in turn, mounted in guiding and supporting members 210, which are adapted to have a substantially vertical movement in a removable ribbon frame 208. When a total is being printed from one of the totalizers, the corresponding ribbon supporting member is moved downwardly against the tension of a pair of springs 2102. When it is desired to remove a used ribbon plate and replace it by a fresh one, the frame 208 may be lifted bodily upwardly, out of the machine, and a new ribbon plate 207, may be forced into the guiding and supporting member while the old plate will be thereby displaced. After the totals have been printed, they may be brought into view under the glass plate, covering the opening 180, by means of the manual paper feeding lever 214. If the proprietor or other party, having control of the machine at this time desires, he may remove the printed record, carried by the storage roll, by first, shifting the slide 220 rearwardly and then tilting the printer frame to render the strip more accessible, in the manner explained in connection with the replacement of a record strip when exhausted.

The total having been printed, the proprietor may next reset the totalizers to zero, if he so desires, in order to prepare the machine for the separate accumulation of entries to be made during the succeeding period. In order to accomplish the resetting, it is merely necessary to engage the button 310, at the end of one of the totalizer shafts 31, to slide the latter longitudinally to the right (Fig. 2), in order to engage the pinion 221, secured to said shaft, with the teeth of the resetting segment 222, at the same time bringing the notches 223 of the shaft into the plane of the pawls 224, carried by the totalizer wheels. When the resetting segment is now drawn forwardly, the shifted totalizer shaft 31 will be rotated, to restore its totalizer wheels to zero. If both totalizers are to be restored the other knob 310 may next be engaged to shift its shaft and the resetting lever 222 is drawn forwardly again. If desired, the lid 7 may then be restored to its normal position and the lock 245 turned, to condition the machine for the normal item entering operations.

However, since the lid 8 has also been unlatched by the previous turning of the lock 245, access

may be had to the various features, located under this lid, and changes may be made in the several controlling elements, thus rendered accessible. It will usually be desirable to note the readings of the several special counters, which indicate the total number of operations of the machine, during the preceding period; the number of operations of the several special transaction keys, as well as the B clerk's key; the number of "No sale" operations, and the number of times that the control lock 245 has been turned. All of these counters, together with their trains of operating connections are mounted in a single unitary frame, which may be very readily removed from the machine, if desired, for any purpose. After having noted the readings of the several counters, any or all of them, with the exception of the lock operated or reset counter, may be restored to their zero positions, by means of the finger wheels 345.

The main or general control lever 295 is, at this time, accessible, and may be shifted from its "Open drawer" position, shown in Fig. 16, to any one of the three remaining positions. If shifted to its uppermost, or unlock clerk position, it will, through the link 298 and plate 299, serve to rock the two armed lever 305, 306, to engage and shift the pair of clerk's key locking levers 116 and 117, so that the slots, in rear of the shoulders 118, will be carried under the pin 119, extending from the clerks' keys, regardless of whether or not one or more of these levers may have been partly shifted by the turning of the locks 106 and 107. Movement of the lever 295 down to the "Closed drawer" position will, through the link 298 and the plate 299, turn the shaft 254 to a position in which the finger 271 is carried away from the surface 270 of the lever 263 and is brought opposite the cut out portion of said lever. This will permit the spring 269, under certain conditions, to rock the plate 263 (Fig. 23) counter-clockwise and rock the arm 309 in the same direction to turn the shaft 257 until the hooks 258 engage over the weighted bail 13. This action of the spring 269 is prevented, however, when the drawer is in the closed position, by the co-operation of the cam surface 315 of the drawer retaining catch 237 with the pin 314 of the slide 265, which is secured to the lower end of the lever 263. The cam surface 315 of the drawer catch is so formed that when the catch is rotated by the opening of the drawer, the slide 265 may be drawn forwardly with the lever 263, under the influence of spring 269, to cause the engagement of hooks 258 over the weighted bail 13 and thereby prevent a subsequent operation of the machine, until the cash drawer has been restored to its latched position. Additional movement of the lever 295 to its lowermost or lock register position, will carry the finger 271 (Fig. 23) still further clockwise, until it engages the arm 308, secured to the shaft 257 and rocks the latter independently of the lever 263, to carry the hooks 258 over the weighted bail 13. Thus, should the proprietor, or other person in control of the machine, desire to lock it against any operation during his absence, or for a given period, the general control lever may be shifted to its lowermost position and the lid 8 returned to its locked condition, by the restoration of lock 245.

If it is desired to disable the bell sounding device, this may be accomplished under the control of a lever 244, normally concealed below the lid 8. This lever, when shifted counter-clockwise (Fig. 6), serves to rock the striker 240 in the

same direction and carry its lower extension away from the bell operating cam 239.

Still another control which is accessible, when the lid 8 is open, is that which determines the effectiveness of the interlock between the clerks' keys and the key coupler. If it should be desired to permit the operation of the machine, without the necessity of depressing a clerk's key, it is merely necessary to shift the lever 316 rearwardly from the position, shown in Fig. 34 so that the connections from this lever will cause the cam opening 3181 of the slide 318 to engage the pin 934 and rock the pivoted locking hook 93 until its shoulder 932 is carried to the rear of pin 891 carried by the clerk's key bail 83. This will permit the shaft 84 and the key coupler to be operated, regardless of whether a clerk's key has been latched to its bail 83.

A preferred form of embodiment of the invention has been described, but it is to be understood that the various phases of the invention are of broad application and they are capable of various modifications and changes which fall within the scope of the claims which follow.

What is claimed is:

1. In a machine of the class described, a common operating member, means for locking said member against operation, yielding means for rendering said locking means inoperative, a lock, a lever, and connections from said lock and said lever to said locking means for positively moving the latter into active position.

2. In a machine of the class described, a common operating member, means for locking said member against operation, yielding means for rendering said locking means inoperative, a lock, a lever and connections from said lock and said lever to said locking means for positively moving the latter into active position, said lever being under the control of said lock.

3. In a machine of the class described, a plurality of totalizers, item entering means therefor, a normally locked platen pivoted between said totalizers and adapted to rock in either direction to print a total from one totalizer or another, manipulative means for rocking said platen, a lock, and connections from the latter for locking said item entering means and releasing said platen for operation.

4. In a machine of the class described, a series of item printing elements, a plurality of totalizers, means for entering items into said totalizers, a record medium, means for automatically printing said items from the item printing elements upon said record medium, a platen member rockable in reverse directions to print the total standing on one or another of said totalizers, means for rocking said platen, and manual means for feeding said record medium after said platen has been rocked to print a total from either totalizer.

5. In a machine of the class described, a plurality of lines of printing elements, a rockable platen member, a plurality of impression means carried by said platen member one for each line of printing elements, means for rocking said platen member to print selectively from one line of printing elements or another, a plate normally preventing rocking of said platen, and controlling means under control of which said plate may be shifted to permit rocking of the platen.

6. In a machine of the class described, a plurality of lines of printing elements, a rockable platen member carrying an impression element for each of said lines of printing elements, means

for rocking said platen member in one direction to print from one line of printing elements and in another direction to print from another line of printing elements, a movable plate normally preventing rocking of said platen member in either direction, and means for controlling the movement of said plate whereby rocking of said platen member in either direction may be permitted.

7. In an accounting machine, a totalizer, a rockable printing frame, means carried by said frame for printing totals from said totalizer and normally concealing the latter, latching means normally preventing rocking of the printing frame, a shield adapted to conceal said totalizer, and a manually operable slide adapted, when operated, to shift said shield into totalizer concealing position and to release said latching means.

8. In an accounting machine, a totalizer, a rockable printing frame, means carried by said frame for printing totals from said totalizer and normally concealing the latter, latching means normally preventing rocking of the printing frame, a shield adapted to conceal said totalizer, a manually operable slide adapted, when operated, to shift said shield into totalizer concealing position, and means on said slide to cause said latching means to be released thereafter.

9. In an accounting machine, a totalizer, a rockable printing frame, means carried by said frame for printing totals from said totalizer and normally concealing the latter, latching means normally preventing rocking of the printing frame, a shield adapted to conceal said totalizer, and a manually operable slide adapted, when operated, to shift said shield into totalizer concealing position and to release said latching means, said slide and said frame having coacting means whereby the slide may be maintained in shifted position and the frame in rocked position.

10. In a machine of the class described, a totalizer, printing means mounted in a liftable frame and normally concealing said totalizer, a totalizer concealing shield normally in inactive position, a latch for preventing lifting of said frame, manual means for first operating said shield to conceal the totalizer and then releasing said latch, and coacting means between said frame and said manual means whereby both may be held in their moved positions.

11. In a machine of the class described, a totalizer, printing means mounted in a liftable frame and normally concealing said totalizer, a totalizer concealing shield normally in inactive position, a latch for preventing lifting of said frame, manual means for first operating said shield to conceal the totalizer and then releasing said latch, coacting means between said frame and said manual means whereby both may be held in their moved positions, and means to prevent lifting of said frame until said manual means is operated or return of said manual means until said frame is restored to normal, the two last mentioned means being embodied in the same mechanical parts.

12. In a machine of the class described, a totalizer including a series of wheels, a normally ineffective shield for concealing said totalizer, means for moving said shield into concealing position, and means for positively locking said wheels upon movement of the shield into concealing position.

13. In a machine of the class described, a totalizer comprising a series of denominational elements, a movable shield adapted to conceal said totalizer, means for controlling the movement of

said shield into concealing position and means controlled by said shield for locking said elements.

14. In a machine of the class described a totalizer comprising a series of wheels, printing means normally concealing said totalizer but adapted to be moved to non-concealing position, a movable shield adapted to conceal said totalizer, means for locking said wheels against operation, and a common member for controlling the movements of said printing means and shield and for controlling said locking means.

15. In a machine of the class described a series of totalizer elements, printing means normally concealing said elements but movable to non-concealing position, a shield normally inactive but movable to conceal said totalizer elements, and common means for controlling the movements of said printing means and said shield.

16. In a machine of the class described a series of totalizer elements, printing means normally concealing said elements but movable to non-concealing position, a shield normally inactive but movable to conceal said totalizer elements, common means for controlling the movements of said printing means and said shield, the latter being effective to cause locking of said totalizer elements when moved to operative position.

17. In a machine of the class described printing elements, impression means therefor, and inking means comprising a frame removably inserted between said impression means and said printing elements, a separate ribbon carrier mounted for independent movement in said frame, and a separable inking ribbon plate carried by said carrier.

18. In a machine of the class described, a series of printing elements, a platen for taking an impression from said elements, a platen operating hammer, means for tensioning and releasing said hammer, a member normally preventing operation of said platen, and connections from said hammer for operating said member to release the platen upon tensioning of the hammer.

19. In a machine of the class described, a series of printing elements, a platen for taking an impression from said elements, a platen operating hammer, means for tensioning and releasing said hammer, a member normally preventing operation of said platen, connections from said hammer for operating said member to release the platen upon tensioning of the hammer, a latch for holding said member in platen releasing position, and means for operating said latch to release said member upon operation of the platen.

CHARLES W. GREEN.

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