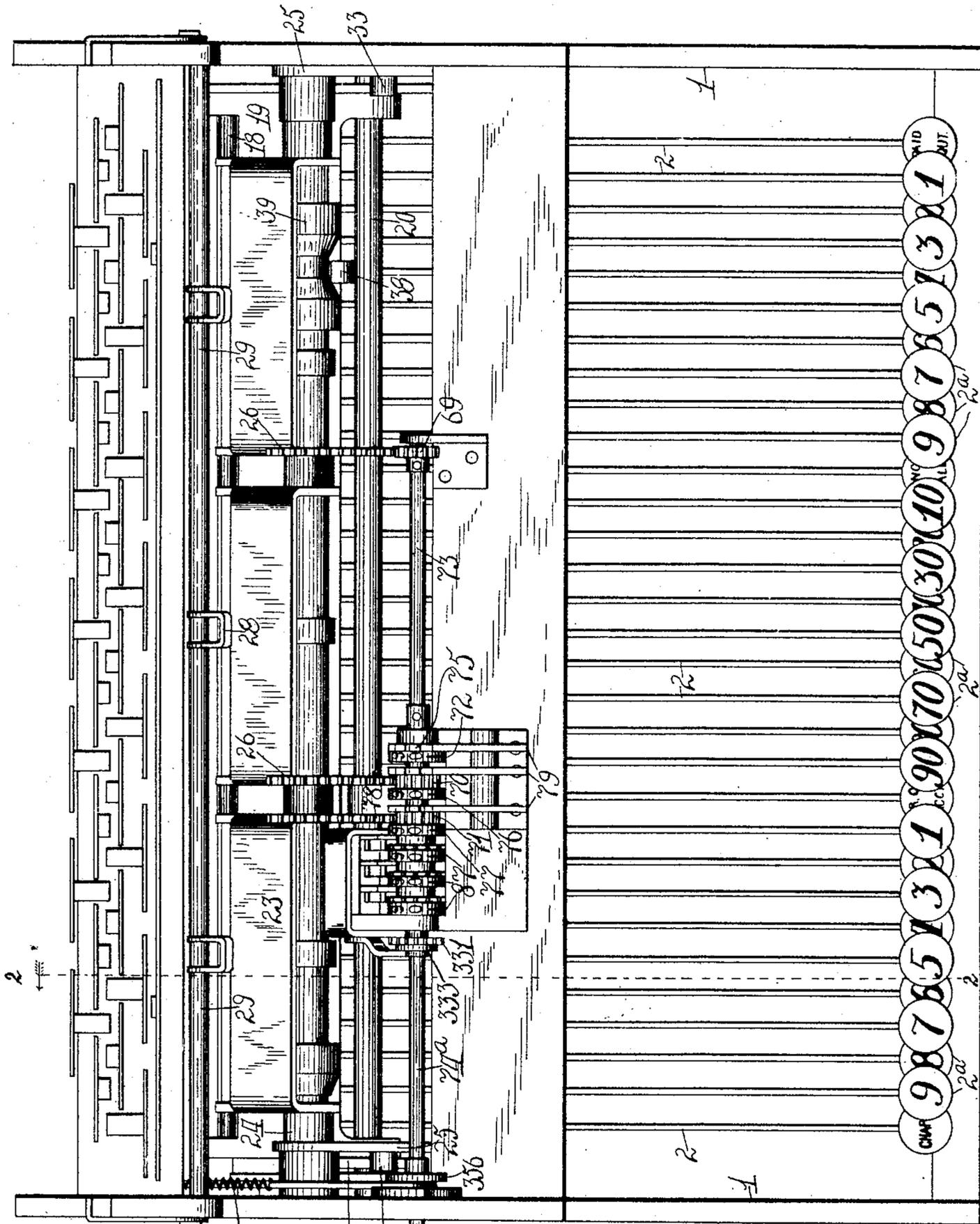


T. CARROLL.  
CASH REGISTER.

APPLICATION FILED JUNE 6, 1904.

2 SHEETS—SHEET 1.



Witnesses  
*Chas. H. ...*  
*Wm. O. Henderson*

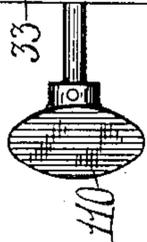


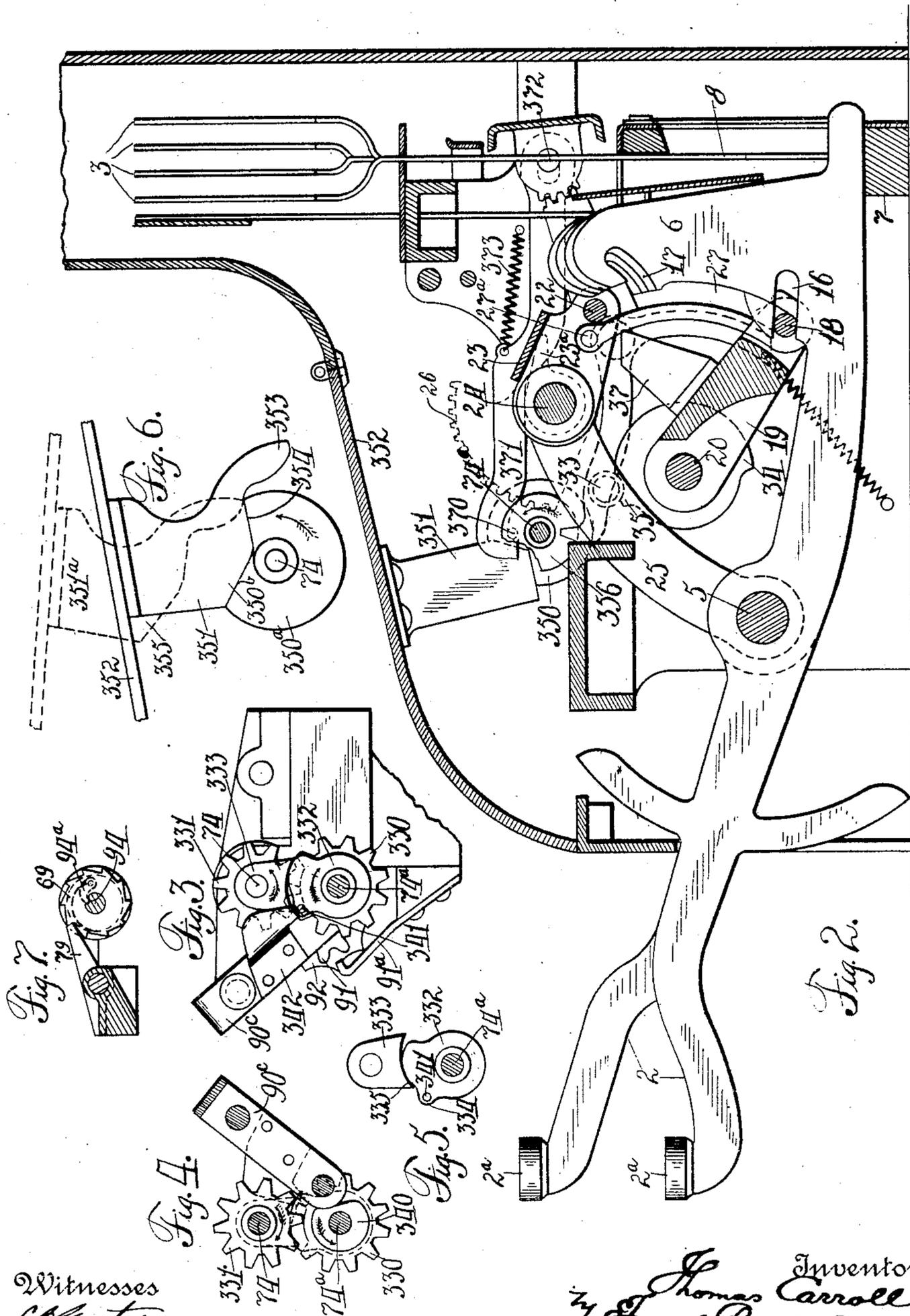
Fig. 1.

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# UNITED STATES PATENT OFFICE.

THOMAS CARROLL, OF DAYTON, OHIO, ASSIGNOR TO NATIONAL CASH REGISTER COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## CASH-REGISTER.

SPECIFICATION forming part of Letters Patent No. 782,217, dated February 14, 1905.

Original application filed June 4, 1903, Serial No. 160,025. Divided and this application filed June 6, 1904. Serial No. 211,275.

*To all whom it may concern:*

Be it known that I, THOMAS CARROLL, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Cash-Registers, of which I declare the following to be a full, clear, and exact description.

This invention relates to improvements in cash-registers, this application being a division of a copending application filed by me on June 4, 1903, Serial No. 160,025.

The object of the present invention is to provide a novel form of turn-to-zero device for the counters of cash-registers or similar machines and also to provide a certain improved locking device in connection therewith.

Certain of the constructions of the cash-register shown herein will also be found set forth and described in an earlier copending application filed by me on March 23, 1901, Serial No. 52,479.

With the above-mentioned objects in view the invention consists of certain novel features of construction and combinations of parts the essential elements of which are set forth in appended claims and a preferred form of embodiment of which is hereinafter specifically described with reference to the drawings which accompany and form part of this specification.

Of said drawings, Figure 1 represents a top plan view of the machine with the casing removed. Fig. 2 represents a vertical section on the line 2 2 of Fig. 1 looking in the direction of the arrow crossing said line. Fig. 3 represents a detail end view of the counter, showing the turn-to-zero devices. Fig. 4 represents a sectional end elevation of the same looking from the opposite end of Fig. 3. Fig. 5 represents a detail of a portion of the turn-to-zero device. Fig. 6 represents a modification of the turn-to-zero device, and Fig. 7 represents a detail of the counter-wheel and its supporting-shaft.

In the aforesaid drawings, 1 represents the frame of the machine, 2 the operating key-le-

vers, and 3 the indicators. The key-levers 2 (see Fig. 2) are hung upon a transverse shaft 5 and are provided at their forward ends with suitable numbered or lettered finger-buttons 2<sup>a</sup> and are arranged in groups or banks in the usual manner in units of cents, tens of cents, and units of dollars. Since the banks are all of substantially the same construction, I shall describe only one bank. The key-levers are formed at their rear ends with graduated vertical standards 6, and each lever when in normal position rests with its rear end upon a transverse rigid supporting-bar 7 and is adapted to support an indicator-stem 8, which rests upon said lever. These indicator-stems have upon their upper ends the usual tablet-indicators 3, which are marked on both sides with figures corresponding with the value of the key upon which they rest.

Each key-standard 6 has formed in its front edge near its base a key-coupler notch or recess 16 and near its upper end a registering notch or recess 17. The key-coupler notches are adapted to engage a bar 18, mounted in a key-coupling frame 19, which is fast upon a rock-shaft 20. The pivot-points of the key-coupler and the keys, respectively, are so located in relation to each other that when the keys are operated the coupler will be swung upward and the rod 18 caused to enter the key-coupler notches of the operated keys, and thus lock all of such operated keys to the coupler. The registering notches 17 of the keys of each bank are located at different distances from a horizontal rod 22 or a register-operating rock-frame 23, according to the value of their respective keys, and the lower wall of each of said notches projects beyond its upper wall, so that when the key is operated said lower wall will engage and lift said rod. It is evident that these registering notches need not be of any particular form, it being only necessary that they be arranged to engage the register-operating rock-frame 23 and lift it the proper distance according to the value of the particular key operated. For convenience the register-operating rock-frames, with their

respective segments, hereinafter described, will hereinafter be referred to simply as "registering-segments."

There are of course (see Fig. 1) three registering-segments, one for each bank of keys, and they are all journaled upon a rocking frame comprising a transverse swinging shaft 24, (see Fig. 2,) the ends of which are secured in two supports or side arms 25, which are pivoted upon the shaft 5. Since the rocking frame which comprises these two said arms 25 and the swinging shaft 24 operates to bring the registering-segments into and out of engagement with the counter, I shall hereinafter refer to it for convenience as the "counter-engaging" frame. It will be readily understood that the registering-frames are all pivoted upon the swinging shaft of the counter-engaging frame. Each registering-frame is supported in its lower normal position by a stop-lug 23<sup>a</sup>, (shown in dotted lines in Fig. 2,) fast to the shaft 24. Each registering-frame comprises a segmental rack-plate or segment 26, located at one end and is normally drawn down to its lower retracted position by a hook-shaped drag-bar 27, pivoted thereto, as at 27<sup>a</sup>, and cooperating with the bar 18 of the coupler. When one of the registering-frames 23 is raised by a key, it becomes coupled to said key and prevents overthrow by its bar 22, passing into the registering-notch 17 of the operated key in much the same manner that the coupler-bar passes into the key-coupler notch. As the registering-notches are located at different distances from the bar 22, it will be seen that the different keys will engage and move said bar different distances, and thus rock the registering-frames correspondingly. The segments thus make movements corresponding in value to the value of the operated keys, which movements are transmitted to the counter-wheels in a manner hereinafter described.

As before mentioned, the shaft 24, which supports the registering-frames, is mounted in supports or arms 25, and each of these arms is pivoted upon the shaft 5 and is provided with a laterally-projecting antifriction-roller 33, as shown in Fig. 2. These rollers are arranged to be engaged and forced upward by counter-engaging cam-disks 34, mounted on the shaft 20 and fast to and movable with the key-coupling frame 19. As the key-coupler moves upward the antifriction-rollers are forced upward and forward out of cam-notches 35, formed in said counter-engaging cam-disks, which action brings the rack-segments 26 into mesh with the counter-pinions 69, hereinafter described. This counter-engaging movement of the rack-segments precedes their rocking or registering movements. As soon as the segments have completed their registering movements they are moved backward with and by the counter-engaging frame because of the lateral or transverse shifting of

the key-coupler 19 and the counter-engaging cams 34, which shifting causes the said cams to pass laterally out from under the antifriction-rollers 33, so that said rollers, the counter-engaging frame, and the registering-frame drop back into disengaged position. This lateral shifting movement of the key-coupler frame, the counter-engaging cams, and the shaft 20, which last simply slides in its bearings in the main frame, is effected by means of a camming-arm 37, which is fast to and projects upwardly from the right-hand end of the key-coupler frame 19, which arm in the upward movement of the key-coupler strikes the beveled surface of a cam-collar 39, (see Fig. 1,) which is fast upon the shaft 24, so that when the arm 37 strikes this beveled collar the entire key-coupler will be shifted bodily to the left, and by other suitable camming means the key-coupler is again shifted to the right to normal position when it reaches its downward position, this other shifting means not being shown, since this lateral shifting movement constitutes no part of my present invention, this mechanism, together with the other constructions above described, being embodied in the aforesaid copending applications and made the subject of claims therein and being set forth here merely to give a brief description of the general mode of operation of the machine to which the present improvements are applied.

The registering-segments 26 cooperate with the counter-pinions 69, 70, and 71, which are actuated by the respective banks of keys to turn them forward. They then become disengaged therefrom. (See Fig. 1.) The pinion 69 of the units-of-cents wheel 72 is mounted fast upon one end of the units-of-cents shaft 73, which is suitably journaled in the main frame. Various counter-wheels are mounted upon the counter-shaft 74, Fig. 3, which shaft is suitably journaled in the counter-frame and is in line with and preferably of the same size as the units-of-cents shaft 73, so that their ends abut. The right-hand end of this counter-shaft 74 projects through the wheel 72 and partly into the ratchet-wheel 75, which is fast to said counter-wheel. The counter-wheels 76 and 77 are journaled upon the shaft 74 and are secured to and carried by the gears 70 and 71. Each counter-pinion 70 and 71 is also provided with a ratchet-wheel 78, similar to wheel 75. Each ratchet is engaged by a spring-pressed retaining-pawl 79, suitably mounted on the counter-frame, so as to prevent any backward rotation of the counter-wheels. For the purpose of giving the counter a higher capacity than that of the highest operating-key the extra adding-wheels 87 are mounted loosely upon the aforesaid shaft 74, and suitable transfer devices are provided between the various adjacent registering-wheels, these transfer devices being set forth in the aforesaid applications.

The resetting devices for turning the counter-wheels to zero are all operated by turning the thumb-button 110. (See Fig. 1.) This thumb-button is fast upon the turn-to-zero shaft 74<sup>a</sup>, which extends through the side frame of the machine and is journaled at the other end in the counter-frame and at this end has fast upon it a pinion 330. (See Fig. 3.) This pinion 330 meshes with a pinion 331, which is fast upon the left-hand end of the counter-shaft 74. Fast upon the pinion 330 is a locking-cam disk 332, which engages a similar locking-cam disk 333, fast upon the pinion 331. The shape of these locking-cams is better shown in Fig. 5, the upper cam 333 being formed with a concave sliding surface, the lower cam 332 being formed with a corresponding convex sliding surface, adjacent to which, however, is a projecting nose 334, the purpose of which formation will appear hereinafter. Each of the pinions 330 and 331 has ten teeth; but the pinion 330 is larger in diameter than pinion 331 and is so constructed as to have one missing tooth. The normal position of the turn-to-zero device is as shown in Fig. 3; but on beginning to turn the pinion 330 by means of the thumb-button 110 in the direction shown by the arrow in Fig. 3 the lower pinion 330 is given an initial movement (on account of the missing tooth) before the pinion 331 starts to rotate. Thus the projecting nose 334 of the cam-disk 332 is carried beyond the center of the concave surface of the cam-disk 333, and therefore the cam-disks are no longer in locking position; but the pinion 331 and its cam-disk 332, carried thereon, are now free to move, and the lower corner 335 of the disk 333 swings down behind the moving disk 332 and is not obstructed thereby. As soon as the pinion 330 has made one complete rotation the cam-disks 332 and 333 are again brought into their normal locking position; but the shape of the upper edge of the cam-disk 332 is such, as shown in Fig. 5, that the cam-disk 333 is given a slight retrograde movement at the end of the revolution of the disk 332. This result is accomplished by reason of the fact that toward the end of the revolution of the disk 332 the projecting nose 334, formed on said disk, contacts with the lower corner 335 of the disk 333, and thereby cams this disk 333 (and therefore the pinion 331) backward for a slight retrograde movement. This retrograde movement of the pinion 331 is possible since at this point there are no teeth of the pinion 330 in contact with the teeth of the pinion 331, owing to the missing tooth of the pinion 330. Furthermore, it is evident from this construction that the pinion 331 is given a slight "overthrow" movement by the pinion 330—that is, slightly more than one complete revolution—and is then given this slight retrograde movement at the end of its revolution, all of which takes place upon one complete revolution of the pinion

330. The purpose of such slight overthrow movement of the pinion 331 and the slight retrograde movement will now be explained. As before stated, the pinion 331 is fast upon the counter-shaft 74. This shaft 74 has formed in it a longitudinal groove 94, (see Fig. 7,) and the radial wall of this groove engages spring-pressed pawls 94<sup>a</sup>, which pawls are carried one upon each counter-wheel, and thus the said counter-wheels will be picked up and turned to zero in a manner the general features of which are well known in the art. It is therefore evident that if the pinion 331 is given a slight overthrow movement at the end of its revolution the shaft 74 will cause the counter-wheels to be carried slightly beyond their zero position, whereby the retaining-pawls 79 will be insured of dropping behind their respective ratchet-wheels, and then the slight retrograde movement of the pinion 331 will cause the counter-wheels to be brought back against their retaining-pawls and into proper alinement. By this means I have obviated the necessity of the nicety of adjustment to carry the counter-wheels to their zero positions and have the retaining-pawls drop into place, and, furthermore, I have insured a positive retrograde movement of the turn-to-zero shaft of the counter-wheels in such manner as to insure the return of the counter-wheels themselves back to their correct positions against the retaining-pawls, and thereby it is impossible for the counter-wheels to remain overthrown to such an extent that the teeth of their respective gear-wheels would bind against the teeth of the operating-segments 26, and thereby prevent the machine from registering. It will be observed that this return of the counter-wheels themselves to normal position after they have been moved slightly beyond normal position and upon the positive retrograde movement of the turn-to-zero shaft is occasioned by the frictional contact of the shaft with the counter-wheels and also by the pressure of the spring-pressed retaining-pawls 79 upon the teeth of the wheels. I have also provided the pinion 330 with means for disengaging the intermediate transfer mechanism for the wheels 87 of higher denomination. Fast upon the pinion 330 and on the opposite side from the locking-disk 332 is a cam-disk 340, (see Fig. 4,) which engages the lower end of the disengaging-frame 90<sup>c</sup> and swings the same forward on the first part of the movement of the pinion 330, thereby carrying the transfer-pinion 91 and the locking-disk 92 out of mesh with the counter-wheels 87 and allowing them to be turned to zero, and the transfer-pinion 91 and locking-wheel 92 are held from turning upon this forward movement by means of the retaining-pawl 91<sup>a</sup>, which is made fast to the counter-frame. Upon the end of the rotation of the pinion 330 the pin 341, (see Figs. 3 and 5,) mounted upon the locking-disk 332, engages an arm 342,

fast upon the disengaging-frame 90°, and carries the disengaging-frame forward into the normal position with the transfer-pinions and star-wheels in contact with their respective counter-wheels. It will also be observed that the pin 341 is drawn from beneath the arm 342 during the initial movement of the pinion 330, thus allowing the disengaging-frame 90° to be swung forward upon the action of the cam 340.

Since the operator might neglect to give a complete rotation to the thumb-knob 110, and thus would neglect to return the counter-wheels completely to zero, I provide a means to insure a complete rotation of the shaft 74<sup>a</sup>. Mounted fast upon this shaft upon the inner side of the side frame of the machine is a disk 350, (see Figs. 1 and 2,) which has formed in it a locking-notch, and an arm 351, fast upon the lid 352 of the casing of the machine, is so situated as to engage the notch of the disk 350, and in case the disk 350 has not been given a complete rotation the lower side of the arm 351 will engage the corresponding upper side of the said notch and carry the disk 350 home to its position of complete rotation. It is also to be observed that this arm 351 serves to lock the disk 350 from rotation while the lid 352 is in its normally closed position, and thereby it is impossible to set the machine to zero while the lid 352 is closed.

In Fig. 6 I have shown a modified form of the arm 351 attached to the lid 352, which modified form embodies the advantages of insuring a complete returning to zero of the counter-wheels and a locking of the turn-to-zero device while the lid is closed and also serves to give the counter-wheels the slight overthrow movement, followed by the slight retrograde movement which is desirable in such turn-to-zero devices as before described. In this case, as shown in Fig. 6, the counter-shaft 74 is extended through to the side frame of the machine and is journaled therein and carries a disk 350<sup>a</sup>, corresponding to the previously-mentioned disk 350, and this disk 350<sup>a</sup> has formed in it a notch 350<sup>b</sup>. Extending downward from the lid 352 is a peculiar-shaped arm 351<sup>a</sup>, which is adapted to engage the notch 350<sup>b</sup> and the shape of which is best shown in dotted lines in Fig. 6. When the shaft 74 has been rotated on the turning to zero of the counter, then upon the closing of the lid 352 the finger 353 of the arm 351<sup>a</sup> comes in contact with the rearward side 354 of the notch 350<sup>b</sup> and carries the disk 350<sup>a</sup> onward a small amount in the same direction of rotation as shown by the arrow, Fig. 6, thus imparting a slight overthrow movement to the shaft 74. Then at the completion of the downward movement of the lid the inclined surface 355 of the arm 351<sup>a</sup> comes in contact with the forward surface of the notch 350<sup>b</sup> and forces the disk 350<sup>a</sup> backward from its overthrow position to

its normal position, as shown in full lines in Fig. 6, thus imparting to the shaft 74 the desired retrograde movement above referred to. It is also evident that this arm 351<sup>a</sup> serves to lock the turn-to-zero device from operation while the lid is closed, and thus there are combined in this one device the means for giving the turn-to-zero device a slight overthrow movement followed by a slight retrograde movement and also a means of locking the turn-to-zero device while the lid is closed. Of course when the proprietor or clerk wishes to reset the machine to zero he must first raise the lid 352 before the turn-to-zero device will be unlocked, and then on closing the lid the complete turning to zero of the counter is insured and the devices again locked, as above described. The lid which I have described may well be the one which is used on cash-registers to expose the registering-wheels to view; but these devices, as above described, for completing the turn-to-zero movement and for locking the shaft may as well be controlled by any other guard or movable plate—such, for example, as the one which the proprietor customarily moves in examining the condition of the machine or in preparing the machine for use in any way.

I have also provided a means for automatically stopping the turn-to-zero devices at the end of one complete revolution, so that the counter-wheels cannot again be turned to zero until a key has been operated. Fast upon and projecting laterally from a disk 356, fast to the turn-to-zero shaft 74<sup>a</sup>, is a pin 370. (See Figs. 1 and 2.) Resting above this pin is a hooked arm 371, which is suitably pivoted upon a shaft 372, extending from the side arm of the machine and is slotted at its pivoted connection, so that it may have a backward movement under the tension of a spring 373. This arm 371 normally rests upon the transverse shaft 24, which, as before described, is carried upward with the counter-engaging frame 25 at each operation of the machine. After the counter-wheels have been set to zero the pin 370 contacts with the hook of the arm 371, and the disk 356 (and thereby the turn-to-zero shaft 74<sup>a</sup>) is thus prevented from further forward movement; but upon the operation of any key the shaft 24 is elevated and the arm 371 thereby is also elevated, so that the hook of said arm becomes disengaged from the pin 370, and the spring 373 thereupon carries the arm 371 backward, so that the hook rests upon the upper surface of the pin 370 and no longer holds the pin from forward movement, and therefore the counter then can again be set to zero.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a cash-register, the combination with a series of registering-wheels, of mechanism for turning said wheels to zero position to—

gether with means for turning said wheels positively beyond their zero position, with provisions for then imparting to them a retrograde movement to zero.

5 2. In a cash-register, the combination with a series of registering-wheels, of a turn-to-zero shaft carrying said wheels, means for turning said shaft in one direction, and means for imparting to said shaft a positive retro-  
10 grade movement.

3. In a cash-register, the combination with a series of registering-wheels and a turn-to-zero device for said wheels; of a guard; and means controlled by said guard to give a com-  
15 pleting movement to the turn-to-zero devices and thereby insure the complete turning to zero of all the wheels.

4. In a cash-register, the combination with a series of registering-wheels and a turn-to-  
20 zero device for said wheels; of a guard; and means controlled by said guard to give the turn-to-zero device an overthrow movement and a positive retrograde movement substan-  
tially as and for the purpose described.

5. In a cash-register, the combination with a series of registering-wheels and a turn-to-  
25 zero device for said wheels; of a guard; and means controlled by said guard to prevent the operation of the turn-to-zero device and  
30 to insure a complete turning to zero of all the wheels.

6. In a cash-register, the combination with a series of registering-wheels and a turn-to-  
35 zero device for said wheels; of a guard; and means controlled by said guard to give the turn-to-zero device an overthrow movement and a positive retrograde movement; and also  
40 to prevent a new operation of the turn-to-zero device, substantially as and for the purpose described.

7. In a cash-register, the combination with a casing, a lid for the same, a series of keys, and a counter operated thereby, and a turn-to-

zero device for said counter; of means con-  
45 nected with said lid for completing the move- ment of said turn-to-zero device substantially as and for the purpose set forth.

8. In a cash-register, the combination with a casing, a lid for the same, a series of keys, a counter operated thereby, and a turn-to-zero  
50 device for said counter; of means connected with said lid for both completing the move- ment of the turn-to-zero device and prevent- ing a new operation of the same until the lid has been raised. 55

9. In a cash-register, the combination with a casing, a lid for the same, a series of keys, a counter operated thereby, and a turn-to-zero  
60 device for said counter; of means connected with said lid for imparting to said turn-to-zero device an overthrow movement and a positive retrograde movement, and for preventing a new operation of the turn-to-zero device until the lid has been raised.

10. In a cash-register, the combination with  
65 a series of keys, a counter operated thereby, and a turn-to-zero device for said counter; of a stop to lock said turn-to-zero device from a new turning to zero after one operation, and means operated by any one of the keys  
70 for releasing said stop.

11. In a cash-register, the combination with a series of keys, a counter operated thereby, and a turn-to-zero device for said counter in-  
75 cluding a turn-to-zero shaft; of a stop to ob- struct said shaft from a new turning to zero after one such turning to zero, and means oper- ated by any one of the keys for releasing the stop.

In testimony whereof I affix my signature in  
80 the presence of two witnesses.

THOMAS CARROLL.

Witnesses:

WM. O. HENDERSON,  
W. M. McCARTHY.