

(No Model.)

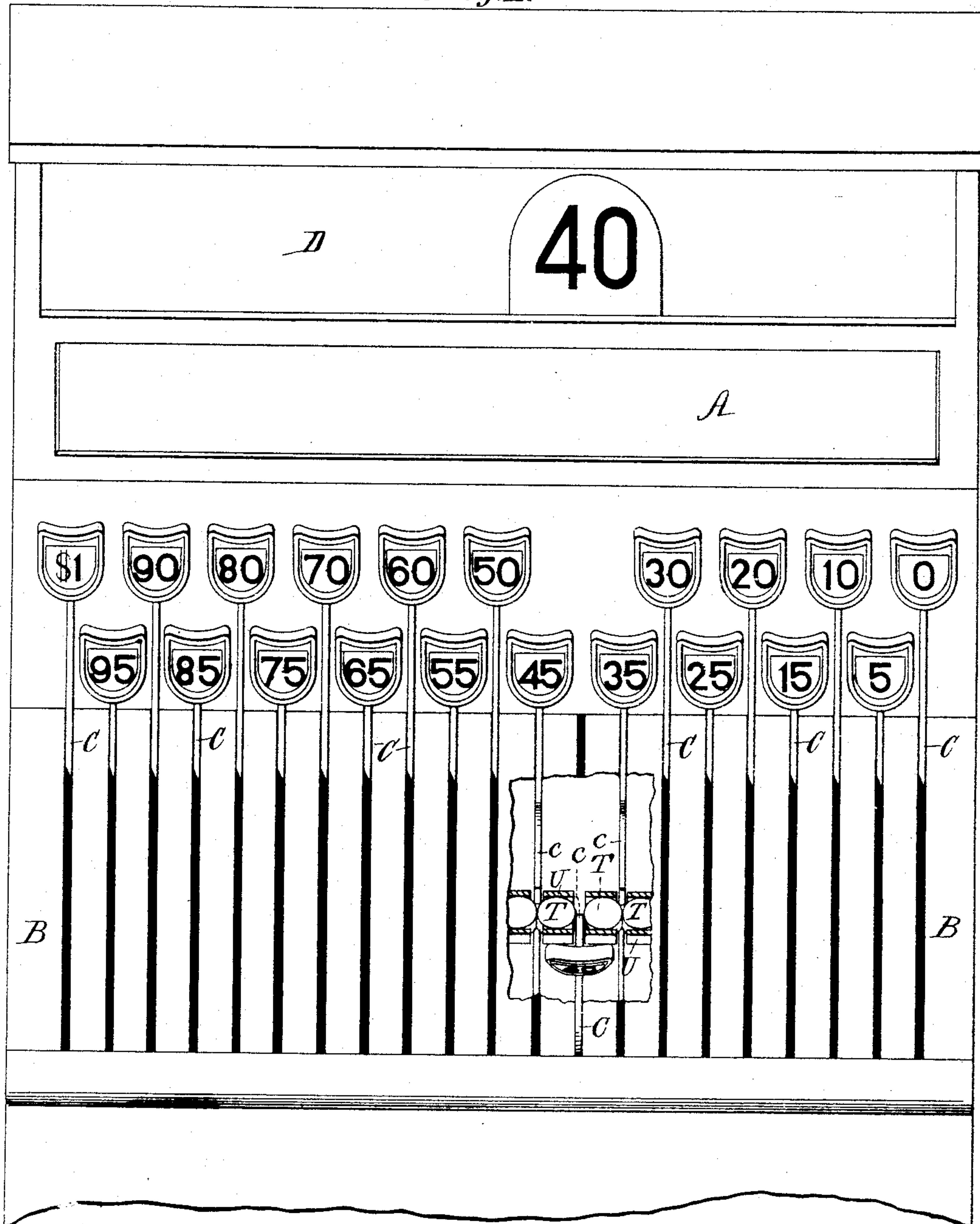
2 Sheets—Sheet 1.

I. D. BOYER & F. HAM.
CASH REGISTER AND INDICATOR.

No. 436,573.

Patented Sept. 16, 1890.

Fig. 1.



Witnesses:
W.C. Jirdinston.
Charles Billon

Inventors.
Israel D. Boyer
Foster Ham
by Peck & Peck
Attorneys.

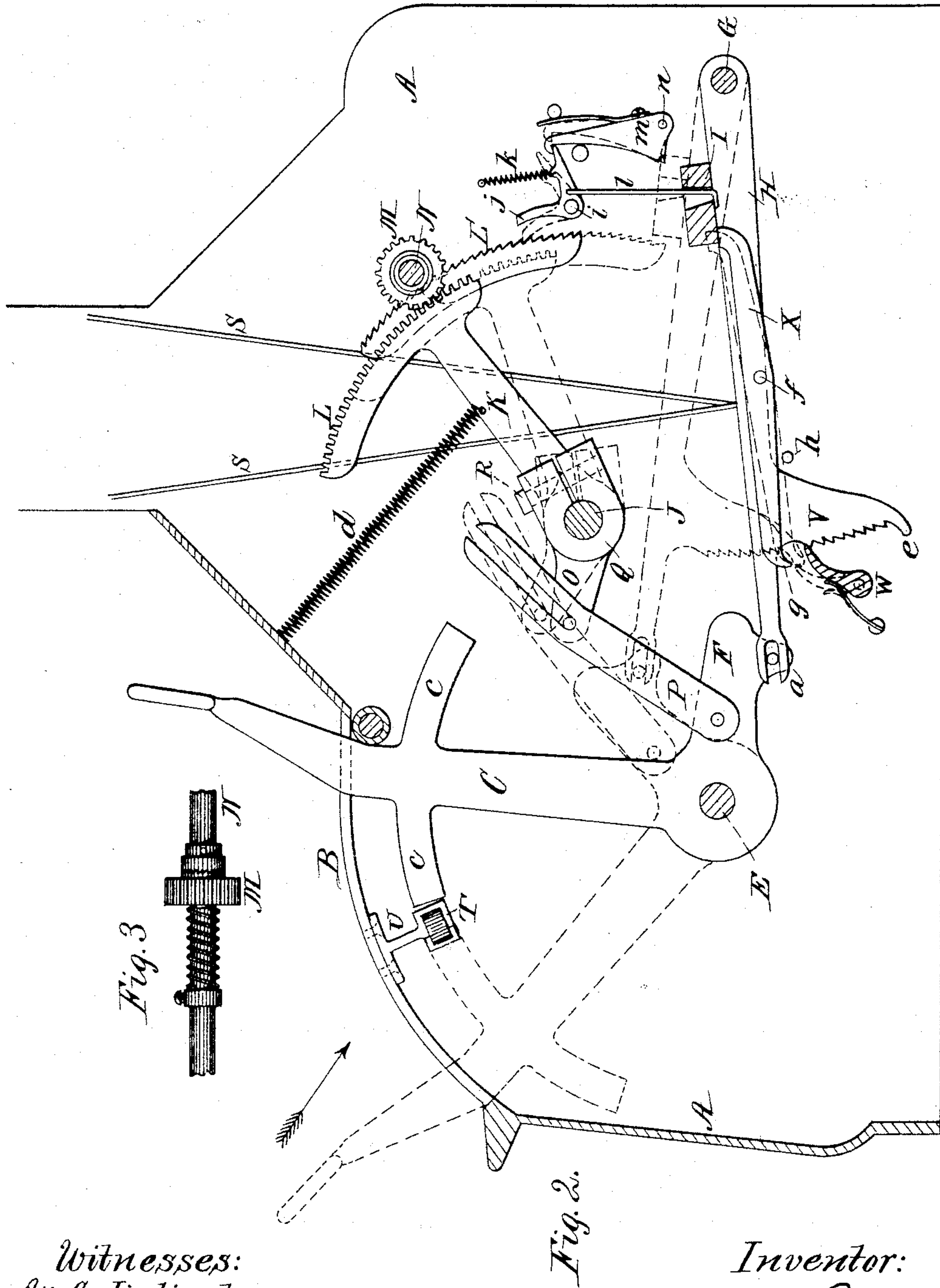
(No Model.)

2 Sheets—Sheet 2.

I. D. BOYER & F. HAM.
CASH REGISTER AND INDICATOR.

No. 436,573.

Patented Sept. 16, 1890.



Witnesses:
W. C. Jirdinaton.
Charles Buller

Inventor:
Israel D. Boyer
Foster Ham
by Peck & Rector
Attorneys.

UNITED STATES PATENT OFFICE.

ISRAEL D. BOYER AND FOSTER HAM, OF DAYTON, OHIO, ASSIGNORS TO THE
NATIONAL CASH REGISTER COMPANY, OF SAME PLACE.

CASH REGISTER AND INDICATOR.

SPECIFICATION forming part of Letters Patent No. 436,573, dated September 16, 1890.

Application filed June 29, 1889. Serial No. 316,025. (No model.)

To all whom it may concern:

Be it known that we, ISRAEL D. BOYER and FOSTER HAM, both citizens 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 and Indicators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

Our invention has for its object an improvement in the construction of this class of machines, and its novelty will be herein set forth, and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a front view of a machine to which our improvements are applied, with a portion of the casing broken away and looking in the direction of the arrow in Fig. 2. Fig. 2 is a side elevation, in section, of a portion of the machine. Fig. 3 is a detail of the clutch between the pinion and registering-shaft.

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

The operating parts of the machine are inclosed in a suitable case or cabinet A, having its upper front portion formed of a slotted plate B through the slots, in which extend and play the upper ends of the operating-keys C, and provided at its upper central or rear portion with a glass-covered reading-opening D, through which suitable indicating-tablets are exposed to view. The operating-keys C, of the shape shown, are pivoted on a shaft E, extending across the machine and have rearward extensions F, the vertical portion of each key and its rear extension F forming a bell crank lever, as shown.

Pivoted on a shaft G at the rear of the machine are a series of levers H—one for each key C, and each connected at its forward end to the extension F of its corresponding key by slot-and-pin connection at a, so that when any key is operated by pulling its upper end forward to the end of its slot in the plate B its lever H is lifted to the position shown by the dotted lines in Fig. 2.

Extending across all of the levers H in front of their pivotal shaft G is a vibrating

bar I, supported in any suitable manner, as by side arms hung on the shaft G. This bar I rests on the tops of the levers H, and whenever any key is operated is lifted to the position shown by the dotted lines in Fig. 1.

Rigidly secured to a central shaft J, extending across the machine and supported in suitable bearings, is an arm K, carrying at its upper rear end a segment-rack L, which meshes with a pinion M on a registering-shaft N, suitably journaled in the upper rear part of the machine. The pinion M may either be loose upon the shaft N and arranged to be locked thereto by ratchet-and-pawl or clutch mechanism—such, for instance, as shown in Fig. 3—when turned in one direction by the movement of the segment-rack L, or it may be tight on the shaft N, so that the latter is turned in both directions by the movements of the rack L. This registering-shaft N is connected to and actuates any suitable or well-known registering mechanism, whose particular construction forms no part of our invention, and which it is therefore deemed unnecessary to illustrate or further describe; also rigidly secured to the shaft J are a series of forwardly-projecting arms O—one for each key C, and each connected to the rear extension F of its appropriate key by a slotted link P, pivoted at its lower end to the extension F and engaging by the slot at its upper end with a pin on the arm O. The arms O may be rigidly secured to the shaft J in any suitable manner. In the drawings they are shown as secured thereto by split hubs Q, each integral with its arm O, which here embrace the shaft J and are clamped thereto by screws R passed through the split ends of the hub. In this manner the arms O may be secured upon the shaft J in different positions and adjusted as desired. It results from this construction and arrangement of the parts that when a key C is operated by pulling its upper end forward to the end of its slot in the plate B, and its rear extension is thereby lifted, the shaft J will be rocked in its bearings, the rack L vibrated, and the pinion M and shaft N turned to actuate the registering mechanism, all as shown by the dotted lines in Fig. 2. A coiled spring d serves to return

the rack L to and yieldingly hold it in its normal position.

To avoid confusion in the drawings, we have shown in Fig. 2 only one key C and its associated parts; but it will be understood that the keys are arranged to move the shaft J and rack L different degrees, according to the values of the keys, and in the construction shown in the drawings this is accomplished by pivoting the lower ends of the links P to the extensions F of the keys at different distances from the pivotal shaft E of the keys, those of the keys of lowest value being pivoted nearest said shaft and those of highest value farthest from it. Thus the key shown in Fig. 2 represents one of about or a little below the middle value, and its link P is pivoted to its extension F at such distance from the shaft E that the full operation of the key moves the segment-rack L less than half its full limit. It will readily be seen that the operation of a key whose link is pivoted to its extension F nearer the rear end of the latter will move the rack L farther and make a higher registration. As illustrated in the drawings, the pinion M has twenty teeth.

The keys C represent multiples of five from 0 to \$1.00, and are arranged to turn the pinion M one tooth for each five of their values. Thus the five-cent key will turn the pinion M one tooth; the twenty-five-cent key, five teeth, and the fifty-cent key, ten teeth, thereby actuating the registering mechanism to register five, twenty-five, and fifty cents, respectively, and this variable registration is brought about by the adjustment of the links P on the extension F, as before explained. This differential adjustment may be aided, if desired, by adjusting the arms O in different positions on the shaft J, as before explained, and by varying the length of the slots in the upper ends of the links P, as will be readily understood.

The parts of the machine thus far described are old and not of our invention, and the same is true of the indicating mechanism, which consists of a series of figured tablets supported in any suitable manner in the upper central portion of the case and actuated from the levers H, as by the wires or rods S, to expose their respective numbers at the reading-opening D. It is therefore thought unnecessary for the purpose of clearly explaining our own invention to illustrate or describe the old parts of the machine any more at length.

The first feature of our invention relates to the application of means for preventing the simultaneous operation of two or more keys, for as all the keys actuate a common registering mechanism to different degrees it will be understood that if two or more keys are operated at once only one of them can actuate the registering mechanism. Thus if the twenty-five and fifty cent keys be operated simultaneously the fifty-cent key will vibrate the rack L sufficiently to turn the pinion M ten teeth and register fifty cents, while the op-

eration of the twenty-five-cent key will have no effect on the rack L and registering mechanism, and its value will be lost.

for preventing such simultaneous operation of two or more of the keys C, we provide a series of stops T, carried in bearings U, secured to the under side of the slotted plate B. These stops may be of any suitable shape; but as illustrated in the drawings they consist of flat circular disks. There is one of these disks loosely carried in a bearing U between each two adjacent slots in the plate B, and the disks are of such size that their combined width is less than the length of their longitudinal bearing-space by a little more than the thickness of one of the keys C, so that each disk has a limited longitudinal play. It results from this arrangement that when any one key C is pulled forward through its slot the two disks whose edges project beneath the slot will be pushed aside by the key and all the disks be thereby crowded together, so that no other key can pass at the same time.

It is not only necessary to provide means for preventing the simultaneous operation of two or more keys, but it is also desirable to prevent the successive operation of keys before the previously-operated one has been reset to normal position; and to this end we have provided means whereby when any key is displaced from its normal position all the other keys are locked until said key is restored to such position. On the forward and rear side of each key at a point where the key strikes the stops T is a segmental projection c of the same thickness as the key and shaped to conform to the arc of the circle traversed by the key when moved on its pivoted shaft E. When the key is in normal position, the forward end of the forward projection c is immediately in rear of the stops T, while when the key is in its extreme forward position the rear end of the rear projection c is between the stops T, so that from the time the key is substantially displaced from its normal position until it is returned thereto the projections c, or the body of the key at the point where the projections join it, are constantly holding the stops on either side crowded together to prevent the operation of another key.

Instead of two projections c on each key—one on its front and the other on its rear side—the front one might be omitted and the rear one lengthened and the stops T be located immediately in front of the body of the key, under which arrangement of the parts the same result would be accomplished; or the rear one might be omitted and the front one lengthened and the location of the stops T changed accordingly.

Another feature of our invention relates to the provision of means for preventing the resetting of a partially-operated key until it has been first operated to its full extent. In a machine of this character where a number of keys actuate a common registering mech-

anism to register their respective values it is necessary, to insure accurate registrations, that each key operated shall be given its full movement, for otherwise less than its full value would be registered. To compel this complete operation of the keys in the present machine, we have provided means which operate when a key has been once displaced from normal position to prevent its return thereto until it is moved on to its full limit, which means may be described as follows:

Extending downward from the under side of each of the levers H is a rack V, having downwardly and forwardly presenting teeth and provided at its lower end with a projection *e*.

W is a pivoted pawl-bar extending across all the keys and spring-pressed against the racks V.

X is a gravitating latch pivoted at *f* to any suitable support between the keys, (or it may be at one side of the machine,) its rear end resting against the under side of the vibrating bar I and its forward weighted end extending above the pawl-bar W and having a pendent nose *g*. When a key is operated and its lever C lifted, the pawl-bar W slips over the teeth of the rack V as the latter rises, and if the key be released at any point the pawl engages a tooth of said rack and holds the key at the exact point where it was released. The lifting of the lever H by the operation of the key lifts the vibrating bar I off the rear end of the latch X, permitting the forward end of the latch to fall and rest on the pin *h* in the position shown by the dotted lines in Fig. 2. Just as the key reaches its full limit of movement the projection *e* at the lower end of the rack V comes in contact with the pawl-bar W and flips it under and in front of the nose *g* of the latch X, which holds said bar out of engagement with the rack, and the key is thereupon free to return to its normal position. Just as it reaches its normal position the vibrating bar I strikes and depresses the rear end of the latch X, thereby throwing up its front end and releasing the pawl-bar W, which immediately falls back against the rack ready for a fresh engagement with its teeth. It will be understood that the racks V of all the keys are in line, so that one pawl-bar W and latch X serve for the whole series. The racks V, instead of being on the levers H, might be on the under side of the rear extensions F of the keys C, in which event they would face rearwardly and the pawl-bar W be located in rear of them, as will be readily understood.

In the machine as thus far described it will be seen that while our improvements will prevent the operation of two or more keys at once and will prevent the operation of a second key before a first has been reset to normal position, and will also prevent the resetting of an only partially-operated key, yet after a key has been operated to its full extent and the pawl-bar W thrown out of

and held from engagement with its rack V the key may be moved back more than half-way to normal position, and from that point be "pumped" back and forth to its limit of stroke indefinitely, all the time moving the segment-rack L back and forth and actuating the registering mechanism. It is very desirable, for reasons well known to those familiar with the use of these machines, to prevent this pumping of the machine, and we have devised novel means for that purpose, as follows:

Secured to the side of the segment-rack L is a second segment-rack L', extending below the end of the rack L and provided with downwardly-presenting ratchet-teeth. This rack is out of line of and moves up and down by the side of the pinion M. Supported on a pivot *i*, immediately in rear of the rack L', is a bell-crank pawl *j*. A coiled spring *k* pulls its horizontal arm upward and tends to throw the pawl into engagement with the teeth of the rack, while a pendent rod *l*, also secured to the horizontal arm of the bell-crank, extends down and hooks under the vibrating bar I, said bar normally resting on the bent end of the rod and holding the pawl out of engagement with the rack in the position shown by the solid lines in Fig. 2. A spring-pressed latch *m*, pivoted at *n*, normally hooks over the end of the horizontal arm of the bell-crank and holds the pawl *j* out of engagement with the rack, in addition to the weight of the bar I on the bent end of the rod *l*. It results from this construction and arrangement of the parts that when the operating-keys and the racks L L' are in their normal position the pawl *j* is held out of engagement with the rack L', and it is free to move downward with the rack L as a key is operated. As the lever H rises with the operation of the key the bar I is lifted, and the weight on the end of the rod *l* thereby removed, so that the pawl *j* is held against the resistance of the spring *k* only by the latch *m*. Just as the key reaches its limit of stroke and the racks L L' have been moved the degree necessary to register the value of such key the upper rear side of the bar I strikes the lower front side of the latch *m* and throws its hooked upper end out of engagement with the horizontal arm of the bell-crank pawl *j*, whose spring *k* immediately presses it into engagement with the rack L'. As the key and the racks move back toward their normal position the pawl *j* slips freely over the teeth of the rack L'; but if the key be stopped at any point before being completely reset and it is attempted to pull it forward again the pawl *m* will engage a tooth of the rack L' and hold the latter and the key from such forward movement. Just before the key reaches its normal position the bar I again bears against the lower bent end of the rod *l* and presses it down, thereby pulling the end of the horizontal arm of the bell-crank past the rounded nose of the latch *m*, which thereupon flips

over the same and holds the pawl out of engagement with the rack until the next full operation of a key, as before explained.

So far as the feature of our invention just described is concerned we do not wish to be limited to any particular form or arrangement of the arresting devices for preventing the second forward motion of the operated key before it has been reset to normal position, for these may be largely varied without departing from our invention. In machines of this character where a series of keys of different values act on a common actuator which transmits different degrees of motion to the registering mechanism to register the values of the respective keys an arrester operating substantially as the one above described may be applied to the actuator in many different ways and at different points. For instance, in the machine shown in the drawings it was convenient, but not at all necessary, to secure the rack L' to the side of the rack L. It operates in such position, because by securing it to the rack L it is made a rigid part of the main actuator, which consists in this instance of the shaft J and segment-rack L, which are moved different degrees by keys of different values and transmit those values to the registering mechanism; but the rack L' could have been rigidly secured to such actuator in other ways, as by an independent arm corresponding to the arm K, which carries the rack L.

We are aware that it has been heretofore proposed in machines having a registering-wheel common to and moved to different degrees by a series of keys of different values to apply to such registering-wheel a lock which engages it at the completion of the stroke of a key and holds it locked until the key has been reset to normal position; and in another application filed simultaneously herewith one of the present applicants has described and claimed as his invention an arrester applied directly to each operating-key for the same purpose; but so far as we are aware we are the first to combine an arrester for that purpose with an actuator common to and acted upon by a series of keys of different values to transmit those values to the registering mechanism.

We are aware that laterally-displaceable ball-and-disk stops have heretofore been combined with the keys of a cash register and indicator, and do not broadly claim the same. Nor are we the first to combine a series of operating-keys having racks with an arresting-bar which engages the racks to prevent the resetting of a partially-operated key, such combination forming the subject-matter of a pending application filed jointly by Edward B. Parkhurst and Foster Ham.

Having thus fully described our invention, we claim—

1. In a cash register and indicator, the combination of a series of operating-keys of different values, a rack actuated to different degrees by the operation of the different keys

of said series, a pinion meshing with said rack and transmitting the movements of the latter to a registering mechanism to register the values of the keys operated, and a series of stops which prevent the simultaneous operation of two or more keys of said series, substantially as and for the purpose described.

2. In a cash register and indicator, the combination of a series of operating-keys of different values, a rack actuated to different degrees by the operation of the different keys of said series, a pinion meshing with said rack and transmitting the movements of the latter to a registering mechanism to register the values of the keys operated, and a series of laterally-movable stops located across the path of travel of the keys and arranged when a single key is operated to be crowded and held together on either side of said key to lock all the other keys from operation until the operated key has been reset to normal position, substantially as and for the purpose described.

3. In a cash register and indicator, the combination, with a series of operating-keys of different values, having operating-buttons on their outer ends, of a series of laterally-movable rolling stops carried in bearings across the path of travel of the keys at a point between their pivotal support and their outer ends, said stops being arranged to be laterally displaced by the operation of a single key to permit its passage between them and to be thereby crowded together on either side of said key to prevent the passage of any other key at the same time, substantially as and for the purpose described.

4. In a cash register and indicator, the combination, with a series of pivoted operating-keys of different values, having operating-buttons on their outer ends and each provided at a point between its pivotal support and outer end with a projection in the plane of movement of the key, of a series of laterally-movable rolling stops carried in bearings across the keys in the path of travel of said projections, said stops being arranged to be displaced by the operation of a single key to permit its passage between them and to be thereby crowded together on either side of said key and so held by the projection on the latter to prevent the operation of a second key until the first has been reset to normal position, substantially as and for the purpose described.

5. In a cash register and indicator, the combination of a series of operating-keys of different values, a rack actuated to different degrees by the operation of different keys of said series, a pinion meshing with the rack for transmitting the movement of the latter to a registering mechanism to register the values of the keys operated, and a key-arrester arranged to prevent a partially-operated key returning to normal position until it has first been operated to its full extent, substantially as and for the purpose described.

6. In a cash register and indicator, the combination of a series of operating-keys of different values, a rack actuated to different degrees by the operation of different keys of said series, a pinion meshing with the rack for transmitting the movements of the latter to a registering mechanism to register the values of the keys operated, a series of key-arresting racks, one for each key and movable therewith, and a pawl-bar which engages the rack of a partially-operated key and prevents it returning to normal position until after it has been operated to its full extent, substantially as and for the purpose described.

7. In a cash register and indicator having a series of operating-keys of different values which act upon a common actuator to transmit to the registering mechanism different degrees of movement proportionate to the values of the keys operated, the combination, with such actuator, of an arrester which after the key has been operated to its full extent prevents further registering movement of said actuator until the latter has been reset to normal position, substantially as and for the purpose described.

8. In a cash register and indicator having a series of operating-keys of different values which act upon a common actuator to transmit to the registering mechanism different degrees of movement proportionate to the values of the keys operated, the combination, with such actuator, of a rack, and a pawl arranged to engage said rack at the completion of the stroke of an operated key and prevent further registering movement of the actuator until the latter has been reset to normal position, substantially as and for the purpose described.

9. In a cash register and indicator having a series of operating-keys of different values, a gear-toothed rack actuated to different degrees by the operation of the different keys, and a pinion meshing with said rack and transmitting the movements of the latter to a registering mechanism to register the values of the keys operated, the combination, with said rack, of a ratchet-toothed rack, and a pawl which engages said last-mentioned rack upon the full operation of a key and prevents any further registering motion of the first-mentioned rack until the latter has been reset to normal position, substantially as and for the purpose described.

10. In a cash register and indicator having a series of operating-keys of different values, a gear-toothed rack actuated to different degrees by the operation of the different keys, and a pinion meshing with said rack and transmitting the movements of the latter to a registering mechanism to register the values of the keys operated, the combination, with said rack, of a ratchet-toothed rack, a pawl adapted to engage the teeth of said rack, a latch for normally holding the pawl out of engagement with the rack, and a trip for releasing said latch at the completion of the

stroke of a key to permit the pawl to engage the rack, substantially as and for the purpose described.

11. In a cash register and indicator, the combination of the operating-keys C, pivoted on the shaft E, the slotted guide-plate B, through the slots in which the upper ends of the keys C extend and have their play, and the rolling stops T, carried in bearings U, secured to the under side of the plate B between the slots and arranged to operate substantially in the manner and for the purpose specified.

12. In a cash register and indicator, the combination of the operating-keys C, pivoted on a shaft E and provided with the projections c, the slotted guide-plate B, through the slots in which the upper ends of the keys C extend and have their play, and the rolling stops T, carried in bearings U, secured to the under side of the plate B between the slots, substantially as and for the purpose described.

13. In a cash register and indicator, the combination of the pivoted operating-keys C, the segment-rack L, immediately connected with and actuated to different degrees by said keys, the pinion M, carried on the registering-shaft N and meshing with the rack L, and the stops T, arranged to prevent the simultaneous operation of two or more of the keys C, substantially as and for the purpose described.

14. In a cash register and indicator, the combination of the pinion M, carried on the registering-shaft N, the segmental rack L, carried by the pivoted arm K and meshing with the pinion M, the arms O, rigid with the arm K and rack L, the operating-keys C, pivoted on the shaft E and provided with the projections c, the slotted guide-plate B, the stops T, carried in bearings U, and the links P, connecting the keys C and arms O, substantially as and for the purpose described.

15. In a cash register and indicator, the combination of the pivoted operating-keys C, the pivoted levers H, connected to and movable therewith, the racks V, one for each key C and co-operating-lever H, the pawl-bar W, arranged to engage said racks, and the latch X, for holding the bar W out of engagement with the racks to permit the resetting of an operated key, substantially as and for the purpose described.

16. In a cash register and indicator, the combination of the pivoted operating-keys C, the pivoted levers H, connected to and movable therewith, the racks V, one on the under side of each of the levers H and each having a projection e at its lower end, the pawl-bar W, the latch X, and vibrating bar I, substantially as and for the purpose described.

17. In a cash register and indicator, the combination of the pinion M, carried on the registering-shaft N, the segmental rack L, carried by the pivoted arm K and meshing with the pinion M, the arms O, rigid with the arm K and rack L, the operating-keys C, pivoted on the shaft E and provided with rearward extensions F, the links P, connecting the ex-

tensions F and arms O, the pivoted levers H, connected at their forward ends to and movable with the key-extensions F, the racks V on the under side of the levers H, the pawl-bar 5 W, the latch X, and the vibrating bar I, substantially as and for the purpose described.

18. In a cash register and indicator such as described, the combination, with the rack L, of the rack L', pawl j, latch m, and a trip, 10 such as the bar I, for tripping the latch m to release the pawl j at the completion of the

stroke of a key, substantially as and for the purpose described.

19. In a cash register and indicator, the combination of the racks L L', pawl j, latch m, 15 bar I, and rod l, substantially as and for the purpose described.

ISRAEL D. BOYER.
FOSTER HAM.

Witnesses:

THOMAS CORWIN,
HENRY THEOBALD.