(No Model.) 2 Sheets—Sheet 1.

A. W. MARR.

TRANSFERRING AND RESETTING MECHANISM FOR CASH REGISTERS.

No. 570,178. Patented Oct. 27, 1896.

Fig. 1.

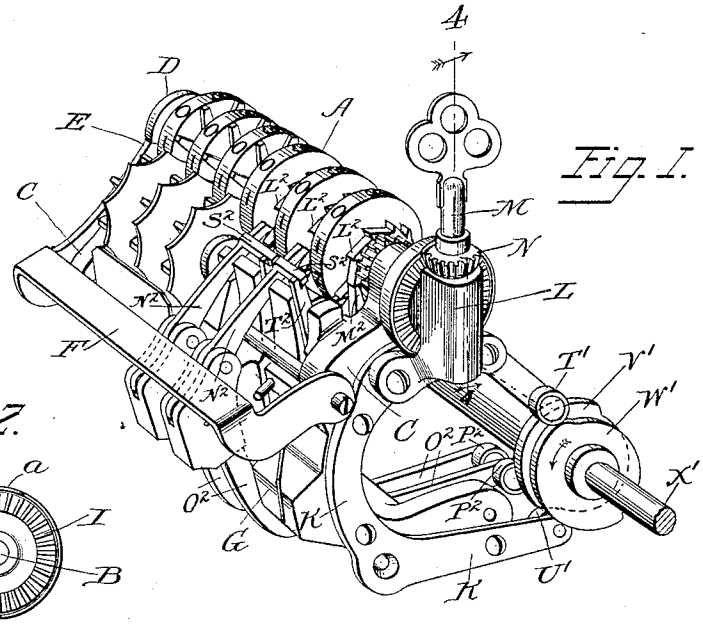


Fig. 2.

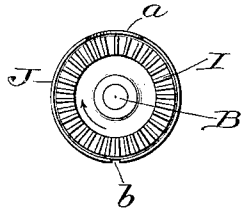


Fig. 3.

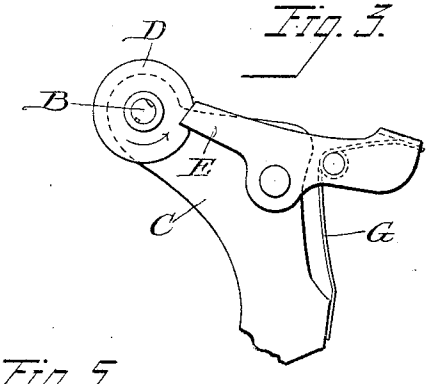


Fig. 4.

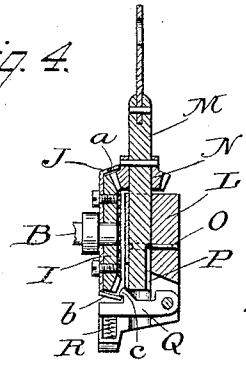
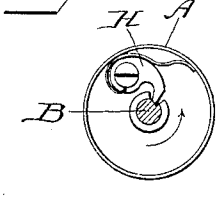


Fig. 5.



Witnesses
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Leonora Niemann.

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by Edmund Rector
his atty

(No Model.) 2 Sheets—Sheet 2.

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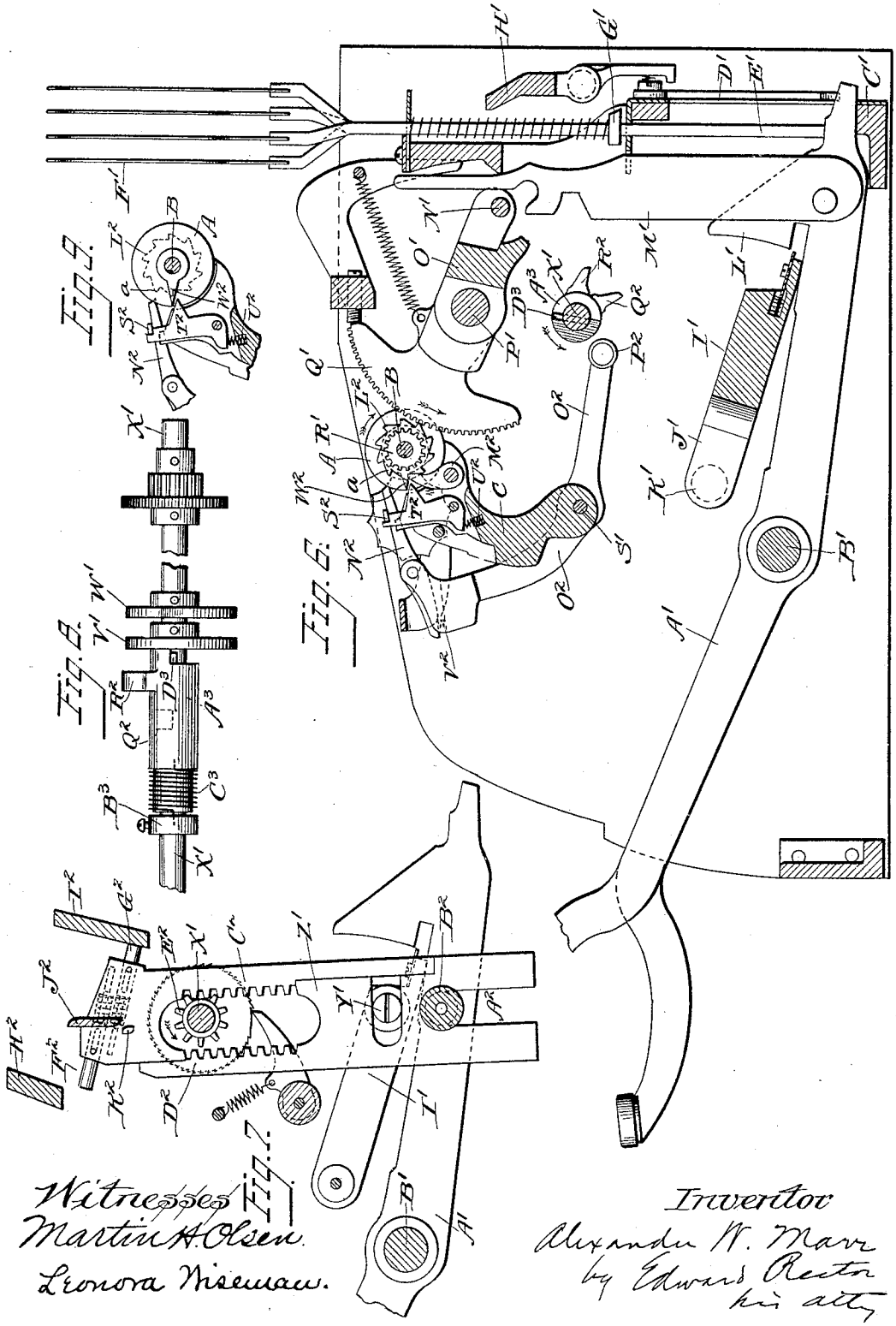

Witnesses
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UNITED STATES PATENT OFFICE.

ALEXANDER W. MARR, OF DAYTON, OHIO, ASSIGNOR TO THE NATIONAL CASH REGISTER COMPANY, OF SAME PLACE.

TRANSFERRING AND RESETTING MECHANISM FOR CASH-REGISTERS.

SPECIFICATION forming part of Letters Patent No. 570,178, dated October 27, 1896.

Application filed February 3, 1896. Serial No. 577,786. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER W. MARR, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented a certain new and useful Improvement in Registers, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates more particularly to the registering devices of cash-registering machines, but is applicable as well to other classes of registers; and it consists in novel means for resetting the registering-wheels or returning them to zero or initial position, novel means for actuating the transfer-pawls, and novel latches coöperating with such pawls, all as will be hereinafter more fully described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of a train of registering-wheels of a familiar form of cash-register; Fig. 2, an end view of the beveled pinion and surrounding flange upon the end of the shaft which supports the registering-wheels; Fig. 3, a detail view of the opposite end of the train of registering-wheels; Fig. 4, a detail vertical section on the line 4 4 of Fig. 1; Fig. 5, a detail of one of the registering-wheels, showing the pawl which is carried by it and coöperates with the notch in the shaft; Fig. 6, a vertical section of a cash register and indicator of familiar construction having my improvements applied to it; Fig. 7, a detail view of the mechanism employed in the machine of Fig. 6 for actuating the rotary shaft; Fig. 8, a detail view of such shaft and the parts carried thereby, and Fig. 9 a sectional detail through the rotary shaft of the registering device.

The same letters of reference are used to indicate identical parts in all the figures.

The machine shown in Fig. 6 is the same in its general features as that patented to Thomas Carney by Letters Patent No. 497,860 and subsequent ones, and will be described only so far as may be necessary to an understanding of my improvements. The key-levers A′ are fulcrumed on the horizontal rod B′ and rest at their rear ends upon the cross-bar C′ of the framework and play up and down in vertical slots in the guide-plate D′, and carry upon their rear ends the vertical rods E′, provided at their upper ends with the indicators F′, said rods having collars G′ upon them which coöperate with the usual pivoted supporting-bar H′ to temporarily support the indicators in elevated position.

Overlying the entire lot of keys in the machine is the cross-bar I′, provided at its opposite ends with supporting side arms J′, which are pivoted at their front ends to the side plates of the framework at K′. The rear edge of this bar is provided with a projecting flange which rests upon the upper edges of the key-levers and coöperates with slotted lugs L′ thereon, to connect the operated keys to the bar I′, as usual. The key-levers have pivoted to their sides near their rear ends graduated lifters M′, which coöperate with the rods N′ of the registering-frames O′, which are mounted upon the shaft P′. There is one of these registering-frames for each set or group of keys in the machine, and the lifters M′ of the keys of each group are so graduated that they engage the rod N′ of their coöperating frame O′ at different points in their upward movements, so that the operations of different keys in the set will impart different degrees of movement to the frame, proportionate to the values of such keys.

Each of the registering-frames O′ has fast upon it a gear-toothed sector Q′, which sectors coöperate with pinions R′, fast upon the hubs or sides of the registering-wheels A, (see also Fig. 1,) which registering-wheels are mounted upon a rotatable shaft B, which is supported in the upper ends of the side arms of a rocking frame C, which is pivoted at its lower end upon a rod S′, supported in the framework. The frame C′ has fast upon its right side, Fig. 1, a horseshoe-shaped plate K, whose two rearwardly-extending arms carry friction-rollers T′ U′, coöperating with two cams V′ W′, fast upon a rotary shaft X′, (see also Fig. 6,) suitably mounted in the framework and given a complete revolution at each operation of the machine by the means hereinafter described. By such means at the complete downward stroke of any operated key the shaft X′ and cams V′ W′ are

given a half-revolution in the direction of the arrow in Fig. 1, while at the return upstroke of such key they are given another half-revolution and brought to initial position. It will be seen from Fig. 1 that at the first forward movement of the shaft and cams the shoulder upon the lower side of the cam V′ will engage the friction-roller U′ of the lower arm of the plate K′, while at the same time the shoulder at the upper side of the cam W′ will be carried from under the roller T′ of the upper arm of said plate, with the result that said plate and the arm C will be rocked on their pivotal support S′ and the train of registering-wheels be thrown rearward and the pinions R′ engaged with the sectors Q′. This operation takes place before the sectors are moved by the operated keys, so that the movements imparted to the sectors by the downward strokes of the operated keys are transmitted to the registering-wheels and the values of such keys thereby registered. At the end of the downward strokes of the operated keys the half-revolution given the shaft X′ and cams V′ W′, as before explained, will have brought the cams diametrically opposite the positions they occupy in Fig. 1, with the result that the shoulder on the lower side of the cam W′ in Fig. 1 will stand at the upper side of said cam and immediately in rear of the roller T′, while the shoulder at the upper side of the cam V′ in Fig. 1 will stand at the lower side of said cam immediately over the roller U′, with the result that at the beginning of the second half-revolution of the parts, at the return upstrokes of the operated keys, the plate K and frame C will be rocked back to the position shown in Figs. 1 and 6 and the pinions R′ be thereby disengaged from the sectors, so that the return upward movements of the latter will not be imparted to the registering-wheels.

The mechanism for rotating the shaft X′ is located at the right side of the machine, just within the right-hand side plate of the framework, and hence does not appear in Fig. 6. It is shown in detail in Fig. 7, where it will be seen that the cross-bar I′, overlying the key-levers, is provided upon its end with a stud Y′, which projects through a horizontal slot in a vertical bar Z′, which bar is provided at its lower end with a vertical slot A^2, which fits over a stud or boss B^2, projecting inward from the side plate of the framework, by which slot and stud the lower end of the bar Z′ is guided in the vertical movements imparted to it by the raising and lowering of the cross-bar I′ at the operations of the machine. The upper portion of the bar is provided with a wide vertical slot whose opposite walls are provided with gear-teeth, thus forming two racks C^2 D^2. The rotary shaft X′ projects through this slot between the two racks, and has fast upon it a pinion E^2, with which the racks are alternately engaged. At its extreme upper end the bar Z′ is provided with a housing in which are confined two spring-pressed plungers F^2 G^2, projecting upon opposite sides of the bar and adapted to coöperate, respectively, with two inclined ribs or lugs H^2 I^2, formed upon the inner side of the side plate of the framework. Intermediate these two lugs the side plate of the framework has formed upon it a vertical rib or lug J^2, with which coöperates a projection K^2 upon the bar Z′.

Under the construction above described it will be seen that when the cross-bar I′ is lifted by the downward stroke of the front end of any key-lever A′ the bar Z′ will be lifted and its rack C^2 caused to turn the pinion E^2 and shaft X′ forward, in the direction of the arrow, the adjustment of the parts being such that the complete downward stroke of the key-lever will cause a half-revolution to be imparted to the pinion and shaft. During this upward movement of the parts the projection K^2 upon the upper end of the bar Z′ will travel upward upon the left-hand side of the rib J^2. As the plunger T^2 engages the inclined surface of the lug H^2 the upper end of the bar Z′ will be pressed toward the right, but the engagement of the projection K^2 with the rib J^2 will prevent it moving in that direction until said projection clears the upper end of the rib J^2, with the result that the plunger F^2 will be forced to the right into its housing and its spring put under tension, so that the instant the projection K^2 clears the upper end of the rib J^2 the upper end of the bar Z′ will be thrown to the right and the lower end of the left-hand rack D^2 be engaged with the pinion E^2. At the downward movement of the parts, upon the return of the operated key-lever or levers to normal position, the rack D^2 will turn the pinion and shaft forward a second half-revolution, thus causing them to be given a complete revolution by the upward and downward movements of the parts. At such downward movement the projection K^2 will pass down along the right side of the rib J^2, and as the plunger G^2 engages the inclined surface of the lug I^2 the upper end of the bar Z′ will be pressed toward the left, but the engagement of the projection K^2 with the rib J^2 will prevent movement of it in that direction until the downward movement of the parts is completed and the projection clears the lower end of the rib J^2, whereupon the spring, acting upon the plunger G^2, which has been put under tension, will throw the upper end of the bar Z′ to the left, into the position shown in Fig. 7, ready for the next operation.

So much of the machine as has been thus far described is old and not of my invention, with which understanding I will now proceed to explain my several improvements. The first of these relates to the transfer devices between the several registering-wheels, by means of which when one wheel has been given a complete revolution the next higher wheel in the series is advanced one number. As seen in Figs. 1 and 6, each of the three

right-hand registering-wheels has fast upon its hub at the right of the wheel a ratchet L^2, with which ratchets spring-pressed holding-pawls M^2, pivoted in the frame C, engage to prevent backward movement of the wheels. With the ratchets of the second and third wheels there also coöperate the transfer-pawls N^2, by which at each complete revolution of the first wheel the second wheel is advanced one number, and at each complete revolution of the latter wheel the third wheel is advanced one number. (The transfers between the third and fourth and the higher wheels in the series are effected by another form of transfer device which has nothing to do with my invention and which therefore need not be described.) The transfer-pawls N^2 are pivoted in and carried by the upper forward ends of long curved levers O^2, which fit in slots in the lower part of the frame C and are fulcrumed upon the pivotal rod S′ of said frame. The rear ends of these levers project rearward into position adjacent the rotary shaft X′ and carry upon their rear ends friction-rollers P^2, with which coöperate cams Q^2 R^2 upon the shaft X′, Fig. 6, with the result that at each complete revolution of said shaft the rear ends of the levers O^2 are depressed and their upper forward ends thrown rearward, carrying the transfer-pawls N^2 with them. The rear ends of these pawls N^2 are normally held up in such position that they cannot engage the ratchets L^2, with which they are respectively designed to cooperate. To this end each pawl is provided with a lateral projection S^2, which rests upon a shoulder formed upon the upper end of a latch T^2, pivoted in the frame C at the right of the pawl and engaged by a spring U^2, which presses the upper end of the latch rearward, the engagement of its upper end with the projection S^2 of the pawl preventing rearward movement of the latch under the influence of its spring U^2, except when the pawl itself moves rearward. Springs V^2, confined beneath the front ends of the pawls N^2, tend to throw their rear ends downward, and do so whenever the upper ends of the latches T^2 are thrown forward from beneath the projections S^2 of the pawls. Each latch T^2 is arranged in line with a projection W^2, Fig. 9, upon the hub of the registering-wheel adjacent said latch, and the latch is provided with a rearwardly-extending projection or tooth adapted to coöperate with the projection W^2 upon the hub of the wheel, with the result that at each complete revolution of the wheel the projection W^2 will engage the latch and throw its upper end forward and release the pawl N^2, whose rear end will then drop sufficiently to bring it into position to coöperate with the ratchet L^2 of its wheel. It will be understood from Figs. 6 and 9 that the ratchet with which the pawl N^2 in Fig. 6 cooperates is not the ratchet shown in full lines in Fig. 6, but is the ratchet of the next higher wheel toward the left, (shown in dotted lines in Fig. 9,) while the latch T^2 (shown in Fig. 6) coöperates with the projection W^2 of the registering-wheel A, (shown in said figure,) said wheel standing between the latch and its coöperating pawl N^2.

From the foregoing description it will be understood that at each operation of the machine the pawl-levers O^2 are engaged by the cams Q^2 R^2 and the pawls N^2 thrown rearward. So long as both pawls are supported upon the upper ends of the latches T^2 their rear ends will play idly over the upper sides of the tooth *a* of the respective ratchets, and the latter and their registering-wheels will not be turned; but when either latch has been tripped by a complete revolution of its coöperating registering-wheel the pawl N^2, coöperating with the next higher wheel, will drop into position to engage the tooth *a* of the ratchet of such wheel, and at the rearward movement of the pawl the wheel will be advanced one number.

Inasmuch as the only thing holding the latches T^2 in their forward positions against the pressure of their springs U^2 is the engagement of the projections S^2 of the pawls N^2 with the upper ends of the latches, it follows that at the rearward movement of the pawls the upper ends of the latches will move rearward with them, and that in the ordinary operation of the pawls (when no transfer is to be effected and the latches have not been tripped) the projections S^2 of the pawls will remain in position upon the upper ends of the latches during their entire backward and forward movements, with the result that, except when the latches are tripped, they constantly support the pawls during all the movements of the latter, and there is no disengagement of the projections S^2 from the latches and no danger of such disengagement.

In the transfer devices of these registers, as heretofore constructed, it has not been possible for the latches T^2 to follow and support the pawls during their complete rearward movement, the result being that the projections S^2 of the pawls would be entirely disengaged from the upper ends of the latches during the later portion of the rearward movement of the pawls and the rear ends of the latter would be supported simply by resting upon the upper sides of the teeth *a* of the ratchets. When the pawls were thrown forward again to normal position, the projections S^2 would again pass over and rest upon the shoulders of the upper ends of the latches. Owing to this disengagement of the projections S^2 from the latches, however, it sometimes occurred that at the return forward movements of the pawls their projections S^2 would not pass above and rest upon the shoulders of the latches, but would strike the rear edges of the latches at the corner formed by the rear end of the shoulder and the vertical rear edge of the latch, so that the upper end of the latch would be carried forward with the pawl and the latch come to rest in tripped position with

the pawl set to turn its ratchet at its next rearward movement. In order to prevent such improper operation of the parts, extreme care had to be exercised in constructing and adjusting them, and even then the improper operation was liable to occur. I have overcome the difficulty by so arranging the latches T^2 that their upper ends may follow and support the pawls during their entire rearward movement and never become disengaged from the projections S^2, except when they are tripped preparatory to the making of a transfer. Under this arrangement much less care is required in the construction and adjustment of the parts, while the possibility of error in the registration is removed.

It will be understood that when a latch is tripped and its pawl is set and then thrown rearward its rear end, as it engages the tooth of the ratchet at *a* and turns the latter rearward, will be lifted by the next succeeding tooth of the ratchet as the latter is brought to the position of the tooth *a* in Fig. 6, so that the projection S^2 of the pawl will be again carried above the plane of the shoulder of the latch. Inasmuch as the latch has followed the pawl in its rearward movement and its rear edge immediately below its shoulder is bearing against the forward side of the projection S^2 of the latch, it follows that as soon as the rear end of the pawl has been lifted, in the manner above explained, until the projection S^2 is carried above the plane of the shoulder the latter will immediately catch under the projection S^2 again, and thus serve to support the pawl in its upper position at the beginning of its return forward movement. The pawl will thereupon carry the latch forward with it and the parts will come to rest in the position shown in Fig. 6.

If the latch T^2 could not move farther rearward than its position shown in Fig. 6 and follow the pawl in its rearward movement, it will be seen that at any return forward movement of the pawl its rear end would slip off the point of the tooth *a* almost at the instant the forward edge of its projection S^2 reached the rear end of the shoulder of the latch T^2, with the result that, as has been explained, the projection S^2 would be liable at times to strike the rear edge of the latch below its shoulder and carry the latch forward to tripped position and leave the pawl set for a transfer. Under my improved arrangement of the parts the proper reëngagement of the projection S^2 with the shoulder of the latch T^2 is insured not only at the return forward movement of the pawl N^2 after having made an idle rearward stroke and effected no transfer, but also at its return forward movement after having made a transfer.

The next feature of my invention relates to the cams Q^2 R^2 for actuating the pawl-levers O^2. It will be understood from the position of these cams that they do not engage the rear ends of the levers O^2 until the second half of the revolution of the shaft X′, and consequently not until after the sectors Q′ have transmitted their movements to the registering-wheels and the pinions R′ of the latter been disengaged from them. Under ordinary operations of the machine, therefore, the rotary shaft X′ at the time the cams Q^2 R^2 engage the pawl-levers is being moved solely by the action of gravity or the springs which reset the various parts of the machine after the front end of the operated key-lever has been released, such release being, of course, usually given at the end of the downward stroke of such lever. Under such conditions the cams Q^2 R^2 do not strike the rear ends of the levers O^2 with any considerable degree of force or violence, so that such levers and the transfer-pawls are moved with ease and the parts properly operated. Inasmuch, however, as the second half-revolution of the shaft X′ takes place during the return upward stroke of the operated key-levers, and inasmuch as the rear ends of the levers are positively connected to the rear edge of the cross-bar I′, by whose downward movement the second half-revolution of the shaft X′ is effected in the manner explained in connection with Fig. 7, it follows that if a person desiring to damage the machine or cause it to operate improperly shall retain his hold upon the front end of the operated key-lever at the end of its downward stroke and shall then positively lift it to normal position quickly and forcibly such positive movement will be imparted to the shaft X′ and the cams Q^2 R^2 be caused to strike the rear ends of the pawl-levers with greatly-increased speed and force, the result of which will be that the transfer-pawls N^2 will be thrown rearward so quickly and violently that if either of them happens to be set for a transfer, so as to engage the ratchet of its coöperating wheel, it will be liable to strike the ratchet such a blow as will cause the wheel to be turned more than one number and an improper registration thus be made. It is a matter of common knowledge that machines of this character are often placed in the hands of clerks who object to using them, and who desire to cause them to work improperly by any means in their power, and that they are often subjected to such severe usage in attempts of this kind as to seriously damage them, and sometimes even to break off the front ends of the steel key-levers. It has been found from practical experience that efforts to cause improper registration by violently returning the operated lever or levers to normal position in the manner above described frequently occur and are sometimes successful. My invention overcomes this difficulty and renders it impossible to cause the cams Q^2 R^2 to strike the pawl-levers O^2 with anything more than a substantially normal degree of force. I accomplish this result by loosely mounting the cams Q^2 R^2 upon the shaft X′ (instead of rigidly securing them thereon as heretofore) and con-

necting them to the shaft by means of a spring, whereby said cams are permitted to yield when caused to strike an obstacle with undue force.

The spring connecting the cams to the shaft is of sufficient strength to overcome the resistance offered by the pawl-levers under normal operations of the machine, so that in such cases the cams act as though they were fast upon the shaft; but if the shaft be operated very quickly and the cams caused to strike the pawl-levers with excessive force the resistance offered will cause the spring to yield and be put under tension, so that the blow given by the cams is cushioned and diminished by their yielding connection with the shaft. As seen more particularly in Fig. 8, the cams Q^2 R^2 are formed upon a sleeve A^3, loosely mounted upon the shaft X′ at the left of the cams V′ W′, heretofore described. Interposed between the left-hand end of the sleeve A^3 and a collar B^3, fixed upon the shaft X′, is a spring C^3, coiled around the shaft X′ (in this instance around the reduced end of the sleeve A^3) and fastened at its left-hand end to said collar and at its right-hand end to the sleeve A^3. The right-hand end of the sleeve A^3 is cut away for a portion of its circumference to form a shoulder, which abuts against a lug D^3 upon the shaft X′, the engagement of the shoulder with this lug limiting the movement of the sleeve A^3 under the influence of the spring C^3, while the cut-away space permits the spring to turn in the opposite direction when sufficient force is applied to it to overcome the tension of the spring.

It will be evident that the cam or cams may be yieldingly connected with the shaft by an interposed spring in other ways than by the specific arrangement which I have shown and described. So far as I am aware I am the first in the art to combine a cam or cams with a rotary shaft by means of an interposed yielding connection which will permit the cams to yield when they encounter an abnormal resistance, and my invention in its broadest sense is of corresponding scope.

The remaining feature of my invention relates to the novel means for resetting the registering-wheels at the end of a day's business or at such other time as the reading has been taken from the wheels. The shaft B, upon which the train of registering-wheels is mounted, projects at its opposite ends beyond the side plates of the frame C, and at its left-hand end has fast upon it a disk D, Figs. 1 and 3, which has in its periphery a single notch with which coöperates the rear end of the left-hand side arm E of a pivoted frame F, Fig. 1, pivotally supported by its two side arms upon the frame C or a rod passing through the same and yieldingly held by a spring G in normal position with the rear end of its left-hand arm E pressed against the periphery of the disk D. When the shaft B is in normal position, the end of the arm E fits in the notch in the disk D. When the shaft is turned, the end of the arm is forced out of the notch as the periphery of the disk rides under the end of the arm, and when the shaft completes a revolution and the notch is brought opposite the end of the arm the latter snaps back into it and serves to yieldingly hold the shaft in normal position.

Each of the registering-wheels A carries upon its left-hand side, Fig. 5, a pivoted pawl H, which is spring-pressed against the shaft B, a notch in the hub of the wheel permitting the end of the pawl to engage the shaft. The shaft is provided with a single longitudinal notch or groove which has an abrupt wall or shoulder at one side and a beveled surface at its opposite side, so that when the wheels are turned in the direction of the arrow in Fig. 5 in the operations of the register the pawls may slip idly over the groove in the shaft; but when the shaft itself is turned in the direction of the arrow the abrupt wall of its groove will contact with the ends of the pawls and pick up the registering-wheels, in whatever position they may be standing at the beginning of movement of the shaft, and carry them around with it, so that a complete revolution of the shaft in such direction will serve to reset all of the registering-wheels to zero or initial position, as is common in this class of devices.

Fast upon the right-hand end of the shaft B, which projects to the right of the frame C, is a beveled pinion I, while surrounding said pinion and fast upon it or upon the shaft B is a flanged disk J, whose flaring flange incloses the beveled pinion and projects to the right flush with or beyond the vertical plane of the pinion, Fig. 4. Secured to the right-hand side of the frame C, in this instance screwed to the right-hand side of the plate K, which is fast upon the side of the frame C, is a housing L, which is provided with a vertical bore adapted to receive the shank of a key M, which has fast upon it a beveled pinion N, adapted, when the key is inserted in place, to mesh with the beveled pinion I, fast upon the shaft B, and serve as a means for turning the shaft B and resetting the registering-wheels. A pin O is passed through the housing L from its outer side and projects at its inner end into the vertical bore in said housing, and the lower end of the shank of the key M is provided with a longitudinal groove to coöperate with the pin O, thus serving to prevent the insertion of the key except in proper position, with the groove P in line with the pin. The groove P communicates at its upper end with a circumferential groove in the shank of the key, which circumferential groove permits the key to be turned after having been inserted in place, while the coöperation of the pin O with such latter groove serves to lock the key in position after it has been slightly turned and prevent its withdrawal before it has completed a revolution. If the pinion N were of the same size as the pinion I, a single revolution of the key would impart a complete revolution to the

shaft B and serve to reset the register-wheels, but inasmuch as the pinion N, as shown, is considerably smaller than the pinion I it follows that several revolutions of the key will be necessary to give the pinion I and shaft B a complete revolution. To permit the downward passage of the pinion N into mesh with the pinion I when the key is inserted, the flange of the disk J is provided at its upper side with a recess or notch *a*. After the key has been inserted and slightly turned this notch *a* will have been carried away from normal position and the projecting flange of the disk J will have moved over the inner edge of the pinion N and will then serve to lock the pinion N in mesh with the pinion I and prevent the withdrawal of the key until the pinion I and shaft B have been given a complete revolution and the registering-wheels been returned to initial position, by which latter movement the notch *a* will have been brought to position above the pinion N again, while the groove P in the shank of the key will also have been brought into line with the pin O, so that the key is free to be withdrawn.

It will be understood from the foregoing that the coöperation of the flange of the disk J with the pinion N is sufficient for the purpose of locking the resetting-key in position after it has been slightly turned and compelling the complete resetting of the registering-wheels before it can be withdrawn, so that the locking coöperation of the pin O with the circumferential groove in the key is not necessary for this purpose, although where the pin O and a longitudinal groove P are employed it is necessary that the circumferential groove be provided or the shaft of the key above the end of the groove P be reduced in order to permit the key to be turned. In event, however, a pinion N of the same size as the pinion I be employed the flanged disk J may be dispensed with and the pin and circumferential groove in the key serve the purpose of compelling the complete resetting movement of the parts.

It will be understood that the ratchet and pawl devices prevent backward movement of the parts after the key has been inserted and turned forward from normal position, so that after it has been thus turned it cannot be withdrawn by turning it backward.

For the purpose of positively locking the shaft B in normal position (in addition to its being yieldingly held in said position by the engagement of the arm E with the notch in the disk D, Fig. 3) there is pivoted in a vertical recess in the lower end of the housing L a locking-arm Q, Fig. 4, whose left-hand end is pressed upward by a spring R and normally fits in a notch *b* in the lower side of the flange of the disk J, Figs. 2 and 4. The engagement of the arm Q with the notch *b* serves to positively lock the shaft B in normal position. When the key M is inserted in the housing L, its lower end bears upon the arm Q and presses its left-hand end downward out of engagement with the notch *b*, thus releasing the shaft B and parts fast upon it and permitting them to be turned by the key. When they have been given a complete revolution and the key is withdrawn, the spring R reëngages the locking-arm Q with the notch *b*.

So far as the locking and releasing operation of the arm Q, which has been described, is concerned the upper edge of said arm may be simply a plain horizontal surface, the left-hand end of the arm being suitably cut away or shaped to coöperate in the manner described with the notch *b* in the flange J. In that event, however, it will be understood that the arm Q might be readily disengaged from the notch *b* by inserting any instrument in the bore in the housing L and pressing the arm Q downward, in which event the resetting devices might be unlocked and the registering-wheels be partially or wholly reset by the clerk or other unauthorized person not having possession of the key at all. Furthermore, it would be somewhat difficult to substantially vary the locking devices of different registers so that the same key would not coöperate with the different locks and unlock others than its own register. I have therefore provided means for overcoming the first-mentioned difficulty to a very great extent, and also for readily permitting the locking devices of different registers to be so varied that each register can be unlocked only by the key belonging to it. To these ends the upper edge of the locking-arm Q, as I have shown it in the drawings, is recessed or cut away beneath the bore of the housing L, and at the left of such recess the cut-away portion is provided with a hooked projection *c*, extending upward and toward the left and having an inclined or beveled right side, with which the periphery of the lower end of the key M engages. Now when the arm Q is pressed downward the proper distance to unlock the register, its left-hand end will have been carried out of and below the notch *b* in the flange J, while its projection *c* will not have moved downward far enough to have engaged the notch, so that as the parts are turned to reset the wheels the edge of the flange J will travel in the notch beneath the point of the hooked projection *c*, as seen in Fig. 4. It will be seen that if the arm Q should be pressed downward far enough to engage the projection *c* with the notch *b*, the parts would remain locked just as though the arm had not been depressed at all, and that it is therefore necessary, in order to unlock the parts and permit the wheels to be reset, to depress the arm Q exactly the proper distance and no farther, and it will be found difficult to so operate the locking device with anything else than the particular key belonging to it. Furthermore, it will be seen that if the inclines upon the projections *c* of the arms Q of different locks are slightly varied the same key will depress the several arms

different distances, and that likewise if the keys be varied slightly in length or in the diameters of their lower ends different keys will depress the arm Q of a given lock different distances. Thus, in Fig. 4, if the key M were a trifle longer it will be seen that it would depress the arm Q so far as to cause the projection *c* to engage the notch *b* and lock the parts, while if it were shorter or its lower end slightly reduced in diameter it would not depress the arm Q far enough to disengage its left-hand end from the notch *b*. Likewise, if the incline of the projection *c* in Fig. 4 were substantially varied the particular key M shown in that figure would not properly coöperate with the arm Q to release the parts. From the foregoing it will be understood that by varying the inclines upon the projections *c*, and also by varying the lengths of the keys M or the diameters of their lower ends, it is possible to provide a very large number of different locks, each of which can be manipulated only by the particular key belonging to it. While, however, this is an advantageous feature of my invention, the latter is not limited in its broader scope to this or any other means for differentiating the locking devices, as will be indicated by the terms of my claims.

In the absence of the flanged disk J, as where a pinion N of the same size as the pinion I is employed and the locking coöperation of the flanged disk with the pinion N thereby rendered unnecessary, the end of the locking-arm Q may coöperate directly with the pinion I, either with a notch cut in its periphery or with the space between two of its adjacent teeth, which stand on opposite sides of the vertical plane of the arm Q when the pinion is in normal position, as will be readily understood.

From the foregoing description it will be seen that in order to reset the registering-wheels it is only necessary to insert the key M in position and then turn it until the end of the arm E snaps back into the notch in the disk D. This reëngagement of the arm with the notch, under the influence of the spring, can be plainly seen, felt, and heard, so that no careful watching is needed to prevent turning the key too far, and when the reëngagement takes place the key is always in position to be removed.

Having thus fully described my invention, I claim—

1. In a registering device, the combination, with two registering-wheels, the lower provided with a projection and the higher with a ratchet, of a reciprocating transfer-pawl adapted to coöperate with said ratchet, and a latch for normally holding said pawl out of operative position, said latch coöperating with the projection upon the lower wheel to be tripped at each revolution of said wheel and permit the transfer-pawl to move into operative position, and reciprocating back and forth with the pawl throughout substantially the complete movements of the latter and maintaining its operative engagement with the pawl except when tripped by the projection upon the lower wheel, substantially as and for the purpose described.

2. In a registering device, the combination, with two registering-wheels, the lower provided with a projection as W^2, and the higher with a ratchet as L^2, of a reciprocating transfer-pawl N^2 adapted to coöperate with the ratchet L^2 and provided with a lateral projection S^2, and the spring-pressed latch T^2 provided at its upper end with the shoulder normally engaging the projection S^2 of the pawl and provided upon its rear side with a projection coöperating with the projection W^2 upon the lower registering-wheel, the adjustment of the parts being such that the upper end of the latch T^2, under the influence of its spring, is permitted to follow the pawl N^2 in its rearward movement to substantially the limit thereof, with its shoulder remaining in engagement with the projection S^2 of the pawl except when the latch is tripped by the projection W^2 on the lower registering-wheel, substantially as and for the purpose described.

3. In a cash-register or other device having a part to be acted upon by a cam, the combination of a rotary shaft, a cam loosely mounted thereon, a coiled spring surrounding the shaft and secured thereto at one end and acting upon the cam at its opposite end, and a stop for limiting the movement of the cam under the pressure of the spring, substantially as and for the purpose described.

4. In a cash-register or other device having a part to be acted upon by a cam, the combination of a rotary shaft as X′, a sleeve A^3 loosely mounted thereon and provided with one or more cams, as R^2, a collar, as B^3, fast upon the shaft, a coiled spring C^3 surrounding the shaft and secured at one end to said collar and at its opposite end to the sleeve A^3, and a stop, as D^3, for limiting the movement of the sleeve A^3 under the pressure of the spring C^3, substantially as and for the purpose described.

5. In a registering device, the combination of the shaft B, the registering-wheels A mounted thereon, suitable means intermediate the wheels and shaft for causing the shaft to pick up the wheels and carry them with it when it is turned in one direction, the pinion I fast upon the shaft, the housing L having the bore for the reception of the key, and the key M adapted to fit in said bore and having fast upon it the pinion N adapted to coöperate with the pinion I for the purpose described.

6. In a registering device, the combination of the shaft B, the registering-wheels A mounted thereon, suitable means intermediate the wheels and shaft for causing the shaft to pick up the wheels and carry them with it when it is turned in one direction, the pinion I fast upon the shaft, the projecting flange J surrounding said pinion and having the notch or recess *a*, the housing L having the bore for

the reception of the key, and the key M adapted to fit in said bore and having fast upon it the pinion N adapted to coöperate with the pinion I and flange J in the manner described.

7. In a registering device, the combination of the shaft B, the registering-wheels A mounted thereon, suitable means intermediate the wheels and shaft for causing the shaft to pick up the wheels and carry them with it when it is turned in one direction, the pinion I fast upon the shaft, the housing L having the bore for the reception of the key, the pin O projecting into said bore, and the key M adapted to fit in said bore and provided with the longitudinal and circumferential grooves coöperating with the pin O, and having fast upon it the pinion N adapted to mesh with the pinion I, substantially as described.

8. In a registering device, the combination of the shaft B, the registering-wheels A mounted thereon, suitable means intermediate the wheels and shaft for causing the shaft to pick up the wheels and carry them with it when it is turned in one direction, the pinion I fast upon the shaft, the housing L having the bore for the reception of the key, the locking-arm Q spring-pressed into locking coöperation with the pinion I, and the key M adapted to fit in the bore in the housing L and to coöperate with the locking-arm Q, and having fast upon it the pinion N adapted to mesh with the pinion I, substantially as described.

9. In a registering device, the combination of the shaft B, the registering-wheels A mounted thereon, suitable means intermediate the wheels and shaft for causing the shaft to pick up the wheels and carry them with it when it is turned in one direction, the pinion I fast upon the shaft, the housing L having the bore for the reception of the key, the pin O projecting into said bore, the spring-pressed locking-arm Q coöperating with the pinion I, the key M adapted to fit in the bore in the housing L and coöperate with the arm Q and provided with the longitudinal and circumferential grooves coöperating with the pin O, and the pinion N fast upon the key M and adapted to mesh with the pinion I, substantially as described.

10. In a registering device, the combination of the shaft B, the registering-wheels A mounted thereon, suitable means intermediate the wheels and shaft for causing the shaft to pick up the wheels and carry them with it when it is turned in one direction, the pinion I fast upon the shaft, the projecting flange J surrounding the pinion I and having the notch or recess *a*, the housing L having the bore for the reception of the key, the spring-pressed locking-arm Q pivoted in said housing and coöperating with the notch *b* in the flange J, and the key M adapted to fit in the bore in the housing and coöperate with the arm Q, and having fast upon it the pinion N coöperating with the pinion I and flange J in the manner described.

11. In a registering device, the combination of the shaft B, the registering-wheels A mounted thereon, suitable means intermediate the wheels and shaft for causing the shaft to pick up the wheels and carry them with it when it is turned in one direction, the pinion I fast upon the shaft, the projecting flange J surrounding the pinion I and having the notch or recess *a*, the housing L having the bore for the reception of the key, the pin O projecting into said bore, the spring-pressed locking-arm Q pivoted in a recess in the housing at one end of said bore and adapted to coöperate with the notch *b* in the flange J, the key M adapted to fit in the bore in the housing L and coöperate with the arm Q, and provided with the longitudinal and circumferential grooves coöperating with the pin O, and the pinion N fast upon the key M and adapted to coöperate with the pinion I and the flange J in the manner described.

12. In a registering device, the combination of the shaft B, the registering-wheels A mounted thereon, suitable means intermediate the wheels and shaft for causing the shaft to pick up the wheels and carry them with it when it is turned in one direction, the pinion I fast upon the shaft, the projecting flange J surrounding the pinion I and having the notches *a* and *b*, the housing L having the bore for the reception of the key, the spring-pressed locking-arm Q pivoted in said housing at the end of the bore and provided with the projection *c* adapted to coöperate with the notch *b* in the flange J, and the key M adapted to fit in the bore in the housing L and coöperate with said projection *c*, and having fast upon it the pinion N coöperating with the pinion I and flange J, substantially as and for the purpose described.

13. The herein-described detachable resetting-key for registers, consisting of the shank M adapted to fit in a suitable bore and having the thumb-piece for turning it, and the pinion N fast upon the shank M near enough its middle to leave a free projecting end to fit in the bore and adapted to coöperate with a pinion turning with the resetting-shaft, substantially as described.

14. The herein-described resetting-key for registers, consisting of the shank M having the longitudinal and circumferential grooves at one end, adapted to coöperate with a projection in the bore or guideway in which the key fits, and having at its other end the thumb-piece for turning it, and the pinion N fast upon the shank M and adapted to coöperate with a pinion turning with the resetting-shaft, substantially as described.

ALEXANDER W. MARR.

Witnesses:
PEARL N. SIGLER,
ALVARD MACAULEY.