No. 627,403. Patented June 20, 1899.

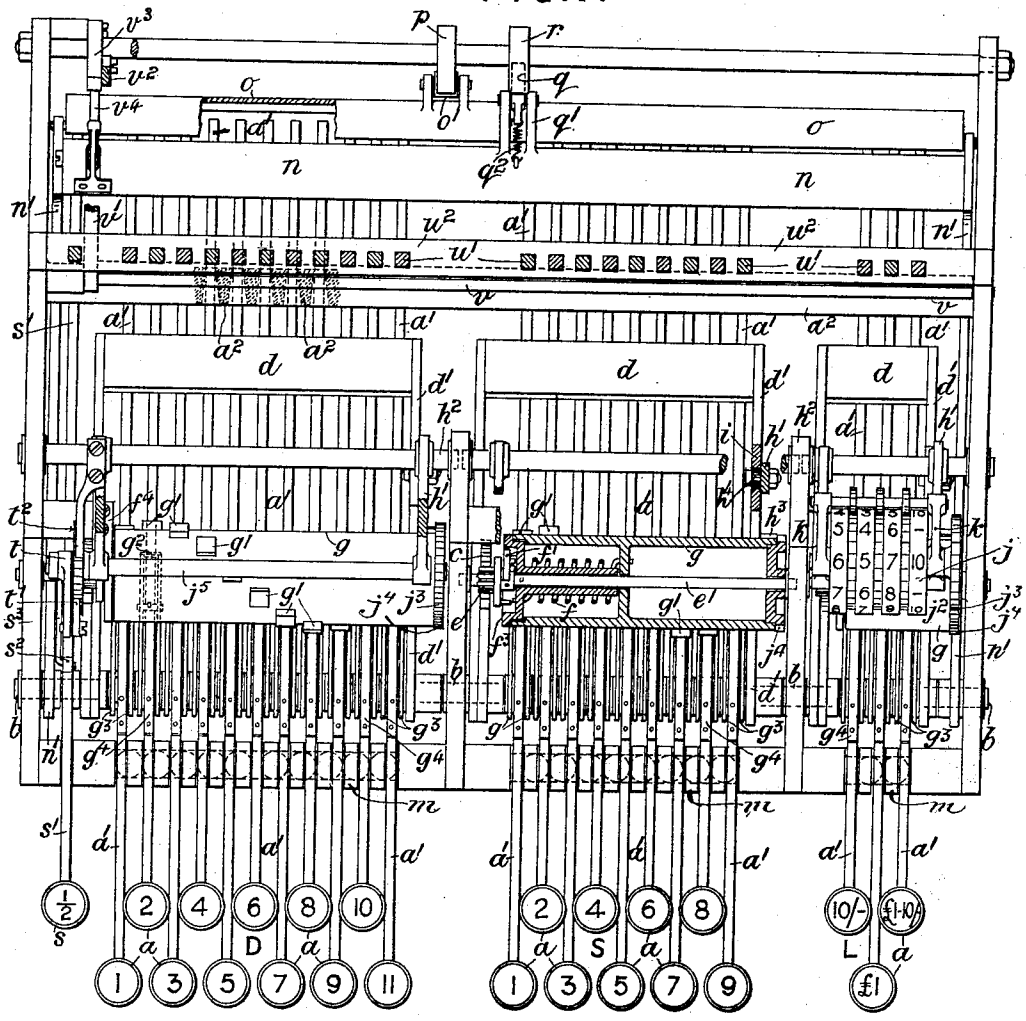
C. J. FAUVEL & N. COLLINS.

CASH REGISTER.

(Application filed May 2, 1898.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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(No Model.) 2 Sheets—Sheet 2.

FIG. 2.

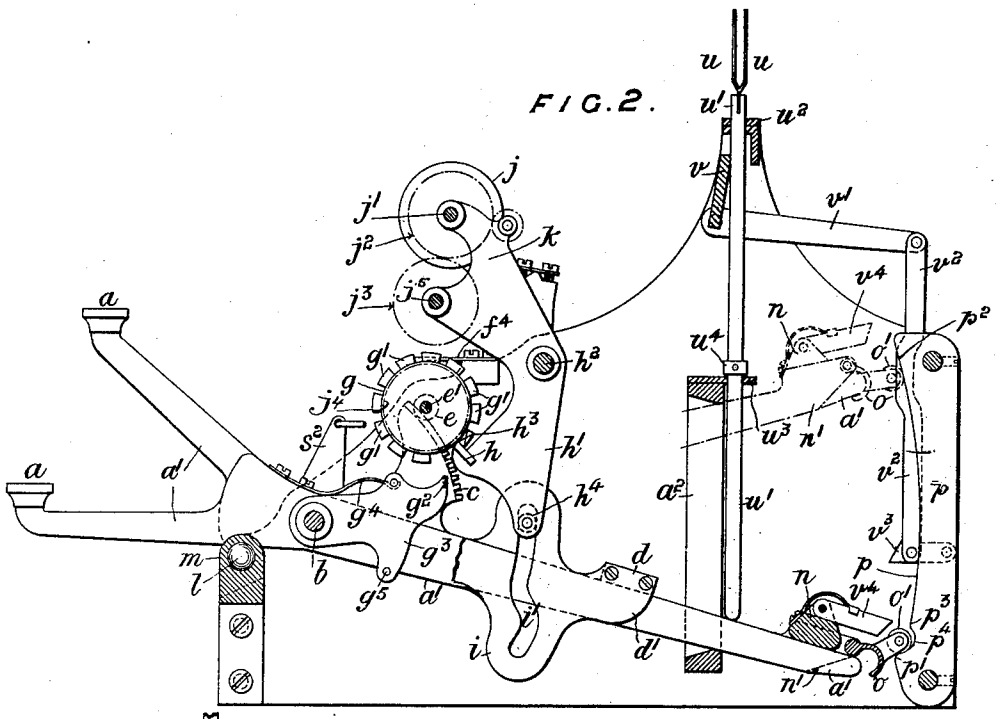
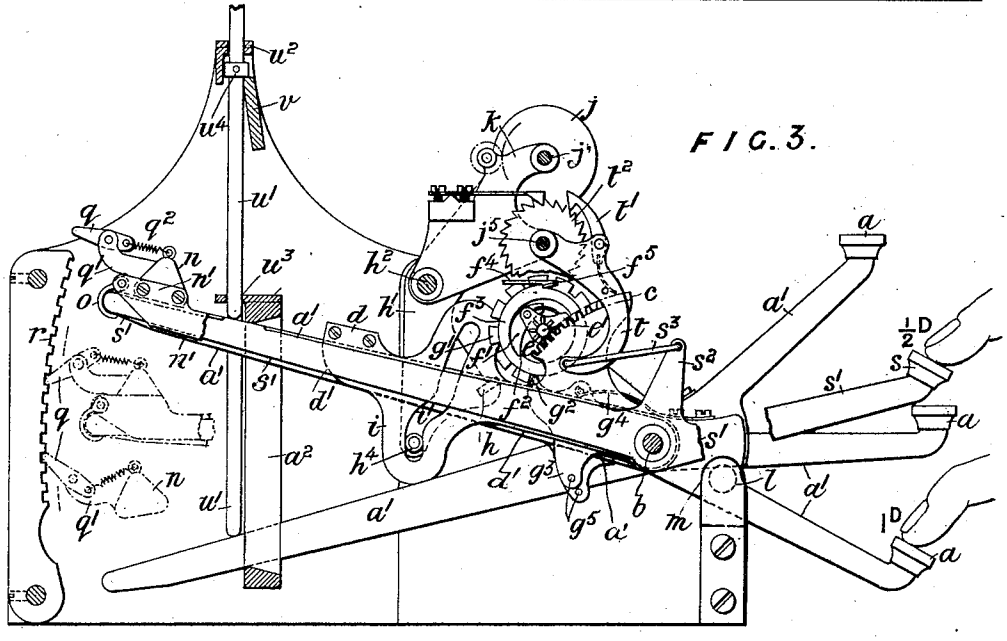


FIG. 3.



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UNITED STATES PATENT OFFICE.

CHARLES J. FAUVEL AND NORMAN COLLINS, OF LONDON, ENGLAND, ASSIGNORS TO THE EMPIRE CASH REGISTER, LIMITED, OF SAME PLACE.

CASH-REGISTER.

SPECIFICATION forming part of Letters Patent No. 627,403, dated June 20, 1899.

Application filed May 2, 1898. Serial No. 679,489. (No model.)

To all whom it may concern:

Be it known that we, CHARLES JAMES FAUVEL and NORMAN COLLINS, engineers, residing at Broad Street House, Old Broad street, in the city of London, England, have invented new and useful Improvements in Cash-Registers, of which the following is a specification, and for which a patent has been applied for in Great Britain, dated October 30, 1897, No. 25,241.

This invention relates to improved apparatus for registering cash receipts, and has for its object to simplify the construction, lessen the cost, and improve the efficiency of the apparatus as compared with other apparatus of the kind heretofore in use.

The improvements relate, first, to key-operated registering mechanisms, wherein the mechanism for recording sums of money of any one denomination of coin is actuated through the medium of a set of keys and of a barrel which always makes a single complete revolution for each such sum of money registered, whatever may be the amount of that sum, there being as many drums and sets of keys as there are denominations of coins to be recorded—that is to say, for the English monetary system (to which this description particularly applies) there would be three such sets, corresponding, respectively, to pence, shillings, and sovereigns, or half-sovereigns sterling, while for other monetary systems the construction would be modified accordingly; secondly, to means of coupling the keys, (appertaining to different sets of registering mechanisms for recording the receipt of a sum of money made up of amounts of different denominations,) which may be simultaneously depressed for the purpose of recording such sum, so that the simultaneous partial depression of two or more keys appertaining to different sets will be completed in respect of all those keys by the continued pressure of the finger on one only of those keys, and the correct registration of the whole sum will be effected, notwithstanding that the pressure on one or more of the keys is relaxed before complete depression; thirdly, to improved means whereby to prevent the return of a key after partial and before complete depression, and likewise the re-depression of a key before it has completely returned to normal position, and, fourthly, to the means of actuating any one registering mechanism for the purpose of recording the receipt of half-units—say half-pennies, for example—independently of the barrel and keys by which the same registering mechanism is operated for recording the receipt of whole units.

Reference is to be had to the accompanying drawings, forming part of this specification, wherein—

Figure 1 is a plan of the machine for recording the receipt of sums of money in terms of "pence," "shillings," and "pounds sterling," the case being omitted and parts of the machine being broken away. Figs. 2 and 3 are opposite end elevations, partly in section, of the mechanism for recording sums of the pence denomination, Fig. 3 showing the mechanism for independently recording half-pennies.

The same letters of reference indicate the same parts in all the figures.

The cash-register comprises three sets of key-levers D S L, respectively appertaining to registering mechanisms for recording the receipt of sums of the "pence," "shillings," and "pounds" denominations. These several key mechanisms being similar in construction, although different in respect of the number of keys, it will be sufficient to describe one of them. We will therefore describe the pence set.

All the keys a of the set are carried by levers a', pivoted about a common axis b, and each key-lever is adapted when depressed to oscillate a quadrant-rack c, which is actuated through the medium of a gravity or spring-depressed bar d, normally resting across all the key-levers and carried by arms pivoted on the key-axis b, with which the quadrant moves as one. The quadrant-rack c is in gear with a pinion e on the axis e' of a spring-barrel g, so that by the depression of any one of the keys a the spring f will be wound up to the extent of one turn, the revolution of the barrel being prevented by a detent h, carried by a lever h', pivoted at h^2 and engaging with a stop-pin h^3 on the barrel. The complete depression of a key effects the withdrawal of this detent through the agency of

a slotted cam-plate i in one with the adjacent arm d', carrying the weight-bar d and acting by its oblique portion i' on a stud h^4 on lever h'. The keys, which are arranged in two tiers, have a constant angular movement, the levers pertaining to the two tiers being suitably shaped as regards their forward members, so that alternate keys will be respectively in the upper and lower tiers, while their rearward members lie all in one plane, so that they all act with equal effect on the mechanism. The barrel-axle e' winds up the spring f through the medium of a pawl f', mounted on an arm fast on the axis, the pawl engaging with a ratchet-tooth f^2 on wheel f^3, loose on the axis, to which wheel the one end of the spring is connected, the other end being connected to the barrel g.

f^4 is a spring-detent engaging with a ratchet-tooth f^5 to prevent the unwinding of the spring on the return of the quadrant-rack c.

The barrel g is provided with peripheral pins g', respectively adapted to be engaged by the several key-levers, as hereinafter described, and spaced at equal angular distances apart around the circumference of the barrel, so that when the detent h is withdrawn by the depression of a key the rotation of the barrel by the spring will be permitted and the barrel will be rotated until the pin g', which corresponds to that key, meets a stop g^2 in connection with the key-lever, which has been presented in the path of the pin g' by the depression of the key, the extent to which the barrel thus rotates being proportional to the value of the sum represented by each particular key and the completion of a revolution by the barrel being deferred until the rise of the key to normal position. Each stop g^2 is carried by a pair of plates g^3, pivoted about the key-lever axis b, and is pressed upward by a spring g^4 and depressed by the engagement of the key-lever a' with a pin g^5, so that the stop g^2 will have a less angular movement than the key-lever, and will consequently remain in the path of the pin g', and thus retain the barrel until the key-lever a' strikes the pin g^5, which occurs when the key has almost completed its return to normal position.

The numerator for indicating the total amount of the different sums represented by the successive depressions of the keys is omitted in Fig. 1 in respect of the pence set, but is shown in end view at j in Figs. 2 and 3 and in plan in respect of the pounds set in Fig. 1. Its main axis j' is mounted in a frame k, moving as one with the detent-lever h' about the axis h^2, so as to be brought by the depression of any one of the keys into such position that a toothed wheel j^2 in one with the units-wheel of the numerator will be thrown (through the medium of an intermediate wheel j^3) into gear with a wheel j^4 in one with the pin-barrel g, these wheels coming into gear just before the detent h is withdrawn, so that when the pin-barrel is permitted to partially rotate to an extent proportional to the value represented by the key which has been depressed the units-wheel of the numerator will be rotated to a corresponding extent. When the key which has been depressed has almost completely risen to its normal position, the pin g' on the barrel escapes from the stop g^2 pertaining to the key-lever and the barrel g is permitted to perform the deferred portion of one complete revolution, this portion of its motion being idle or having no effect on the registering mechanism. The barrel is arrested on completing its revolution by the reëngagement of the detent h with the stop-pin h^3. The numerator may be of any suitable construction.

Means of preventing more than one key of each set being depressed at one time should be provided, such means consisting of a row of laterally-movable distance-pieces of steel, preferably in the form of balls l or of rollers or disks contained in a tubular race or casing m, extending transversely across the key-levers, the race or casing m being notched across to give passage to the key-levers, so that each lever when depressed must pass between two adjacent balls l, the race or casing being of such length that when a key thus depressed passes between two adjacent balls the remainder of the balls will be thereby pressed tightly together in the race, so as to obstruct the depression of any other key of the set, there being only so much total clearance between the balls as to give passage to one lever at a time. In Fig. 1 the balls pertaining to the set of levers D are supposed to have been pushed to right and left by the key marked 6, so that when that key was depressed the balls being thus locked immovably in the race or casing m would have prevented the concurrent depression of any other key of the set D. It will be evident that the laterally-movable distance-pieces may have a sliding instead of a rolling motion of displacement, in which case they would be of substantially hemispherical or equivalent form, with the convex side presented to the key-levers.

The return of the key-levers a' to normal position is effected by the pressure of a cross-bar n, carried by arms n', pivoted on the key-lever axis b, this bar being continuous across the three sets of keys D S L, corresponding to pence, shillings, and pounds, so as to be raised by the depression of any one of them. To the bar n is hinged a locking-bar o, also common to the keys of the three sets D S L, this bar being adapted to engage the tail end or ends of any key lever or levers of which the key or keys may be depressed, so that should two or more keys (one of each set) be depressed simultaneously to a partial extent the completion of the depression of any one key will, through the agency of this locking-bar, cause the completion of the movement of the other key or keys, and thus insure the

correct registration of a sum made up of amounts of different denominations. The locking-bar *o* is a hinged flap, and in the normal position of the key-levers (shown in Fig. 2) it is held out of engagement with their tail ends by an arm terminating in a friction-roller *o'*, abutting against a shoulder *p'* of a stationary guide-cam *p*. The portion $p^2 p^3$ of the cam *p* is struck from the key-lever axis *b* at such a radius as to cause (by contact of roller *o'* therewith) the locking-bar *o* to engage with the key-lever of one set (or with the levers of different sets that may happen to be simultaneously operated) and to remain in engagement therewith throughout their stroke, the transition from the locked to the unlocked position, and vice versa, being permitted by the depth of the notch p^4. The locking-bar *o* also serves to prevent an incomplete stroke of any key-lever in either direction. For this purpose a non-return pawl *q* is pivoted on a bracket *q'*, mounted on cross-bar *n*, and is adapted to engage with a stationary rack *r*, Figs. 1 and 3, both on the up and down strokes, so as to prevent retrograde motion of the bar *n* (and therefore of the locking-bar *o* and of any key lever or levers engaged therewith) before the completion of the stroke. The pawl is held in engagement with the rack by a spring q^2, the transition of the pawl from the one to the other inclination (according to the direction of motion as indicated in dotted lines in Fig. 3) being permitted only at the ends of the rack *r*.

To the set of keys D, appertaining to sums of the pence denomination, is added a key *s* for recording half-pennies or semi-units on the register. The lever *s'* of the keys has an arm s^2 coupled by link s^3 to a lever *t*, pivoted to the spindle j^5 of the wheel j^3, before referred to, the lever *t* carrying a pawl *t'*, gearing directly with a ratchet-wheel t^2, fast on axis j^5, so as to propel the units-wheel of the numerator forward to the extent of one tooth of wheel t^2, which corresponds to half a unit for each depression of the key *s*, whose lever, although subject to the locking-bar mechanism, is not subject to the control of the balls *l*, so that it may be depressed along with any other key of the pence set D. In Fig. 3 the half-penny key *s* and the one-penny key are supposed to have been thus depressed simultaneously for the purpose of recording the receipt of the sum of one and one-half pence, the effect being that while the units-wheel of the numerator is moved forward the distance of a unit, through the medium of the spring-barrel *g*, during the depression of the one-penny key *a*, the pawl *t'* will be moved back over the teeth of the ratchet-wheel t^2 during the depression of the key *s*, and when said key is allowed to rise the pawl and ratchet *t' t²* will propel the units-wheel forward to the extent of an additional half-unit. From this it may be seen that the semi-units key *s* may be moved to operate the register when the registering mechanism is in either of its two positions with regard to the barrel *g*.

Each set of key-levers D S L is provided with a set of tablets bearing numerals corresponding to the respective values of the keys to which they respectively correspond, the tablet corresponding to any one key being raised into view, as usual, by the act of depressing that key to indicate to the customer the value of the key which has been depressed. Referring again to the set of keys D, each tablet *u* is carried by a vertical stem *u'*, sliding in guides u^2 u^3, the tablets when in the lowered position being concealed by the casing of the machine, (not shown,) provided with a window, at which the tablet corresponding to any key that may be depressed is exhibited. For this purpose the stem *u'* of each tablet rests upon its corresponding key-lever *a'* or on a shoulder-stop attached to the stem, the correct relation of the two longitudinally of the machine being maintained by vertical guide-bars of a frame a^2, between which the key-levers work. The tablet or tablets raised by the depression of any one or more keys will be maintained in the raised and visible position until the registration of the sum received by a detent-bar *v*, common to all the tablets of all the sets, which is adapted to engage under a shoulder u^4 on the stem *u'*, the bar *v* being pivoted on end gudgeons and provided with a lever-arm *v'*, connected by a link v^2 with a lever v^3, pivoted to the frame and projecting in the path of a finger v^4, pivoted to the bar *u*, so that the lever v^3 will be raised by the finger v^4 and disengage the detent-bar *v* from the stem or stems of any tablet or tablets that may have been raised at the previous operation of the machine, this action taking place early in the stroke when next a key in any one of the sets of keys is depressed. The finger v^4 being pivoted and spring-pressed and the ends of the lever v^3 and finger v^4 being beveled, the latter will pass the former freely on the down-stroke in readiness to act on it again at the next depression of a key.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, we declare that what we claim is—

1. In a cash-registering machine, the combination with a set of keys appropriated to register the receipt of sums of a particular denomination, of a spring-actuated barrel having peripheral studs set at angular distances from the zero-point, proportional to the values represented by the keys to which they respectively correspond, mechanism whereby the winding up of the spring to a constant extent and the release of the barrel from the zero position are effected by the depression of any one key of the set, each key being adapted when depressed, to engage with its corresponding stud, and arrest the barrel after a partial revolution correspond-

ing in extent to the value of key depressed, substantially as and for the purpose specified.

2. In a cash-registering machine, the combination, with a set of keys appropriated to register the receipt of sums of a particular denomination, of a spring-actuated barrel having peripheral studs set at angular distances from the zero-point, proportional to the values represented by the keys to which they respectively correspond, mechanism whereby the winding up of the spring to a constant extent and the release of the barrel from the zero position are effected by the depression of any one key of the set, each key being adapted when depressed, to engage with its corresponding stud and arrest the barrel after a partial revolution corresponding in extent to the value of the key depressed, mechanism actuated by the depression of any one key of the set whereby during such partial revolution of the barrel, registering mechanism is brought into gear with the barrel so as to be actuated thereby to an extent corresponding to the partial revolution thus permitted, and whereby the registering mechanism is disengaged from the barrel when by the return of the key the barrel is permitted to perform the remainder of one complete revolution, substantially as specified.

3. In a cash-registering mechanism comprising a set of key-levers and a spring-actuated barrel having studs angularly spaced around the barrel for engagement by respective key-levers, the combination, with each key-lever, of a stop adapted to be engaged with the corresponding stud on the barrel, said stop being so connected to the key-lever that lost motion will be permitted between them, so that the stop will be moved to a less angular extent than the key-lever, a spring tending to press the stop into engagement with the barrel-stud, and of a positive means of engagement between the key-lever and the stop, such as a pin carried by the latter and presented in the path of the former, whereby the spring will be overcome when the lost motion is taken up, the effect of such lost motion being that the stop will be presented in the path of the corresponding stud early in the stroke of the key-lever in the one direction, and be withdrawn from engagement with said stud late in the stroke of the key-lever in the other direction, so as to enable the mechanism controlling the release of the barrel from, and its reëngagement in, the zero position, to be operated by part only of the stroke of the key-lever, as specified.

4. In a cash-registering mechanism comprising a set of key-levers and a spring-actuated barrel having studs for engagement by respective keys, the studs being angularly spaced around the barrel in proportion to the respective values of the keys, and means whereby the spring is caused to be wound and the barrel to be released from zero position by the depression of any one key, the combination, with the stud-barrel, of registering mechanism adapted to be geared with the barrel, and of means whereby the registering mechanism is so geared with, and is actuated by, the barrel only during that part of its revolution between the zero position and its arrest by the key which has been depressed so that the extent to which the registering mechanism will be actuated will correspond to the extent of such partial revolution and to the value represented by the key which has been depressed, substantially as specified.

5. In a cash-registering machine, the combination, with a set of key-levers, of a bar adapted to be raised by the oscillation of any one lever of the set, and of a locking-bar hinged thereto and adapted to engage the levers of the set, and of a stationary guide-cam adapted by its form to act on the locking-bar and cause the latter to enter into locking engagement only with the lever operated immediately after said lever commences to move, and to remain in engagement therewith throughout its stroke and to release it only on its return to normal position, substantially as specified.

6. In a cash-registering machine, the combination, with a set of key-levers, of a bar adapted to be raised by the oscillation of any one lever of the set, and of a locking-bar hinged thereto and adapted to engage the levers of the set, and of a stationary guide-cam adapted by its form to act on the locking-bar and cause it to enter into locking engagement only with the lever operated, immediately after it commences to move and to remain in engagement therewith throughout its stroke and to release it only on its return to normal position, and of means whereby the return of the locking-bar and lever engaged thereby is prevented until the completion of the stroke, said means consisting of a double-acting non-return pawl and of a rack with which the pawl is adapted to make a non-return engagement in either direction of travel of the locking-bar, substantially as specified.

7. In a cash-registering machine, comprising two or more sets of key-levers, said sets being respectively appropriated to register the receipt of sums of a particular denomination, the combination, with the two or more sets of key-levers, of a presser-bar common to all and adapted to be raised by any lever of either set, and of a locking-bar hinged to such presser-bar and adapted to engage such of the levers of all the sets as may be oscillated at one time, and of a guide-cam adapted to act on the locking-bar and to cause it to enter into locking engagement with the levers of different sets which may be simultaneously oscillated, to the exclusion of the others, and to remain in engagement therewith throughout the stroke and to release them only on return to normal position, so that the stroke of all the keys simultaneously depressed to a partial extent will be completed by the complete depression of any one of them, substantially as specified.

8. In a cash-registering machine comprising two or more sets of key-levers, said sets being respectively appropriated to register the receipt of sums of a particular denomination, the combination, with the two or more sets of key-levers, of a presser-bar common to all and adapted to be raised by any lever of either set, and of a locking-bar hinged to such presser-bar and adapted to engage such of the levers of all the sets as may be oscillated at one time, and of a guide-cam adapted to act on the locking-bar and to cause it to enter into locking engagement with the levers of different sets which may be simultaneously oscillated, to the exclusion of the others, and to remain in engagement therewith throughout the stroke and to release them only on return to normal position, so that the partial stroke of all the keys simultaneously depressed will be completed by the complete depression of any one of them, substantially as described, and of means whereby the return of the locking-bar and lever engaged thereby is prevented until the completion of the stroke, said means consisting of a double-acting non-return pawl and of a rack with which the pawl is adapted to make a non-return engagement in either direction of travel of the locking-bar as specified.

9. In a cash-registering machine, the combination with registering mechanism with means of moving such mechanism into and out of gear, with a spring-actuated barrel having peripheral studs set at angular distances from the zero-point proportional to the values of the keys to which they respectively correspond, a set of key-levers respectively adapted to be presented each by the depression of its key in the path of the corresponding stud of the barrel, so as to arrest the barrel after partial revolution corresponding in extent to the value of the key depressed, and with mechanism whereby the winding up of the spring and the release of the barrel from the zero position are effected by the depression of any one key of the set, of a supplementary key having no action on the key-controlled barrel and key-operated barrel winding and releasing mechanism and of pawl-and-ratchet mechanism whereby such supplemental key is directly geared with the units-wheel of the registering mechanism so as to cause the said units-wheel to be moved to the extent of a semi-unit by the rising movement of said supplemental key after it has been depressed and in whichever of its two positions with regard to the spring-actuated stud-barrel the registering mechanism may be.

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In presence of—
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T. W. KENNARD.