Sept. 10, 1935. F. E. MILLER 2,014,358

CASH REGISTER

Filed April 13, 1927 6 Sheets-Sheet 1

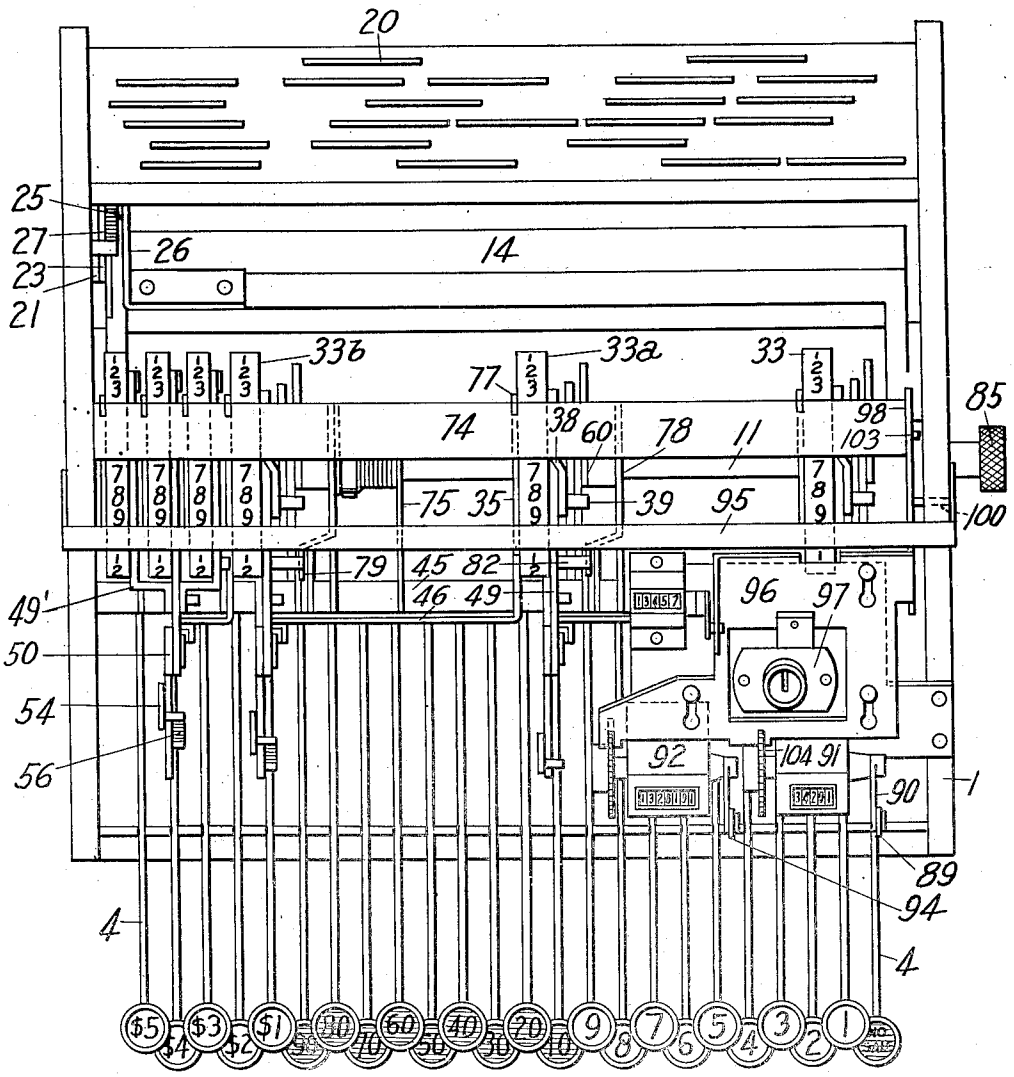


Fig. 1

INVENTOR.
Frederick E. Miller
By C. L. Walker
ATTORNEY.

Sept. 10, 1935. F. E. MILLER 2,014,358

CASH REGISTER

Filed April 13, 1927 6 Sheets-Sheet 2

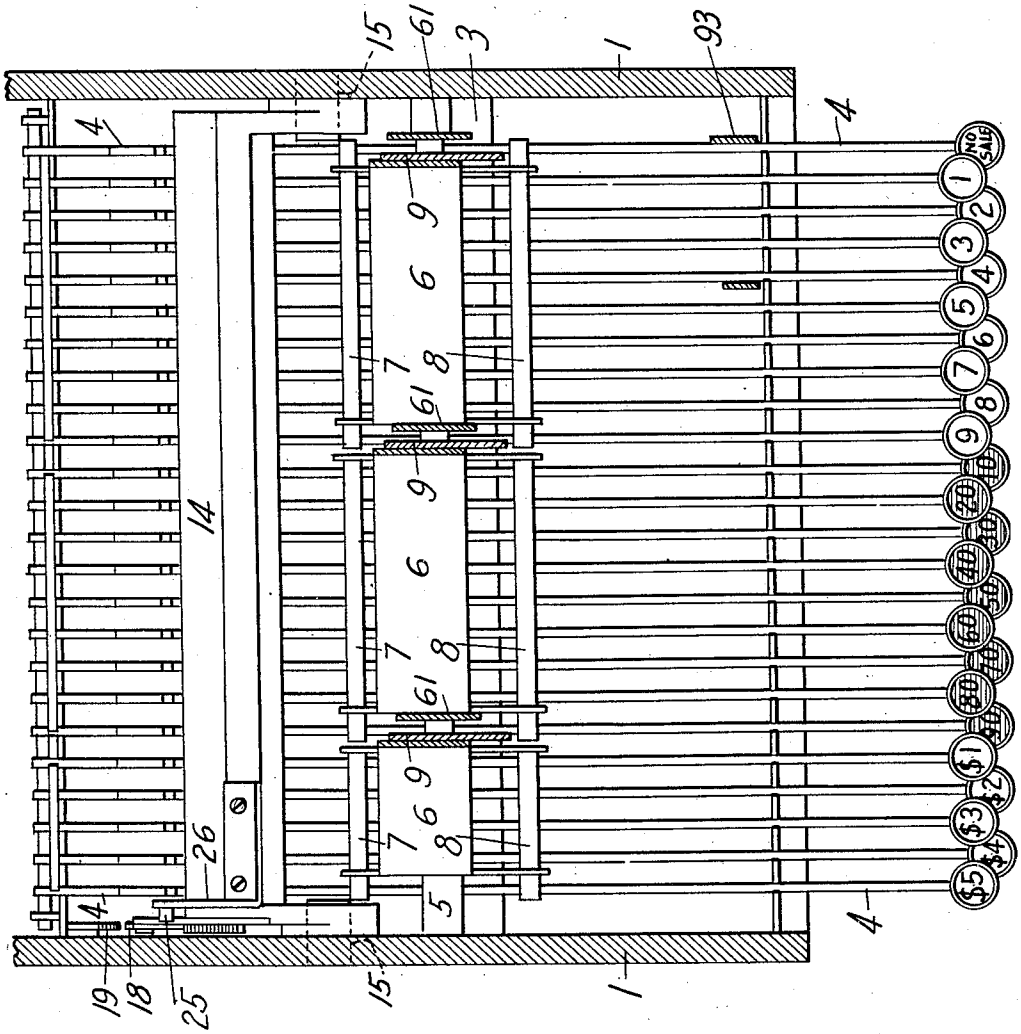


FIG. 2.

INVENTOR.
Frederick E. Miller
By L. C. Walker
ATTORNEY.

Sept. 10, 1935. F. E. MILLER 2,014,358

CASH REGISTER

Filed April 13, 1927 6 Sheets-Sheet 3

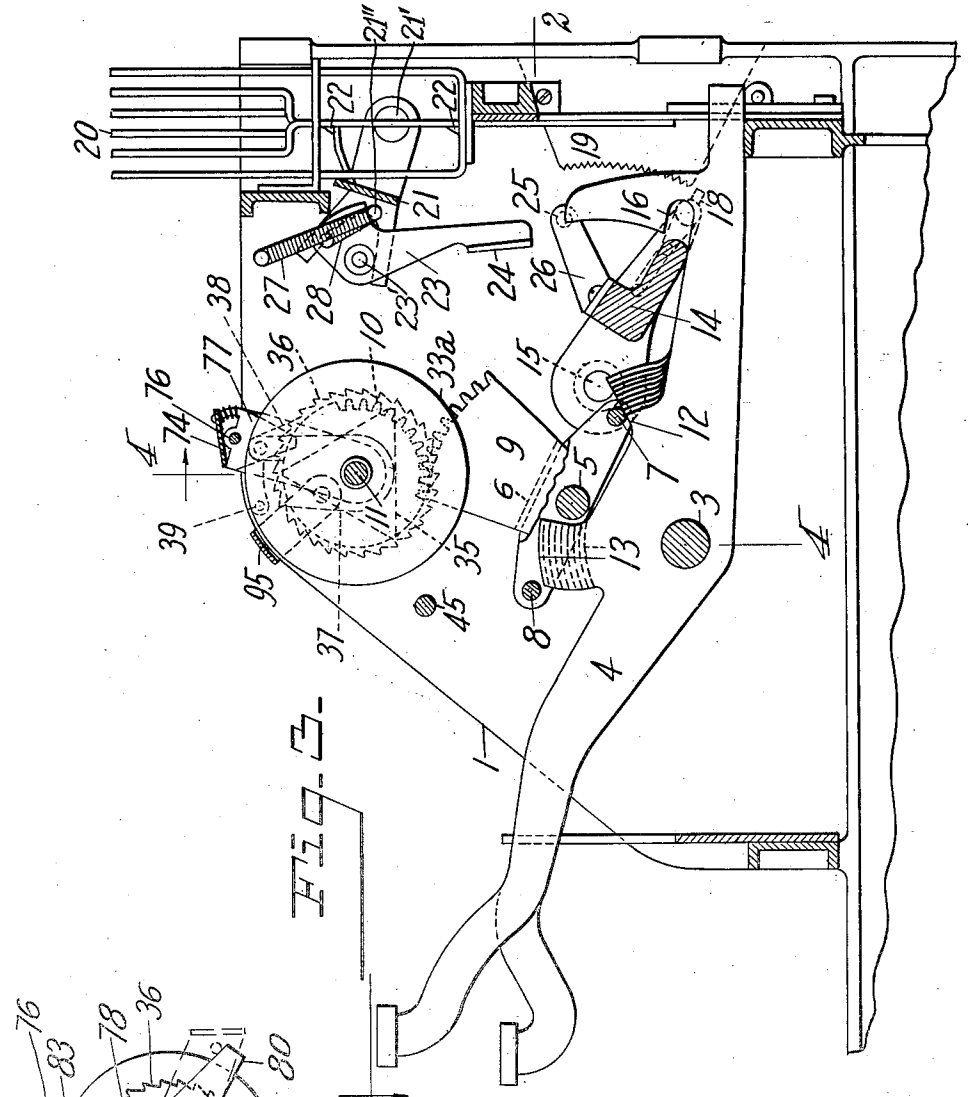


FIG. 3.

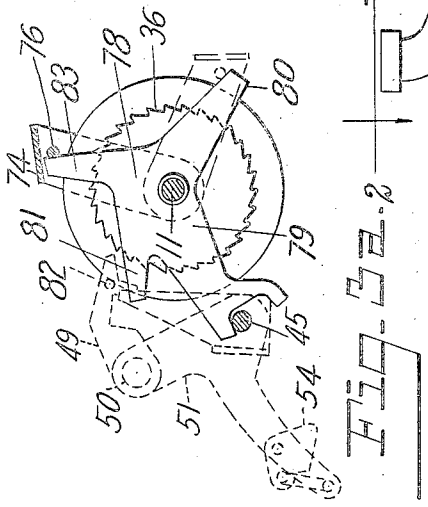


FIG. 2.

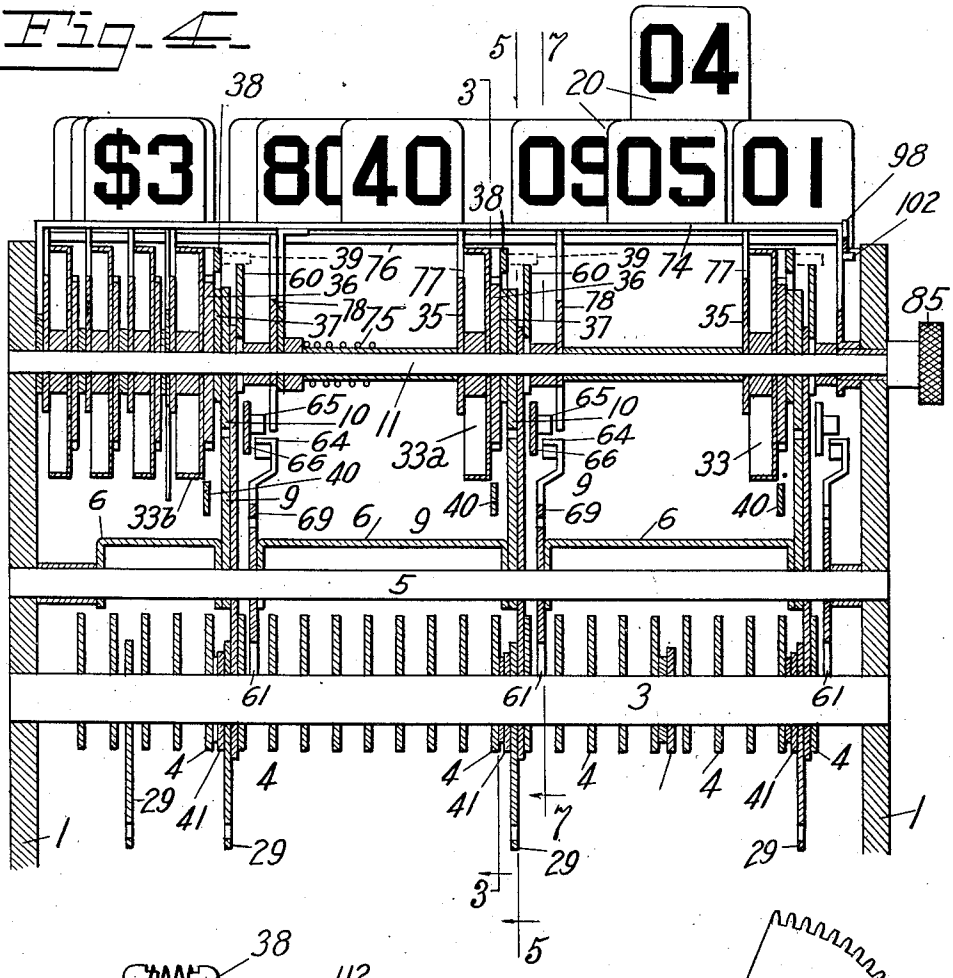
INVENTOR.
Frederick E. Miller
By H. C. Walker
ATTORNEY.

Sept. 10, 1935. F. E. MILLER 2,014,358

CASH REGISTER

Filed April 13, 1927 6 Sheets-Sheet 4

Fig. 4.



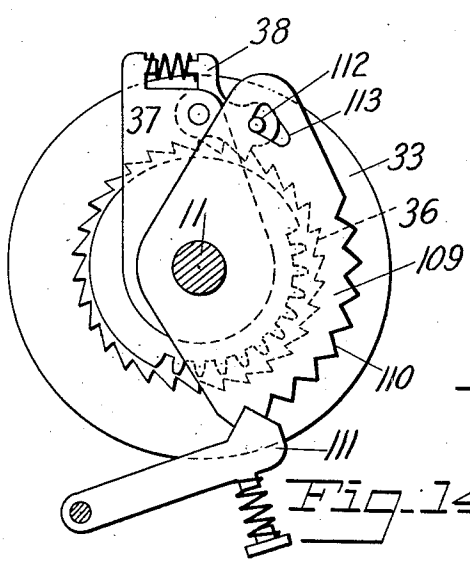


Fig. 14.

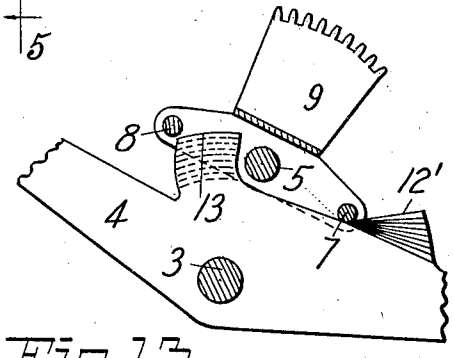


Fig. 13.

INVENTOR.
Frederick E. Miller
By P. L. Walker
ATTORNEY.

Sept. 10, 1935. F. E. MILLER 2,014,358

CASH REGISTER

Filed April 13, 1927 6 Sheets-Sheet 5

Fig. 7.

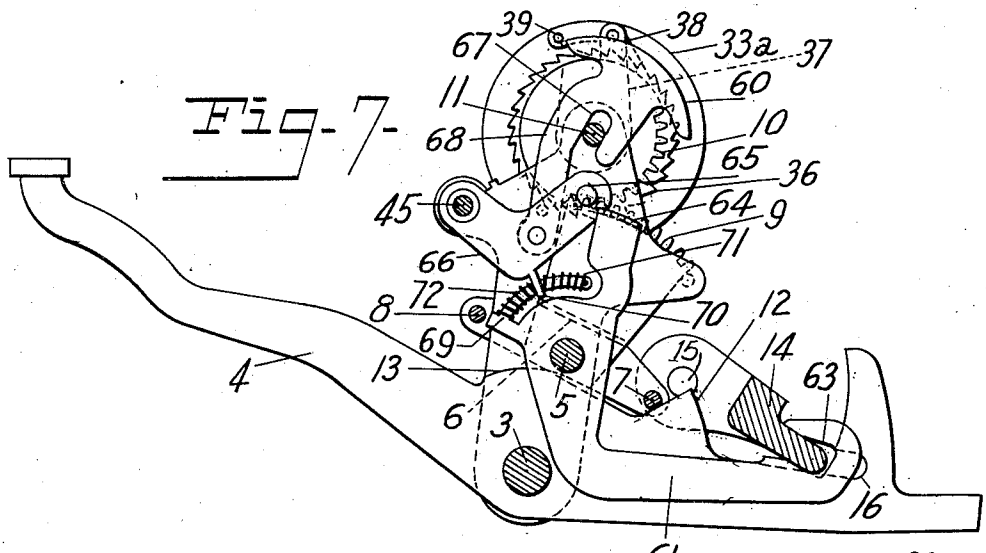


Fig. 5.

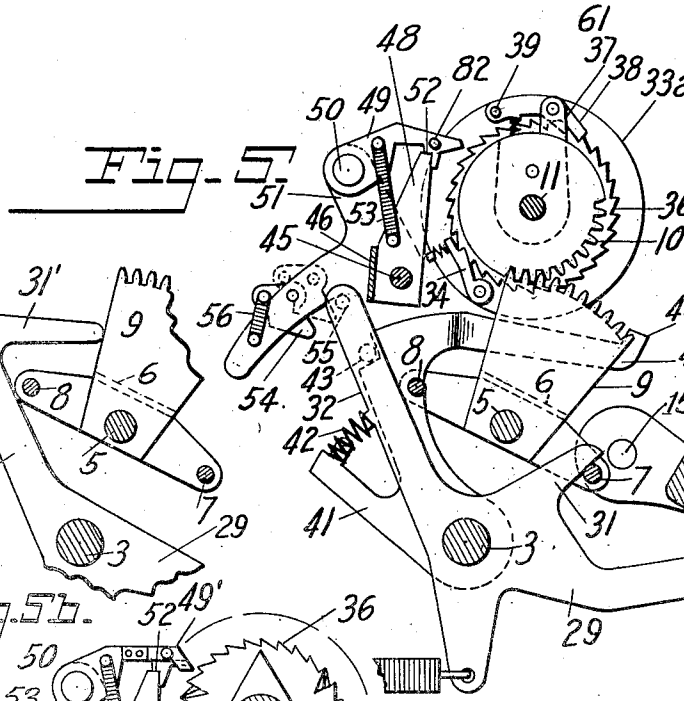


Fig. 5a.

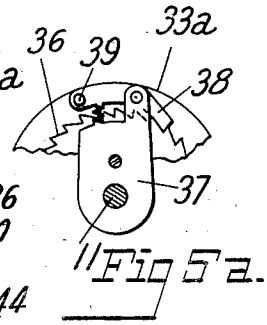


Fig. 5b.

Fig. 6.

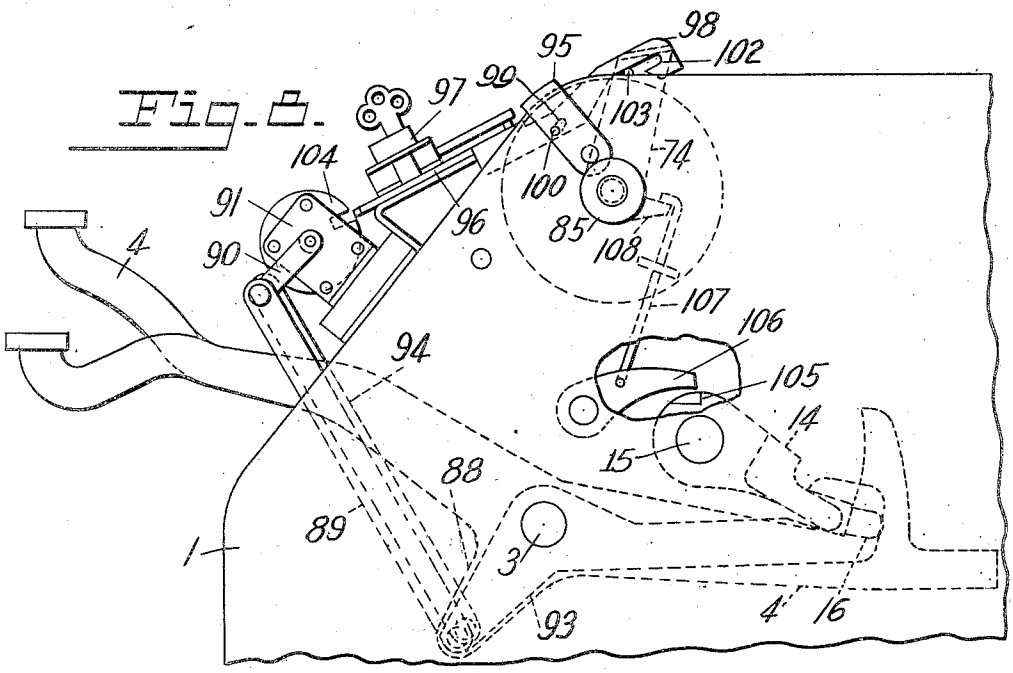
INVENTOR.
Frederick E. Miller
BY F. E. Miller.
ATTORNEY.

Sept. 10, 1935. F. E. MILLER 2,014,358

CASH REGISTER

Filed April 13, 1927 6 Sheets-Sheet 6

Fig. 8.



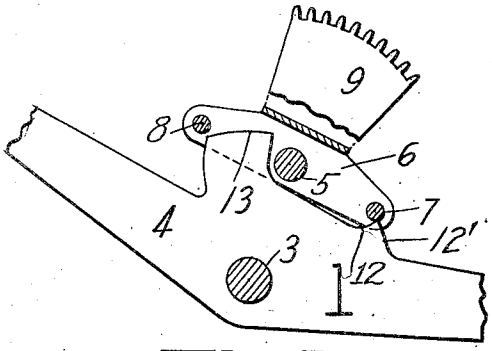


Fig. 9.

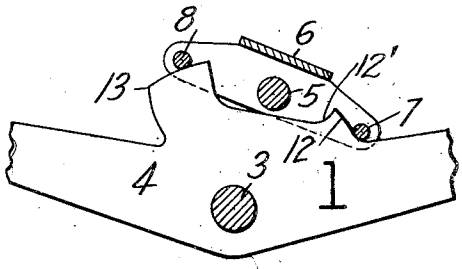


Fig. 10.

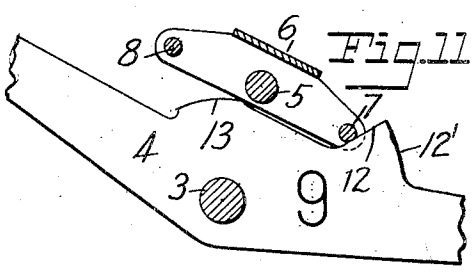


Fig. 11.

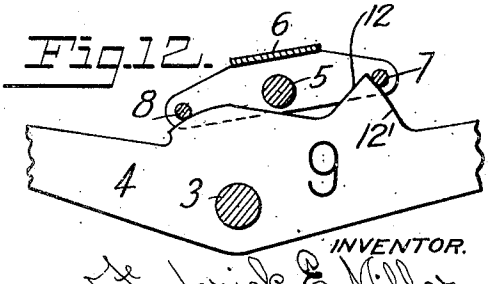


Fig. 12.

INVENTOR.
Frederick E. Miller
By F. E. Miller
ATTORNEY.

Patented Sept. 10, 1935 2,014,358

UNITED STATES PATENT OFFICE

2,014,358

CASH REGISTER

Frederick Edward Miller, Dayton, Ohio, assignor to John Q. Sherman, Dayton, Ohio

Application April 13, 1927, Serial No. 183,603

14 Claims. (Cl. 235—15)

My invention relates to cash registers of the key operating type and more particularly to the differential mechanism for operating the counters to different extent in accordance with the key or keys operated and for automatically limiting the operation to a predetermined degree.

The object of the invention is to simplify the structure as well as the means and mode of operation of cash registers, whereby they will not only be cheapened in construction but will be more efficient in use, positive in operation, uniform in action, possess increased accuracy and reliability and unlikely to get out of repair.

A further object of the invention is to provide a cash register mechanism having a minimum number of operating parts and in which duplicate parts, or those differing from each other but slightly, are used to a considerable extent, thereby minimizing cost of construction and facilitating manufacturing operations.

A further object of the invention is to provide a simple but efficient means for actuating the counter mechanism by the operation of a key and by the same movement automatically setting a stop for limiting the counter actuating movement.

To this end the mechanism includes an oscillatory actuator frame having operative engagement with the counter mechanism and tilted by a key lever having thereon an actuating cam surface of such shape and extent as to determine the degree of oscillatory movement of the actuator frame. Such key lever further has thereon a cam surface engaged by such oscillatory actuator frame at the limit of its predetermined movement, thereby preventing overthrow and confining the movement of the actuator frame under the influence of each key lever to different predetermined range of movement in accordance with the key operated.

One of the objects of the invention is, therefore, to provide such improved form of operating key lever, serving not only to actuate, but also to limit the counter operating mechanism and to provide means for automatically returning the actuated mechanism preparatory to each succeeding operation.

A further object of the invention is to provide improved means for counter wheels and transfer mechanism therefor, operated directly by the key lever.

A further object of the invention is to avoid, so far as possible, the use of many small parts by increasing the size of operative parts and the actuating leverage employed, thereby increasing the permissible tolerance variations and to operate the part as directly as possible from the prime mover or key lever with view to eliminating lost motion.

With the above primary and other incidental objects in view, as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation, or their equivalents, as hereinafter described and set forth in the claims.

Referring to the accompanying drawings, wherein is shown the preferred, but obviously not necessarily, the only form of embodiment of the invention, Fig. 1 is a top plan view of the assembled machine forming the subject matter hereof. Fig. 2 is a top plan sectional view on line 2—2 of Fig. 3 with the super-structure, comprising the counter wheels and associated mechanism, removed, and also the indicators and supporting frame omitted. Fig. 3 is a transverse sectional view on line 3—3 of Fig. 4. Fig. 3A is a detail view of the transfer restoring means. Fig. 4 is a vertical sectional view on line 4—4 of Fig. 3, viewed toward the rear. Figs. 5 and 6 are detail views in planes 5—5 and 6—6 of Fig. 4 respectively showing the counter wheel actuating means and transfer mechanism. Fig. 5A is a detail view of the counter pawl. Fig. 5B is a detail view of a modification of the return means for the actuator segment. Fig. 7 is a similar view in the plane 7—7 of Fig. 4 illustrating the overthrow prevention means. Fig. 8 is a side elevation illustrating the common locking means for the operating keys, the return to zero mechanism, the counter flash, and the customer and operation counters. Figs. 9 and 10 illustrate the relation of the oscillatory actuator frame to the initial or first key of the series in normal and operated positions respectively. Figs. 11 and 12 are similar views illustrating the relation of the actuator frame to the ninth or final key of the series in both normal and operated positions respectively. Fig. 13 illustrates a modification of the key cams. Fig. 14 shows a modification of the overthrow preventer.

Like parts are indicated by similar characters of reference throughout the several views.

In the drawings, 1—1 indicates the end plates of the supporting frame which are interconnected one with the other and serve as a support for a series of longitudinally disposed parallel shafts upon which the operating mechanism is mounted. Upon the shaft 3 is mounted a series of key levers

4. These key levers are arranged in banks or groups of nine keys each, comprising the units or cents bank, including the penny keys from 1 to 9, the tens or dimes group, containing the keys increasing from ten cents to ninety by multiples of ten and a third group representing dollars. The operating parts pertaining to each group or bank of keys is substantially the same, so that a description of one structure will, for the most part, suffice for all, except as may be hereafter noted.

Actuating means

Mounted upon a second shaft 5, located somewhat above the main or key lever shaft 3 is a series of rocking actuator frames 6, one for each bank of keys. That is to say, each oscillatory actuator frame is common to nine keys of a particular group or denomination. This oscillatory actuator frame 6 comprises end plates interconnected with each other for to and fro oscillatory movement about the shaft 5, and carries at opposite sides of the shaft 5, preferably though not necessarily, at equal distances therefrom, longitudinally disposed parallel rods 7 and 8. Fixedly attached to one end of the oscillatory actuator frame 6 is a gear segment 9, intermeshing with an oscillatory gear pinion or sector 10, mounted upon a longitudinally disposed shaft 11 near the top of the machine, which shaft carries the several counter wheels. The degree of oscillation of the actuator frame 6 and with it the actuator gear segment 9 determines the addition made upon the counter wheels carried by the shaft 11. The movement of the oscillatory actuator frame 6 is both effected and limited by any one of the several keys of the bank or series to which such frame pertains. Each key of the bank or series, however, will oscillate the actuator frame 6 to a different extent and will in turn limit such oscillation when the prescribed movement has been completed.

To this end each of the key levers 4 is provided with a cam surface 12, engaging with the rod 7 of the actuator frame as the forward end of the key is depressed. The key lever 4, being pivoted upon the shaft 3 and the oscillatory frame 6 being pivoted eccentric thereto upon the shaft 5 will move through differential paths of operation. As the key lever is depressed, the cam surface 12 is elevated upwardly and forwardly about the shaft 3 and toward the shaft 5. At the same time the rod 7 resting upon the cam surface 12 is carried upwardly with the key lever in a path eccentric with the shaft 3. Because of this differential path of movement, the engaged rod 7 of the actuator frame will have a travel rearwardly as well as upwardly upon the cam surface 12.

The degree of oscillation transmitted to the rocking frame 6 is determined by the length or extent of the cam surface 12 which differs upon different keys of the group or bank. As shown more particularly in Figs. 4 and 5 this cam surface 12 of the initial or number 1 key of the bank is comparatively short. After a quite limited oscillatory movement of the actuator frame 6 the rod 7 will have traveled beyond the end of the cam surface 12 and thereafter the key is free to complete its oscillatory movement independent of the rocking frame 6. To the contrary, as shown in Figs. 6 and 7, the cam surface 12 upon the final or number 9 key of the bank or series is more extended and the rocking frame 6 will have completed a very much greater degree of movement before its rod 7 riding upon the cam surface 12 will reach the end of the such cam surface and pass therebeyond onto the concentric portion 12', allowing the key to complete its movement independent of such frame. In Figs. 9 and 11 the rocking frame is shown in its normal or "home" position with the frame rod 7 engaging the cam surface 12 preparatory to operation. In Figs. 10 and 12 these keys 1 and 9 have been shown operated with the rocking frame oscillated to such position that the frame rod 7 has passed beyond the extremity of the cam surface 12 and therefore is no longer affected by the operation of the key. The intermediate keys, 2 to 8 inclusive, have cam surfaces 12 of different lengths proportionate to the position of such key in the group. Thus each key will operate the rocking frame 6 to a progressively different extent in direct proportion to the value of the key operated.

Stop motion means

In addition to the cam surface 12, each of the key levers 4 is provided with a stop surface 13 concentric with the shaft 3, but so positioned when the key is in its normal or "home" position as to be out of registry with the rocking frame rod 8. The relation of the stop surface 13 to the rocking frame rod 8 when the parts are in their normal position is such that upon oscillation of the frame 6 the rod 8 will pass beyond the stop surface 13 without engagement therewith. Such relation is clearly shown in Fig. 9. However, upon the initial movement of the key lever 4 necessary to rock the frame 6 the stop surface 13 will move into the path of the rod 8 and serve to limit the oscillatory movement of the actuator frame under the influence of the key, which is transmitted thereto through the cam surface 12 and the rod 7. The radius of the stop surface 13 is so proportioned with relation to the extent of the cam surface 12 that at the moment the rod 7 of the rocking frame passes beyond the cam surface 12 and hence the actuating influence of the key lever ceases, the rod 8 of the rocking frame will contact with the stop surface 13 of the actuated keys, thereby limiting the movement. The stop surface 13, being concentric with the center of oscillation of the key lever 4 on the shaft 3, permits an additional idle movement of the key lever subsequent to the arrest of the rocking frame 6 while maintaining an arresting contact between the stop surface 13 and the rod 8. The radii of the stop surfaces 13 of different key levers differ in accordance with the relative value of the key, to permit different range of movement of the rocking frame 6.

Thus upon the operation of any key of the series the oscillating frame 6 will be rocked through a degree of movement proportionate to the value of the operated key by the engagement of the cam surface 12 with the oscillating frame rod 7, and at the limit of such predetermined degree of oscillation, the rocking frame 6 will be arrested and further movement positively prevented by the engagement of the frame rod 8 with the stop surface 13 of the operated key. The oscillatory frame 6 and its actuating segment 9 are thus arrested after a predetermined degree of movement by engagement with a portion of the same key member by which such rocking motion was effected. The key lever itself is not arrested, but may continue its full stroke movement independent of further adjustment of the oscillatory frame 6 and without changing

the adjustment thereof. The concentric stop surfaces 13 of different keys of the series are of different radii or different extent, thus serving to limit the oscillation of the frame 6 to different degrees of movement proportionate to the value of the key operated. In this rocking movement the contact rod 8 of the oscillatory frame 6 will have passed over and beyond the stop surfaces or extensions 13 of the unoperated keys, which as before mentioned, are normally positioned out of the path of such rod 8, and moved into such path only at the initial operation of the key.

Key coupler and full stroke means

Rearwardly beyond the rocking frame 6 there is disposed transversely of the machine an oscillatory key coupler bar 14 pivoted at 15 in the side frames of the machine. This key coupler bar is common to all of the keys of the several banks or series and is elevated about its pivotal connection by the operation of any key of any series or bank. Beyond the key coupler bar 14 and in close proximity thereto each key lever is provided with an enlargement having therein a notch or recess 16 within which the key coupler bar 14 engages as the key is operated and the bar raised. Due to the eccentricity of the pivotal connection 15 of the key coupler bar and the pivotal shaft 3 of the key lever the key coupler bar 14 is withdrawn from the notch or recess 16 so long as the keys are in their normal or retracted position. Upon the operation of any one of the key levers and consequent elevation of the key coupler bar 14 the differential movement of such parts will project the margin of the key coupler bar into the recesses 16 of such keys as may have been operated in unison. These keys are thereby interconnected for further operation together. Connected to an arm projecting from one end of the key coupler bar 14 is a reversible detent pawl 18 having engagement with an arcuate ratchet plate 19 upon the frame of the machine to insure a full stroke movement of the key coupler bar, and with it the operated keys. The detent pawl 18 is sufficiently long that it will trail idly over the teeth or serrations of the ratchet plate 19 in one direction as the key coupler is elevated and in the other direction as the key coupler and key levers return. The pawl is too long to reverse its position so long as it engages with the ratchet plate 19 and is permitted to reverse only after passing beyond the extent of the serrations of the plate 19 at either end. The reverse insures a full stroke movement of the key levers and the key coupler bar in both directions.

Indicator means

This key coupler bar also performs the further function of releasing the indicators or targets. At the rear of the machine are mounted a plurality of vertically movable indicator targets, one for each key lever. These indicators are provided with dependent stems engaged by the rear end of the corresponding key levers to elevate the indicator targets whenever the key is operated. A detent bar 21 common to all of the indicators extends across the machine and is pivotally connected with the side frame at 21'.

Detent shoulders or spurs 22 on the stems of the indicator targets 20 engage such detent bar 21 when the indicators have been elevated to position for observation by the operation of a key. Pivoted at 23' upon the side frame 1 is a bell crank 23, one arm of which has operative engagement with a stud 21'' upon the oscillatory detent bar 21. The oscillation of the bell crank lever 23 serves to deflect the indicator detent bar 21 about its pivotal connection 21' against the tension of its retracting spring 27 and withdraw it from beneath the shoulders or spurs 22 of the operated indicator targets, thereby permitting such indicators to fall to their depressed or normal positions. The other arm of the bell crank lever 23 is provided with a lip or flange 24 which extends in inclined transverse relation across the path of travel of a stud 25 carried upon an arm 26 secured to and moving with the key coupler bar 14. As the key coupler bar 14 rises at the operation of any key of the machine the stud 25 engages the rear inclined face of the flange or lip 24 of the bell crank lever 23 and oscillates the lever to withdraw the detent bar 21 from engagement with the detent shoulders or spurs of the operated indicators. Upon the return movement of the key coupler bar 14 and actuated key levers, the stud 25 moving therewith engages with the forward inclined face of the flange or lip 24 thereby pushing the bell crank lever 23 idly out of its path. The indicator detent bar 21 and the actuating bell crank lever are retracted by contractile springs 27 and 28.

Actuator return means

Associated with each group or bank of value keys is an additional lever 29 also pivoted upon the shaft 3 and formed at its rear end into a hook-shaped extension having therein a recess 30, similar to the recess 16 of the value keys, within which the margin of the key coupler bar 14 is engaged. Whereas the key coupler bar 14 is normally disconnected from the value keys and engages in the notch or recess 16 thereof only when a key is operated, such key coupler bar is at all times engaged in the notch or recess 30 of the lever 29. Thus the lever 29 is oscillated about the pivotal shaft 3 in unison with the operation of any key of the corresponding bank or series. The lever 29 performs two functions. It is provided with a finger 31 which operates to return the oscillatory frame 6 after each operation. This finger 31 overhangs the oscillating frame rod 7. Inasmuch as the arm 29 and finger 31 move in unison with operated keys and consequently in unison with the oscillation of the frame 6, the finger 31 does not interfere with such movement of the oscillating frame. Upon the return movement of the operated key and with it the key coupler bar 14 with which is connected the lever 29 the finger 31 by engaging with the frame rod 7 insures the return movement of the oscillated frame 6. At its forward end the return lever 29 is provided with an upward extending arm 32 which serves to actuate the transfer mechanism as hereinafter described. In lieu of providing the finger 31 upon the lever 29 for engagement with the oscillating frame rod 7 such finger may be provided upon the forwardly and upwardly extending arm 32 as indicated at 31' in which case the finger would contact with and push the gear segment 9 during the return movement of the parts to insure return oscillation of the rocking frame 6 by which the gear segment 9 is carried.

Counter mechanism

Mounted upon the shaft 11 is a series of counter wheels comprising one for each bank or series of keys, to wit, a cents or units wheel, pertaining to the first or right hand bank of keys, a dimes or

tens of cents wheel, pertaining to the middle bank of keys, and a hundreds of cents, or dollars wheel, pertaining to the left hand bank of keys. In addition, there are provided adjacent to the last mentioned hundreds or dollars wheel a series of additional counter wheels, pertaining to tens of dollars, hundreds of dollars and thousands of dollars, to which transfers are made from the hundreds of cents or units of dollars wheel. The units or cents wheel **33**, the dimes or tens wheel **33***a*, and the hundreds of cents or dollars wheel **33***b*, and the corresponding transfer mechanism are identical in construction and operation, so that a description of one will suffice for all.

The counter wheels **33**, **33***a* and **33***b* are loosely mounted for rotation upon the shaft **11**. The wheels are of sufficiently large diameter to carry upon their periphery multiple sets of numerals 0 to 9, inclusive. In the present instance the wheels are provided with three successive sets of numerals. Secured to one side of each counter wheel and operating therewith is a transfer trip cam **35** which serves to set the transfer mechanism to add 1 to the next succeeding wheel of the next higher denomination whenever a count of ten has been accumulated. That is to say, inasmuch as the counter wheel in the present case carries three successive sets of numerals 0 to 9 it must operate the transfer mechanism three times during each complete rotation. Therefore, the cam **25** for setting the transfer mechanism is triangular in form, having three operative points, one for each set of numerals.

At its opposite side each of the counter wheels **33** carries a ratchet wheel **36**, also fixedly secured to the counter wheel. Loosely journalled upon the shaft **11**, adjacent to the ratchet wheel **36** is the oscillatory gear sector **10**, heretofore referred to as intermeshing with the actuator segment **9** upon the rocking frame **6**. Fixedly connected with the gear sector **10** for unison operation under the influence of the actuator segment **9** is a pawl arm **37**, carrying a pivoted ratchet pawl **38**, spring pressed into engagement with the teeth of the ratchet wheel **36** carried by the counter wheels. The pawl is provided with a tail portion carrying a lateral stud **39** which engages with an overthrow preventer to lock the pawl into engagement with the ratchet wheel. During the depression of any key of the corresponding bank, the actuator frame **6** and with it the actuator segment **9** are rocked upwardly and forwardly. This movement of the actuator segment oscillates the gear sector **10** and with it the pawl arm **37** in a reverse direction. The pawl **38** carried by the arm **37**, engaged with the ratchet wheel **36** through a proportionate degree of rotation. The wheel is held in its advanced position against return movement by a spring actuated detent **34**, engaging with the teeth of the ratchet wheel **36**. During return movement of the key lever and rocking frame, the gear sector **10** and with it the pawl arm **37** will be operated in reverse direction. This return movement, however, is idle and the ratchet pawl **38** rides idly over the ratchet wheel **36** back to the normal or starting position preparatory to the next operation.

Counter locating means

Mounted upon the main shaft **3** closely adjacent to the return lever **29** is a detent and locating arm **40** which normally moves in unison with the return lever **29** to which it is connected by an intermediate yielding connection whereby the return lever **29** is capable of further movement independent of such detent and locating arm. The detent and locating arm **40** is provided with a finger **41**. An expansion spring **42** is interposed between the finger **41** of the arm **40** and the arm **32** of the return lever. The expansion of the spring **42** tends to retract the arm **40** in relation with the return lever **29** and arm **32** thereof which return movement is limited by the engagement of a shoulder upon the arm **40** with a stud **43** carried by the arm **32** of the lever **29**. The expansion of the spring **42** tends to hold the shoulder of the arm **40** in engagement with the stud **43**. The arm **40** is carried in unison with the movement of the lever **29** and arm **32** until the beak **44** at the end of the arm **40** engages with a ratchet wheel **36** of the counter wheel **33**. This engagement of the arm **40** with the ratchet wheel **36** occurs as the key lever and accompanying parts approach the limits of their stroke, but before the stroke is completed. The angular beak **44** by its engagement with the teeth of the ratchet wheel **36** serves to locate the counter wheel **33** by camming engagement within the angle of the ratchet teeth of the ratchet wheel **36**. If the counter wheel is slightly out of its proper position of adjustment at the moment of engagement of the arm **40** with the ratchet wheel **36** the camming action of the beak **44** upon the ratchet teeth will serve to readjust the counter wheel and bring it to the exact position. Furthermore, the engagement of the beak **44** of the arm **40** with the ratchet wheel will limit the advance movement of the wheel to prevent overthrow, particularly of the keys representing the values of 8 or 9, wherein the movement of the counter actuating part is through an extended range and more or less momentum of the parts and counter wheel is obtained. As before mentioned the beak **44** of the arm **40** engages the ratchet wheel before the actuating key, key coupler bar and return lever **29** have completed their full stroke, but at a time when the counter wheel has been advanced to its full range of adjustment. The further movement of the return lever **29** and its arm **32** in unison with the final movement of the key lever is compensated for by the compression of the spring **42**.

Transfer mechanism

If during the addition effected by the movement of the sector **10** and pawl arm **37**, the counter wheel **34** has passed the zero position, or in other words, if the addition, together with the previous accumulation on the wheel has exceeded ten it is necessary that a transfer of one be made to the wheel of next higher denomination. This is the purpose of the trip cam **35**.

Mounted upon the transverse shaft **45** is an oscillatory yoke **46**. One end **47** of this yoke is extended rearwardly beside the counter wheel **33** and into the path of the trip cam **35**. As the trip cam **35** is rotated in unison with the counter wheel, whenever an accumulation of ten is effected upon the counter, such trip cam engages the projecting end **47** of the yoke **46** and oscillates such yoke upon its supporting shaft **45**. This yoke **46** extends from one counter wheel to the counter wheel of next higher denomination. The opposite end **48** of the yoke extends upwardly and supports in elevated position, a transfer pawl **49** pivotally connected at **50** upon an oscillating arm **51**, also pivoted upon the shaft **45** closely adjacent to the end of the yoke **46**. The transfer pawl **49** is located in a plane common with the ratchet wheel **36** of the counter wheel of next

higher denomination. It is normally held out of engagement with the teeth of such ratchet wheel 36 by engagement of the end 48 of the yoke with a shoulder 52 upon the pawl 49. Pawl 49 is subjected to the tension of a spring 53, tending to draw the transfer pawl 49 downwardly and hence into engagement with the teeth of the ratchet wheel 36 whenever permitted to do so by the disengagement of the end 48 of the yoke from the shoulder 52. The oscillation of the yoke 46 by engagement of the trip cam 35 with the opposite end 47 of the yoke 46 effects this disengagement of the end 48 from the shoulder 52 allowing the transfer pawl to engage with the ratchet wheel 36. The transfer lever 51 extends downwardly and forwardly, substantially coincident with the path of travel of the arm 32 of the return lever 29 before referred to. The transfer lever 51 carries a one way pawl 54 pivotally connected to the lever 51 and projected by a spring 56 into the path of a stud 55, carried by the return lever arm 32. The mounting of this trip pawl 54 is such that it will yield against the tension of its spring 56 to permit the forward and downward passage of the arm 32 and stud 55 during the operative movement of the key lever 4 and with it the return lever 29 to effect the registration of a desired amount. However, upon the return movement of the arm 32 and its stud 55 the trip pawl 54 will resist movement about its pivotal connection with the arm 51, necessitating the stud 55 in the return lever arm 32 traveling over the cam face of the trip pawl 54, thereby elevating the transfer lever 51. The lever 51 thus receives an oscillatory movement about its pivotal shaft 45 and thereby transmits to the transfer pawl 49 a thrust movement. This pawl, being in engagement with the ratchet wheel 36 due to the disengagement of the end of the yoke 48 from the shoulder 52 by the previous action of the transfer trip cam 35, during such thrust movement, will advance the counter wheel of the higher denomination one step to add one thereto as result of the accumulation of ten upon the counter wheel of lower denomination.

The one way pawl 54 is pivoted at different points throughout the extent of the arms 51 pertaining to different banks of keys. The arm 51 of the cents bank has its pawl furthest removed from the shaft 11, so that after completion of a registration, upon return movement of the arms 32, the transfer will be made from the cents counter to the dimes counter before the transfer is effected from the dimes counter to the dollars counter. In event the first transfer completes an accumulation of ten on the next counter, the operation of the second transfer mechanism, which is timed for later operation carries the one completed by the first transfer into a still higher counter. The lever 51 is provided with spaced holes 57 in either of which the pawl 49 may be mounted according to the bank of keys to which the lever 51 pertains.

In transferring from the units of dollars to tens of dollars and ten to the hundreds and thousands of dollars wheels, a conventional method of gear transfer may be employed wherein a single tooth for each ten numerals appearing upon a counter wheel of this series will engage and actuate the gear pinion one step, which gear pinion is interconnected with the counter wheel of next higher denomination to advance such wheel also one step or add one thereto for each ten accumulated on the preceding counter wheel. Such gear transfer device being old and well known in this art and forming no part per se of the present invention is not illustrated.

However, the same form of transfer mechanism heretofore described is preferably employed in connection with the tens of dollars, hundreds of dollars and thousands of dollars counter wheels. A single set of such transfer mechanism parts common to the three dollars counter wheels is employed. The transfer pawl, however, corresponding to the pawl 49 of the preceding transfer mechanism is of triple form, comprising three interconnected fingers 49' arranged in the planes of the ratchet wheels 59 of the tens, hundreds and thousands of dollars counter wheels. These pawl fingers 49' are slightly offset in stepped relation one above the other. The tenth tooth of the ratchet wheels 59 of such dollar counter wheels is of increased depth. When in the course of rotation of such counter wheels such deep notch reaches the position to be engaged by the corresponding transfer pawl 49' the pawl pertaining to the first series of wheels falling into such deep notch allows the second of the pawl finger 49' to engage with the ratchet wheel of the second counter of this series. Whenever the deep notches of the ratchet wheels pertaining to the first two counter wheels of such series are aligned in position to receive the corresponding transfer pawl fingers 49' the first two of such triple fingers falling into the aligned deep notches permits the third finger of the triple pawl 49' to engage with the ratchet wheel of the next higher counter wheel. This particular detail feature of employing a triple finger transfer pawl falling into a deep tooth or notch at the tens position of the ratchet wheel to enable the engagement of the succeeding finger of the triple pawl with the corresponding higher ratchet wheel is a well known expedient in the cash register and counting machine art, and per se, forms no part of the present invention. However, the mechanism for setting and actuating such triple finger pawl is of new and novel construction.

Overthrow preventer

In the operation of a counting mechanism, and especially cash registers, the momentum gained by operating parts, particularly the rotation of the counter wheels, has a tendency to cause the counter mechanism "to overthrow". That is to say, the mechanism by quick or violent operation may be made to add more than the value of the operated key. Such overthrow or miscounting of the mechanism is sometimes intentionally effected by striking the value keys a sudden blow to effect a violent, forceful operation. To effectually prevent such overthrow or misoperation of the counter mechanism, whether accidental or intentional, an improved form of overthrow preventer has been embodied in the mechanism. It is for this purpose that the lateral stud 39 is provided in the tail portion of the actuating pawl 38. A segmental plate 60 having radial sliding engagement with the counter wheel shaft 11 projects beneath the lateral stud 39 of the actuating pawl 38. When in its elevated position the arcuate margin of the sector plate 60 is concentric with the counter wheel shaft 11 and parallel with the arcuate path of the actuating pawl stud 39. During the operating movement of the pawl 38 this stud 39 rides upon the arcuate margin of the sector plate 60. The plate 60 thus serves as a stop to prevent the oscillation of the actuating pawl 38 out of engagement with the teeth of the ratchet wheel 36 and serves to lock the actuating

pawl in engagement with the ratchet wheel during the advance movement of the counter wheel and ratchet wheel beneath the pawl **38**, under influence of momentum acquired by the parts during their operative stroke. To permit the idle return of the actuating mechanism, including the pawl **38** which rides idly over the teeth of the ratchet wheel **36** during such retrograde movement, the sector shaped locking plate **60** is retracted inwardly toward the shaft **11**. This retraction of the stop plate **60** out of the path of the pawl stud **39** permits the pawl to vibrate as it passes over the teeth of the ratchet wheel **36** in its return to its normal position.

To adjust the sector shaped stop plate **60** into operative position preparatory to the action of the counter wheels and to retract the plate to permit the return movement of the actuating pawl there is mounted upon the shaft **5** which also carries the oscillating frame **6**, an L shaped lever **61**. One arm of this L shaped lever **61** extends rearwardly parallel with and intermediate succeeding value keys and beneath the key coupler bar **14**. At its rear end this laterally projecting arm of the L shaped lever **61** is provided with a head having therein a notch or recess **63** quite similar to the notch or recess **30** of the return lever **29** and the notch or recess **16** of the value keys. The key coupler bar **14** is permanently engaged in such notch or recess **63** similar to its engagement with the recess **30** of the return lever **29**. The result is that the lever **61** is oscillated about the shaft **5** at each operation of the key coupler bar by any key of the machine. The upwardly extending arm of the lever **61** is provided at its extremity with a laterally projecting flange or lip **64**. This flange or lip **64** forms a temporary stop for a stud **65** carried by a rock arm **66** pivoted upon the transfer mechanism shaft **45**. The engagement of the flange or lip **64** on the upwardly extending arm of the lever **61** first above and then below the stud **65** as such lever moves to and fro serves to temporarily hold the pivoted arm **66** in an elevated position and then in depressed position. The arcuate stop plate **60** within which the slot **67** of which the counter wheel shaft **11** engages, is provided with a dependent leg **68** pivotally connected to the rock arm **66**. The oscillation of the rock arm **66** serves to reciprocate the sector shaped plate **60** into and out of operative relation with the lateral stud **39** of the actuating pawl **38**. The rocking movement of the L shaped lever **61** under influence of the key coupler bar **13** not only effects the locking engagement and subsequent release of the rock arm **66**, but also serves to actuate the rock arm **66** to reverse position when released from engagement with the flange or lip **64**. Carried by the L shaped lever **61** is an arcuate spring supporting finger **69**. The rock arm **66** is provided with a bifurcated finger **70** which straddles the spring supporting finger **69** at a mid-length point. Two helical springs **71** and **72** are carried by the finger **69**. One of these springs is arranged on each side of the bifurcated finger **70** of the rock arm **66**. The springs **71** and **72** are provided with abutments upon such supporting finger **69** at their outer ends. At their ends these springs abut on the opposite sides of the bifurcated finger **70**. Upon the primary or actuating movement of the L shaped lever **61** due to the elevation of the key coupler bar **14** by the operation of any value key of the machine, the movement of the upper end of such L shaped lever carries the stop flange or lip **64** beneath the lateral stud **65** of the rock arm **66**. The depression of the rock arm **66** is thereby prevented. Such arm and with it the sector shaped rocking plate **60** are thus held in their uppermost position during the continued actuating movement of the parts and while the counter wheel is being advanced through the predetermined range by the pawl **38**. During the continued movement of the lever, the spring **71** bearing against the bifurcated finger **70** of the rock arm **66** is compressed. The arm, however, is prevented from yielding under such compressive movement by engagement of the stud **65** with the top surface of the flange or lip **64**, until such lip or flange **64** is moved forwardly beyond the stud **65** as the parts reach the limit of their movement. Thereupon the reaction of the compressed spring **71** oscillates the rock arm **66** downwardly, drawing with it the sector shaped locking plate **60** out of the path of the oscillatory motion of the stud **39** of the actuating pawl **38**. Upon the initial return movement of the L shaped lever **61** as the key coupler bar **14** descends upon release of a value key, the stop flange or lip **64** will pass above the stud **65** of the rock arm **66** thereby temporarily locking such arm in its depressed position. During the continued retraction of the parts, the spring **72** is placed under compression against the unyielding resistance of the bifurcated finger **70** of the arm **66** until the several parts reach the limits of their return movement. At such point the stop flange or lip **64** again passes beyond the stud **65** and so releases the rock arm **66**. Under the reaction of the compressed spring **72** this arm **66** is again oscillated upwardly, carrying with it the segmental locking plate **60**. The plate **60** is again thus positioned to prevent the disengagement of the pawl from the ratchet wheel **36**. It is to be understood that the actuating pawl **38** is capable of two distinct oscillatory movements. One of these is the actuating movement concentric with the counter wheel shaft **11** and is effected by the pawl carrying arm **37** while the pawl is maintained in engagement with the ratchet wheel **36**. The other movement is an oscillatory movement of the pawl **38**, per se, about its pivotal connection with the pawl carrying arm **37**. This movement occurs as the pawl arm and pawl are retracted leaving the counter wheel and ratchet wheel **36** in their advanced position. It is this latter oscillating movement incident to the idle retraction of the pawl over the teeth of the stationary ratchet wheel **36** which is permitted by the retraction of the sector shaped locking plate **60**, by the depression of the rock arm **66**. When the rock arm **66** is in its elevated position, it holds the sector plate **60** also elevated with its margin concentric with the shaft **11** and parallel with the path of travel of the lateral stud **39** of the pawl **38** during the actuating movement thereof. The oscillation of the pawl necessary to disengage it from the ratchet wheel **36** or to permit the teeth of the ratchet wheel to advance beneath the pawl and independent thereof is thus effectually prevented.

Return to zero means

In order that the counter wheels may, from time to time, be reset to zero there is provided a yoke **74**, the arms of which are pivoted upon counter wheel shaft **11**. The yoke extends transversely across the counter wheels. It is retracted after each oscillatory movement to a position above the counter wheels by a spring **75** coiled about the shaft **11** with one end of the spring engaging an arm of the yoke **74** and the other end

of the spring engaging with the transfer mechanism shaft 45. The yoke 74 carries a transverse shaft 76 upon which are pivoted a plurality of spring retracted fingers 77. A finger 77 is provided in the plane of each transfer cam 35 pertaining to the several counter wheels. These fingers 77 are so mounted and connected that they will yield in one direction to permit the passage of the point of the transfer cams 35 during the normal operation of the machine. However, upon the rearward and downward oscillation of the yoke 74 such pivotally mounted fingers 76 will engage with the transfer cams 35 of the respective counter wheels and advance the counter wheels and transfer cams in unison with the oscillation of the yoke 74. By this action the numerals on the counter wheels are brought into alignment and the zeros presented at the observation points. To limit the oscillatory movement of the resetting yoke 74 in either direction and to effect the resetting of the transfer pawl to normal elevated or inoperative position at the resetting of the counter wheels there is provided adjacent to each counter wheel a multi-fingered plate 78. This plate has a downwardly and forwardly extending arm 79 bifurcated at its extremity and loosely embracing within such bifurcation the transfer mechanism shaft 45. The bifurcation of this arm is sufficiently wide to permit the plate 78 a limited degree of oscillatory movement upon the counter wheel shaft 11. Such oscillatory movement is limited in either direction by the engagement of the fingers of the arm 79 with the shaft 45. This plate 78 is provided with a rearwardly extending arm 80 engaged by the yoke 74 or by the shaft 76 carried thereby as the yoke approaches the limit of its resetting motion. The plate 78 being capable of a limited oscillatory movement defined by the width of the notch or recess in the bifurcated arm 79 embracing the shaft 45, is capable of a final short movement in unison with the yoke. Above the arm 79 the multi-fingered plate 78 carries a finger 81 which extends beneath a lateral stud 82, projecting from the transfer pawl 49. As has before been mentioned, the pawl 49 is normally held elevated by the end 48 of the yoke 46, and is permitted to drop into engagement with the ratchet wheel 36 by the disengagement of the terminal 48 of the yoke from the shoulder 52. In the event that the terminal 48 of the yoke has been withdrawn from the shoulder 52 and the transfer pawl has been permitted to drop into engagement with the ratchet wheel 36 prior to the resetting operation, the finger 81 of the multi-fingered plate 78 will engage the stud 82 and restore the transfer pawl 49 to its elevated position upon the oscillatory movement of the plate 78 as the yoke approaches the limit of its stroke. Upon the return movement of the resetting yoke under the influence of the spring 75, the yoke or the shaft 76 carried thereby, engages an upwardly extending finger 83 upon the multi-fingered plate 78 which serves to limit the return movement of the yoke and to restore the plate 78, the return movement of which is limited by the engagement of the bifurcated arm 79 over the shaft 45. The resetting yoke is actuated by a knob 85 connected therewith and extending beyond the frame and cabinet of the machine. There is preferably, though not necessarily, provided upon the resetting yoke 74 a full stroke device comprising a drag pawl 86 pivoted upon the yoke having engagement with a serrated detent plate or ratchet plate 87 secured to the frame of the machine. While the drag pawl 86 is free to oscillate in either direction it is of such length that it cannot reverse while in engagement with the detent or ratchet plate 87 and can reverse its position only after passing beyond the end of such plate in either direction. Thus a full stroke of the return to zero yoke in either direction is insured. Means controlled by the resetting yoke 74 is preferably, though not necessarily, provided for locking the machine against operation so long as the yoke is moved away from its normal or home position and operated to again release the machine for operation only by the return of the yoke 74 to its normal position.

Operation counters

Two operation counters are provided, one of which pertains solely to the operation of the no sale key located at the right of the machine. This key serves to operate a no sale indicator but does not effect any registration or addition upon the counter wheels. This no sale key is provided with a dependent arm 88 connected by a link 89 with the rock arm 90 upon an operation counter 91. This counter 91 may be of any suitable character or construction, of which numerous types are now available upon the market. Each operation of the "no sale" key will effect an operation of the counter 91. In addition to the counter 91 there is provided a second counter 92. Upon this counter is added one for each operation of any value key of the machine. To operate the counter 92 there is provided a bell crank arm 93 pivoted upon the main shaft 3 and having a dependent arm similar to the arm 89 of the "no sales" key which is connected by a link 94 with a rock arm on the counter 92. The rearwardly extending arm of the bell crank lever 93 is provided with a notch or recess in which the key coupler bar 14 is permanently engaged so that the lever 93 is oscillated with each movement of the key coupler bar. Therefore, whenever the key coupler bar is oscillated by any manipulation of any value key, the lever 93 will be oscillated in unison to add 1 upon the customer's counter 92.

Counter flash

The figures upon the several counter wheels brought to reading positions register with observation openings in a cabinet not shown in the drawings. However, it is not desirable that the total registration accumulated upon the counter wheels shall be open to observation of unauthorized persons. There is therefore provided a flash bar 95 in the form of a U shaped yoke, the ends of which are pivoted to the main frame 1. This flash bar 95 is oscillated to and fro into and out of registry with the reading position of the figures upon the counter wheels and consequently into and out of registry with the observation openings of the cabinet by a reciprocatory plate 96. This plate 96 is mounted on suitable guides on the main frame and is adjusted to and fro by the operation of a key lock 97. By means of the lock 97 the adjusting plate 96 is held at either limit of its stroke. The plate 96 is provided with an upwardly and rearwardly extending arm 98 having therein a slot 99 in which engages a stud 100 projecting from one arm of the oscillatory flash bar yoke. The construction is such that as the plate 96 is moved to and fro by the turning of the key in the lock 97 the flash bar yoke is moved in unison therewith. The arm 98 serves the further function of locking the set to zero yoke 74 in its normal or retracted position. The arm 98 is pro-

vided at its end with a hook like extension 102 within which engages a stud 103 on the side arm of the set to zero yoke 74. Whenever the plate 96 is reciprocated rearwardly it not only raises the flash bar 95 to expose the reading characters of the counter wheels, but it also advances the hook 102 to release the stud 103 whereupon the yoke 74 may be oscillated to return the counter wheels to normal or zero position. In its retracted position the reciprocatory plate 96 serves to lock the customer and operation counters 91 and 92. Each of these counters is provided with a resetting wheel or disc 104 having therein peripheral notches into which the margin of the plate 96 is projected when in normal position. Thus the key lock 97 simultaneously controls the opening and closing of the counter wheel flash, the operation of the set to zero device, and the resetting of the operation and customer counter. It also serves to control a lock for the keys, whereby the keys may not be operated during the time the set to zero mechanism is away from normal position. To this end the hub of the key coupler bar is provided with a shoulder 105 with which engages a locking pawl 106 secured to the side frame of the machine. Inasmuch as the key coupler bar is raised by the operation of any key of the entire series, it is obvious that so long as the detent pawl 106 is in engagement with the shoulder 105 of the key coupler bar no key can be depressed. Connected with the locking pawl 106 is a pull rod 107, the upper end of which overhangs a lifting lug 108 projecting from the set to zero yoke 74. Whenever the yoke 74 is in its normal retracted position the lug 108 by its engagement with the laterally turned end of the link 107 holds the detent pawl 106 elevated out of engagement with the shoulder 105. However, the initial movement of the yoke 74 allows the detent 106 to fall into locking position.

Modifications

Whereas the cam surfaces 12 of the respective keys have been shown of different lengths, but of like angles, for actuating the rocking frames 6 differentially in accordance with the value of the key operated, in lieu of such construction the cam surface 12 of such respective keys may be made of equal length, but of different inclinations to effect the same result. Under the construction first described the rocking frame is actuated through the initial movement of the keys to different extent and thereafter such keys have a further independent or idle movement of different extent or range. By the modified construction as shown in Fig. — the period of oscillation or actuation of the rocking frame 6 will be uniform for each key and thereafter each key will perform its final movement through a range of equal extent. The difference is that the rocking frame will be moved more or less rapidly to achieve a greater or less range of movement within a given range of movement of the actuating key.

In Fig. 14 there is shown a modification of the overthrow preventer wherein an oscillatory plate 109 is loosely journalled upon the counter wheel shaft 11 adjacent to each of the oscillatory pawl carrying arms 37. This plate 109 has in its periphery a series of V shaped cam notches 110, with which engages a correspondingly shaped spring pressed detent lever 111. The shape of the notches 110 and that of the lever 111 is such that the plate may be moved in either direction against the yielding resistance of the spring pressed lever 111. This lever, however, affords a resistance to the movement of the plate in either direction. The actuating pawl 38 carried by the oscillatory arm 37 and engaging with the ratchet wheel 36 carries a laterally extending stud 112 which engages in a cam slot 113 in the plate 109. This slot extends circumferentially and is sufficiently long to permit a limited initial movement of the pawl arm 37 and pawl 38 independent of the plate. During such initial movement the pin 112 moves into the forward end of the slot 113 and by the camming action of the slot is forced tightly in engagement with the ratchet wheel 36. During further movement of the pawl the plate 109 moves idly with the pawl and pawl arm, but serves to hold the pawl in locked relation with the ratchet wheel. Upon retractive movement of the pawl and pawl arm the initial movement is independent of the plate 109, thus shifting the pin to the opposite end of the slot 113 where it is free for idle movement as the pawl rides idly over the teeth of the ratchet wheel 36.

From the above description it will be apparent that there is thus provided a construction of the character described, possessing the particular features of advantage, before enumerated as desirable, but which obviously, is susceptible of modification in its form, proportions, and arrangement of parts, without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention is described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific details shown, but that the means and construction herein disclosed comprise the preferred form of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention I claim:

1. In an accounting mechanism, a counter wheel, a ratchet wheel connected thereto, an oscillatory pawl arm mounted concentric with the ratchet wheel and having operative engagement with the ratchet wheel, actuating locking means for the pawl arm, a snap-over detent for the pawl automatically moved into and out of engagement therewith at the opposite limit of its range of movement, spring actuating means therefor tensioned by the operation of the actuating means and means operated by the initial movement of the actuating means for temporarily locking the detent in engagement with the pawl throughout the operative stroke of the pawl arm in one direction and locking the detent out of engagement with the pawl during the reverse movement of the pawl arm, the pawl being automatically released at the limit of its operative movement for idle return oscillation.

2. In an accounting mechanism a counter wheel, actuating means for advancing the wheel through predetermined degrees of rotation including a ratchet wheel and an oscillatory pawl engaging therewith, and a movable locking plate movable into and out of position concentric with the path of travel of said pawl and serving to hold the pawl in engagement with the ratchet wheel snap-over means tensioned by the operation of the actuating means in alternate directions for automatically shifting the plate at the opposite limits of the range of movement of the pawl into and out of operative relation therewith, and means for locking the plate in its shifted

position during the movement of the parts in each direction.

3. In a counting mechanism, a traveling pawl having operative engagement with a ratchet wheel to actuate a counter wheel and capable of movement transverse to its path of travel to permit independent relative travel of the pawl and ratchet wheel, and means for actuating the pawl to advance the ratchet and counter wheels and a movable locking plate, the margin of which extends parallel with the path of travel of the pawl normally limiting the transverse movement of the pawl to maintain it in operative engagement with the ratchet wheel, and spring means for shifting said plate with a snap-over action into and out of operative position at the opposite limits of the range of movement of the pawl.

4. In a counting mechanism having manipulative value keys determining the movement of the counter mechanism, a traveling pawl having operative engagement with a ratchet wheel to actuate a counter wheel and capable of movement transverse to its path of travel to permit independent relative travel of the pawl and ratchet wheel, and means for actuating the pawl to advance the ratchet counter wheels and a movable locking plate, the margin of which extends parallel with the path of travel of the pawl normally limiting the transverse movement of the pawl to maintain it in operative engagement with the rachet wheel, spring actuating means for the plate tensioned to move the plate in one direction by the operative movement of a value key in one direction and tensioned to return the plate upon the return movement of the value key and detent means controlled by the movement of the key for detaining the locking plate until the spring tensioning operations are completed.

5. In a construction of the character described, a series of pivoted key levers, a counter wheel movable through different predetermined degrees of rotation by the operation of different key levers, a notched disc associated with the counter wheel, and a stop arm pivoted concentrically with the key levers, actuating means therefor by which the arm is movable in unison with each of the key levers of the series into engagement with the notched disc to arrest and locate said counter wheels in their predetermined adjusted position and a yielding connection between such stop arm and its actuating means whereby the operative key lever is capable of a limited further movement subsequent to the arrest of said arm.

6. In a construction of the character described, a series of pivoted key levers, a counter wheel movable through different predetermined degrees of rotation by the operation of different key levers, a notched disc associated with the counter wheel, and a stop member yieldingly actuated by and movable with any operated key of the series into engagement with the notched disc to arrest and locate the counter wheel in its adjusted position the key being capable of further independent movement to effect the operation of a counter wheel of higher denomination subsequent to the engagement of the stop member with the notched disc.

7. In a construction of the character described, a rotary counter wheel, a ratchet wheel associated with the counter wheel, an actuating pawl associated with the ratchet wheel, actuating means therefor, pawl locking means for locking the pawl in engagement with the ratchet wheel during its operative stroke and spring means for transmitting to said pawl locking means a snap action into and out of operative engagement with the pawl at the opposite limits of the stroke of said pawl.

8. In a construction of the character described, a rotary counter wheel, a ratchet wheel associated with the counter wheel, an actuating pawl operatively engaging the ratchet wheel and movable to advance the wheel, means for actuating the pawl through different predetermined degrees of oscillation, and a locking member mounted for reciprocatory motion in a radial direction relative to the ratchet wheel for holding the pawl and ratchet wheel in interengagement to prevent independent movement of either in one direction, spring means for actuating the locking member first in one direction and then in the other, and detent means for restraining the spring means during the movement of the pawl in each direction, and for releasing such spring means to actuate the locking members in a snap movement preparatory to the movement of the pawl in reverse direction.

9. A safety device for a cash register wherein a counter wheel and associated ratchet wheel are actuated through a range of movement determined by manipulation of one of a plurality of value keys, by a traveling pawl movable into and out of operative engagement with the ratchet wheel, characterized by a spring actuated movable locking plate for locking the pawl into engagement with the ratchet wheel, reversible spring actuating means therefor, and locking means for alternately locking said plate in and out of operative position controlled by said keys.

10. An overthrow prevention device for a register mechanism wherein a rotary counter wheel and ratchet wheel associated therewith are actuated by a traveling pawl having operative engagement with the ratchet wheel to an extent determined by operation of one of a series of value keys which control the range of movement of the pawl, characterized by a movable locking plate for the pawl, reversible spring means for moving the plate into operative position prior to the actuating movement of the pawl and for retracting the plate out of operative position prior to the return movement of the pawl, and locking means holding the plate against movement during the movement of the pawl in each direction and releasing said plate only at the end of such movement.

11. An overthrow prevention device for a register mechanism wherein a rotary counter wheel and ratchet wheel associated therewith are actuated by a traveling pawl having operative engagement with the ratchet wheel to an extent determined by operation of one of a series of value keys which control the range of movemment of the pawl, characterized by a movable locking plate for the pawl, an oscillatory arm with which said plate is connected, spring means for actuating the arm first in one direction and then in the other, means for placing the actuating spring under tension in either direction, and stop means for holding the arm in its adjusted position against the tension of the spring actuating means until the pawl approaches the limit of its range of movement in each direction.

12. An overthrow prevention device for a register mechanism wherein a counter wheel is movable through different degrees of oscillation by actuating means controlled by the operation of one of a series of value keys, characterized by overthrow prevention means controlled by the operation of any key of the series, means for automatically moving the overthrow prevention means

into operative position at the completion of the retractive movement of the key and for automatically retracting the same at the completion of the operative movement of the key to permit independent return of the counter actuating means.

13. An overthrow prevention device for a register mechanism wherein a counter wheel is actuated through different degrees of movement in accordance with the value of an operated key of a series of such keys which are common to a member movable with any key of the series, characterized by a spring actuated overthrow prevention means set for operation by the movement of said common member in either direction, and detent means therefor holding said overthrow prevention means in its adjusted position during the movement of the key and adapted to release said means only as the key reaches the limit of its range of movement in each direction.

14. An overthrow prevention device for a register mechanism wherein a counter wheel is actuated through different degrees of movement in accordance with the value of an operated key of a series of such keys controlling such counter wheel, characterized by overthrow prevention means including an oscillatory arm, opposing springs acting upon the arm to oscillate it first in one direction and then in the other, means for tensioning said springs alternately, and means for holding the arm against movement during the tensioning operation and releasing said arm at the completion thereof to move the overthrow prevention means into and out of operative position.

FREDERICK EDWARD MILLER.