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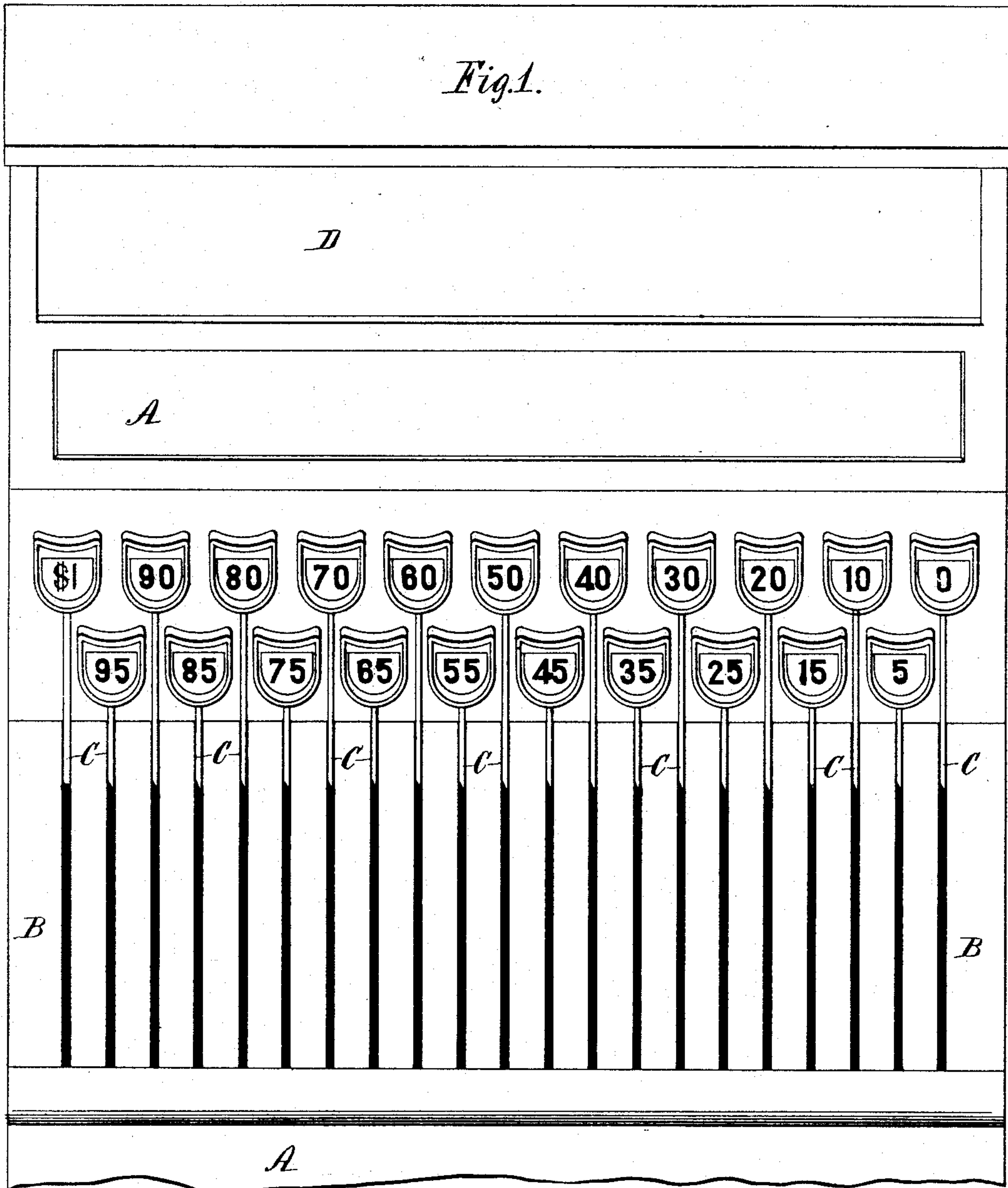
3 Sheets—Sheet 1.

I. D. BOYER.

CASH REGISTER AND INDICATOR.

No. 414,008.

Patented Oct. 29, 1889.



Witnesses:
W. C. Jirdinston.
J. C. Coffman

Inventors:
Israel D. Boyer
by Beck & Rutter
their Attorneys.

(No Model.)

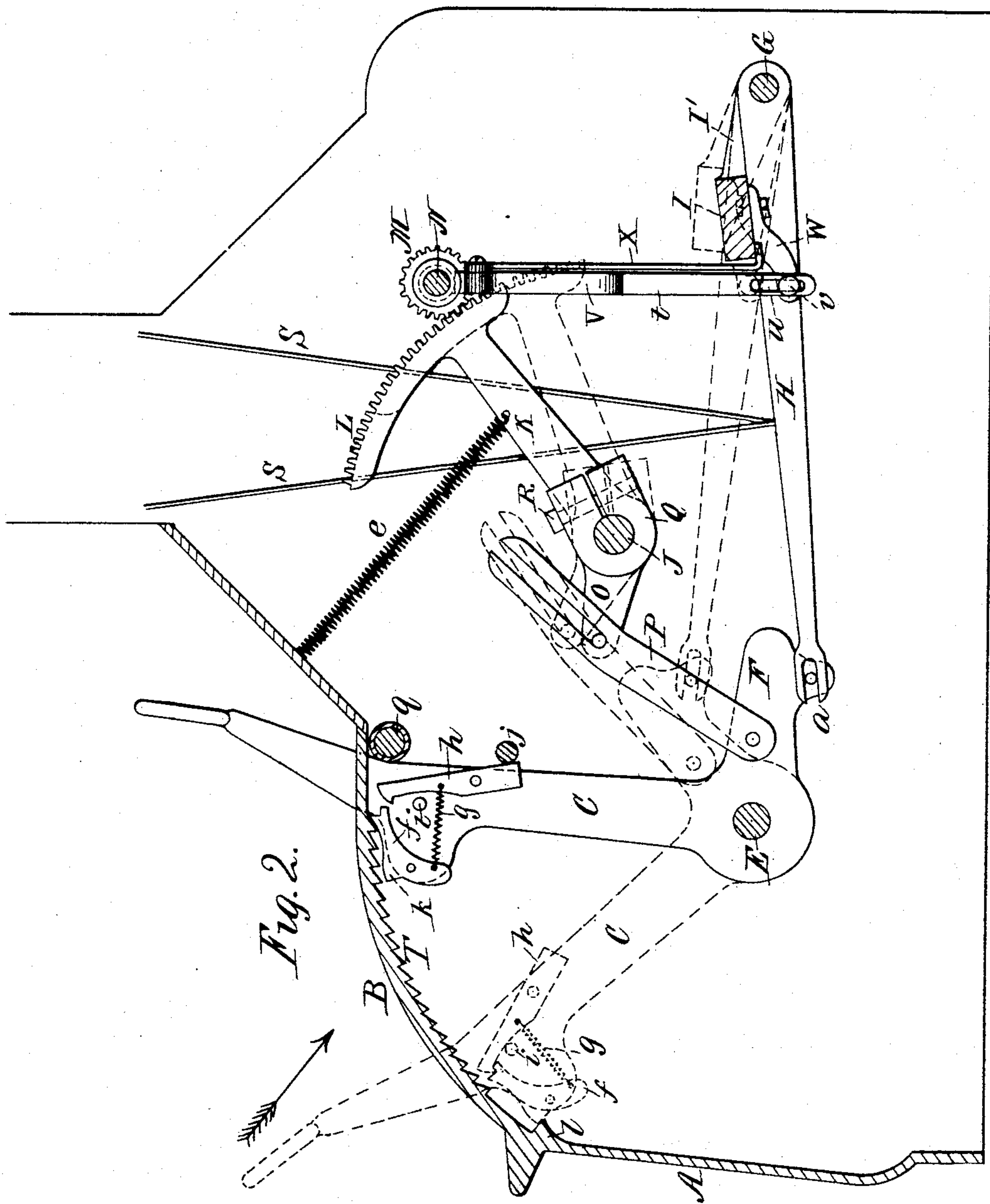
3 Sheets—Sheet 2.

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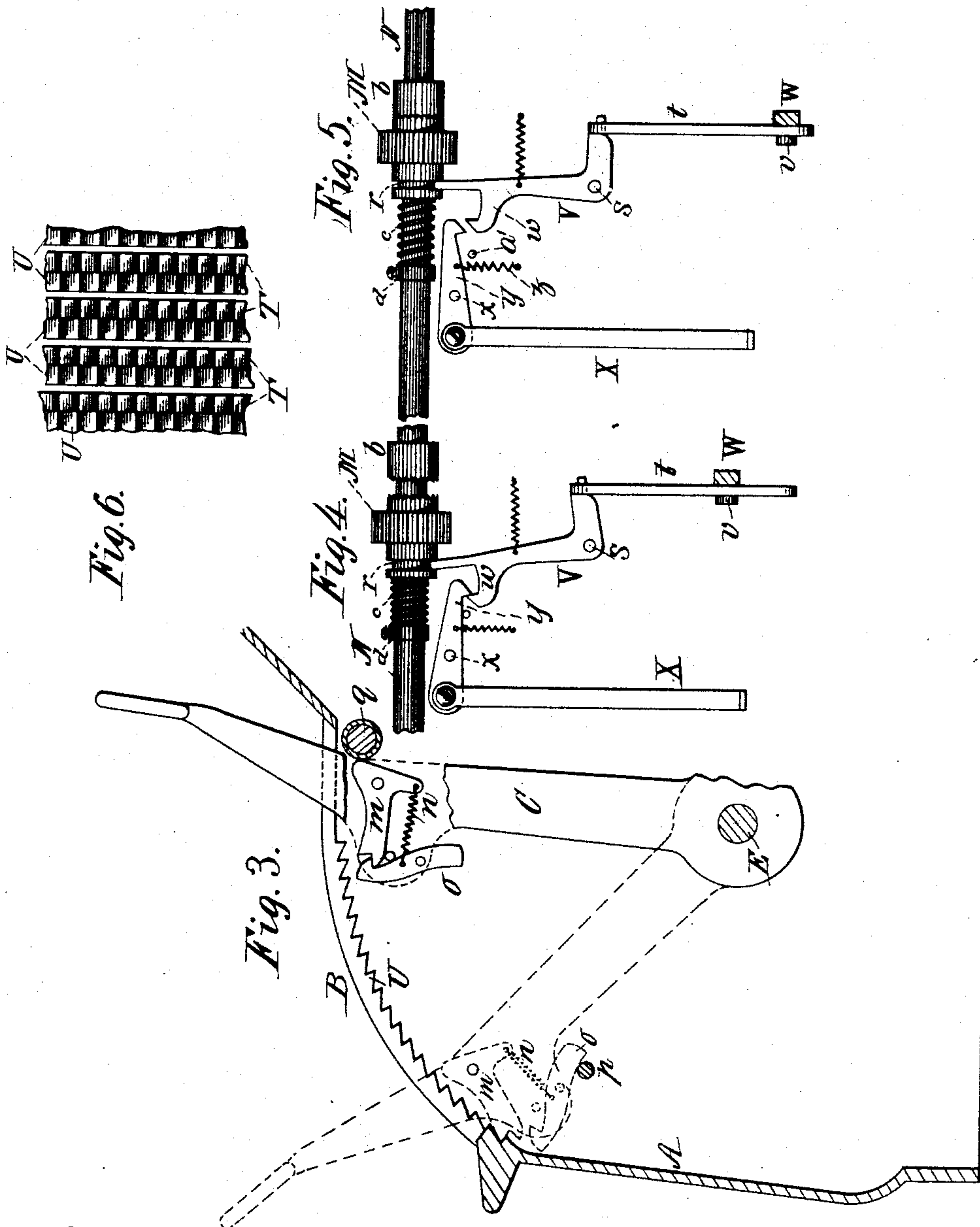
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Patented Oct. 29, 1889.



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UNITED STATES PATENT OFFICE.

ISRAEL DONALD BOYER, OF DAYTON, OHIO, ASSIGNOR TO THE NATIONAL CASH REGISTER COMPANY, OF SAME PLACE.

CASH REGISTER AND INDICATOR.

SPECIFICATION forming part of Letters Patent No. 414,008, dated October 29, 1889.

Application filed July 2, 1889. Serial No. 316,337. (No model.) Patented in Canada July 2, 1889, No. 50,326.

To all whom it may concern:

Be it known that I, ISRAEL DONALD BOYER, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Cash Registers 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.

The novelty of my invention will be herein set forth, and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a front view of a portion of a machine embodying my improvements, looking in the direction of the arrow in Fig. 2. Fig. 2 is a side elevation in section of a portion of the same. Fig. 3 is a side elevation in section of the front portion of the same machine, with part of the shank of an operating-key broken away to show the pawl and latch on its opposite side. Figs. 4 and 5 are details in rear elevation of the clutch mechanism on the registering-shaft and the devices for throwing it into and out of engagement. Fig. 6 is a detail plan view of a portion of the under side of the slotted guide-plate for the keys.

The same letters of reference are used to 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 I', 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. 2.

Rigidly secured to a central shaft J, extending across the machine and supported in suitable bearings, is an arm K, carrying at its upper end a segment-rack L, which meshes with a pinion M on the registering-shaft N, journaled in the upper rear part of the machine. The pinion M is loose on the shaft N, and one end of its hub is provided with clutch-teeth arranged to engage corresponding teeth on the adjacent end of the hub b, which is rigidly secured to the shaft N. (See Figs. 4 and 5.) A coiled spring c surrounds the shaft N, between the opposite side of the pinion M and a collar d, secured upon the shaft N, and serves to press and normally hold the hub of the pinion M against the hub b and their teeth in engagement to effect a clutch between them, so that when the pinion M is turned forward by the downward movement of the rack L the shaft N is turned with it. The teeth of the clutch are preferably of such shape and so arranged that in the backward turning of the pinion M on the return-stroke of the rack L the teeth of its hub can slip freely over those of the hub b against the pressure of the spring c and the shaft N remain stationary, but this construction and relative arrangement of the clutch-teeth is not essential, since one feature of my invention, hereinafter described, consists in providing means for automatically throwing the clutch out of engagement at the completion of the downward registering movement of the rack L and holding it out of engagement during the return of said rack to normal position.

The registering-shaft N is connected to and actuates any suitable or well-known registering mechanism, whose particular construction forms no part of my invention, and

which I therefore consider it unnecessary to illustrate or describe.

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 hubs embrace the shaft J and are clamped thereto by screws R, passed through the split ends of the hubs. 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 *e* serves to return the rack L to and yieldingly hold it in its normal position.

To avoid confusion in the drawings, I 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, 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 extensions F, as above described. This differential adjustment may be aided, if desired, by adjusting the arms O in differ-

ent 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 my 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 my own invention to illustrate or describe the old parts of the machine any more at length.

The first feature of my invention relates to a novel key-arrester which prevents a partially-operated key from resuming its normal position until it has been first moved forward to its full limit of stroke, thereby compelling the full operation of the keys and insuring the registration of their full values. This improvement is illustrated in Fig. 2. The slotted guide-plate B has on its under side a series of racks T, having downwardly and forwardly presenting ratchet-teeth and located one at the side of each of the key-slots in said plate. These racks T, as illustrated in the drawings, are on the right-hand sides of the slots when looking at the machine from its front, and on the right-hand side of each key C, beneath the rack T, is pivoted a pawl *f*, normally pressed into engagement with said rack by a spring *g*. Also pivoted to the side of the key C is a latch *h*, to which is connected one end of the spring *g*, which tends to pull the latch forward against a stop-pin *i*. When the key is in its normal position of rest, the upper end of the catch is held back away from said pin by a stop *j* engaging the lower end of the latch, which stop may consist of a rod extending across all the keys and operating to normally hold the latches *h* of all the keys in the position shown by the solid lines in Fig. 2. When a key is pulled forward, the latch *h* is at once thrown by the spring *g* against the pin *i*. As the key moves along its slot the pawl *f* slips freely over the teeth of the rack T, and if the key is released at any point engages with a tooth of said rack and prevents the key returning to normal position. Just at the moment the key reaches the full limit of its stroke a shoulder *k* on the upper front side of the pawl *f* strikes against a projecting ledge *l* at the lower end of the rack T, which throws the upper end of the pawl out of engagement with the rack and forces its shouldered end down past the beveled hooked end of the latch *h*, which latter then flips over the shouldered end of the pawl and holds it out of engagement with the rack. The key is now free to return to normal position, and just as it reaches such position the lower end of the latch *h* strikes the stop *j*, which throws its upper end out of engagement

with the pawl f , and the spring g presses the latter into re-engagement with the rack T, ready for another operation of the key. It will thus be seen that when any key is substantially displaced from normal position it cannot be returned thereto until it is first operated to its full limit of stroke, and its full value thereby registered on the registering mechanism.

In the combination of these individual arresters with each key I do not wish to be limited to any particular form or relative arrangement of the operating-keys and racks, since these may be largely varied without departing from my invention. Inasmuch as the key-arresting devices above described are thrown out of operation at the completion of the forward stroke of the key and are held out of operation until the key has been completely reset to normal position, it will be evident that after a key has been operated to its full extent and the pawl latched out of engagement with the rack, said key may be moved back nearly to normal position, and from that point be "pumped" back and forth to and from the forward end of the slot, and the registering mechanism be actuated at each forward stroke to register nearly the full value of the key. It is desirable to prevent such operation of a key, and the next feature of my invention relates to the provision of novel means for that purpose. (Illustrated in Fig. 3.) In addition to the racks T the slotted guide-plate B is provided on its under side with a series of racks U, having downwardly and rearwardly presenting ratchet-teeth, and located one at the side of each key-slot, opposite the rack T, as illustrated in the drawings, the racks U being on the left-hand sides and the racks T on the right-hand sides of their respective slots when looking at the front of the machine. In this instance, therefore, on the left-hand side of each key C is pivoted a pawl m , which may be conveniently made in the form of a bell-crank, as shown. A spring n , connected to the pendent arm of the bell-crank, tends to throw the pawl up into engagement with the rack U, while a latch o , also pivoted to the key and having the spring n connected to it, normally holds the pawl out of engagement with the rack, as shown by the solid lines in Fig. 3. As the key is pulled forward, therefore, the pawl m clears the teeth of rack U until, just as the key reaches the forward limit of its stroke, the lower end of the latch o strikes a stop p , which throws its upper end off the shouldered end of the pawl m , thereby releasing the latter, which is at once pressed into engagement with the rack U by the spring n . As the key returns to normal position the pawl m rides freely over the teeth of the rack; but if the key be stopped at any point before reaching its normal position the pawl engages a tooth of the rack and prevents any forward movement of the key. Just as the key reaches its normal position the upper rear end of the pawl m

strikes a stop q , which throws its forward end out of engagement with the rack U and forces its shouldered end down past the nose of the latch o , which immediately flips over it and holds it in the position shown by the solid lines in Fig. 3, ready for the next operation of the key. The stop p , for tripping the latch o to release the pawl m , may be a rod extending across all the keys and operating on all of the latches o , and the same is true of the stop q , which may extend across all the keys and operate on all the pawls m , and which in the drawings is shown as a rod against which the keys rest, and is covered with leather, rubber, cloth, or other soft material to receive the shock of the return-stroke of the keys.

As in the case of the devices for preventing the resetting of a partially-operated key until after full operation of it, so, in the case of the improvement last described, my invention is not limited to any particular form or relative arrangement of the rack and operating-key, but contemplates, broadly, the combination, in a cash register and indicator, of an operating-key and a rack which is free from the key during its forward registering movement and engaged therewith during its return movement, for the purpose specified.

The next feature of my invention relates to the provision of means for disengaging the clutch between the registering-shaft and driving-pinion at the completion of the forward stroke of a key and holding it out of engagement until the key is restored to normal position. This feature of my invention is illustrated in Figs. 2, 4, and 5, the latter two of which represent details of the clutch and the disengaging devices in rear elevation. The hub of the pinion M, on the opposite side from the clutch, is provided with an annular groove r , with which engages the upper end of a shifter V, in this instance made in the form of a bell-crank pivoted at s , and having loosely connected to the end of its lower horizontal arm a pendent link t , having a vertical slot u in its lower end. Secured to the under side of the vibrating bar I, Fig. 2, is a forwardly-projecting arm W, carrying a laterally-projecting pin v , engaging the slot u in the link t . The upper vertical arm of the shifter V has a laterally-projecting hook w , while pivoted at x is a latch y , having its engaging end adjacent to the hook w , and carrying at its opposite end a pendent link X, having its lower end bent rearward at right angles to form a hook, upon which rests the forward edge of the bar I, as shown in Fig. 2. A spring z tends to pull the latch y down against a pin a' , while the weight of the bar I on the end of the link X normally holds the latch up against the tension of the spring z , in the position shown in Fig. 5. When the parts are in their normal position of rest, the pin v on the end of the arm W is in the lower end of the slot u in the link t . When a key is operated, the bar I is lifted off the end of the link X, and the spring z

thereupon pulls the latch *y* down against the pin *a'*. Just as the key reaches the limits of its stroke the pin *v* on the arm *W* strikes the upper end wall of the slot *u* in the link *t* and lifts the latter sufficiently to vibrate the shifter *V* to the position shown in Fig. 4, thereby moving the pinion *M* away from the hub *b* and disengaging the clutch. In assuming the position shown in Fig. 4 the hook *w* of the shifter *V* flips past the nose of the latch *y* and is engaged and held thereby, so that until the latch is tripped and the hook released the clutch will be held out of engagement, and any movement given the pinion *M* will not be communicated to the shaft *N* and registering mechanism. The latch is tripped and the hook *w* and shifter *V* released just as the operated key reaches its normal position of rest by the bar *I* striking the lower bent end of the link *X* and pulling it down to the position shown in Figs. 2 and 5. The coiled spring *c* thereupon throws the pinion *M* back to the position shown in Fig. 5, so that upon operating the next key the pinion *M* turns the shaft *N* to register its value. This feature of my invention is designed for the same general purpose as the racks *U* and their co-operating devices—namely, to prevent the pumping of the machine with a key which has been fully operated but not returned to its normal position—and may be employed either in place of or supplemental to those devices. It is not limited to any particular construction and arrangement of the parts, but contemplates, broadly, the employment, for the purpose specified, of any suitable shifter operating, as the one described, to automatically disengage the clutch between the driving-pinion and registering-shaft at the completion of the stroke of an operated key.

Having thus fully described my invention, I claim—

1. In a cash register and indicator, the combination of a rack and an operating-key provided with a pawl which engages said rack during the stroke of the key in one direction and is disengaged therefrom during its stroke in the opposite direction, substantially as and for the purpose described.

2. In a cash register and indicator, the combination of a rack and an operating-key provided with a pawl which engages said rack during the registering-stroke of the key and is disengaged therefrom at the completion of said stroke, substantially as and for the purpose described.

3. In a cash register and indicator, the combination of a rack, an operating-key provided with a pawl which engages said rack during the registering-stroke of the key and is disengaged therefrom at the completion of said stroke, a latch for holding the pawl out of engagement with the rack during the opposite stroke of the key, and a trip for said latch, substantially as and for the purpose described.

4. In a cash register and indicator, the combination of a segment-rack and a pivoted operating-key which is engaged with said rack during its stroke in one direction and disengaged therefrom during its stroke in the opposite direction, substantially as and for the purpose described.

5. In a cash register and indicator, the combination of a segment-rack and a pivoted operating-key which is engaged with said rack during its registering-stroke and disengaged therefrom at the completion of said stroke, substantially as and for the purpose described.

6. In a cash register and indicator, the combination of a segment-rack and a pivoted operating-key provided with a pawl which engages said rack during the registering-stroke of the key and is disengaged therefrom at the completion of said stroke, substantially as and for the purpose described.

7. In a cash register and indicator, the combination of a segment-rack, a pivoted operating-key provided with a pawl which engages said rack during the registering-stroke of the key and is disengaged therefrom at the completion of said stroke, a latch for holding the pawl out of engagement with the rack during the opposite stroke of the key, and a trip for said latch, substantially as and for the purpose described.

8. In a cash register and indicator, the combination of a rack and an operating-key, which is free from the rack during its registering-stroke and engaged therewith during its opposite stroke, substantially as and for the purpose described.

9. In a cash register and indicator, the combination of a rack, an operating-key provided with a pawl, a latch for holding the pawl out of engagement with the rack during the registering-stroke of the key, and a trip for said latch, substantially as and for the purpose described.

10. In a cash register and indicator, the combination of a segment-rack and a pivoted operating-key, which is free from the rack during its registering-stroke and engaged there- with during its opposite stroke, substantially as and for the purpose described.

11. In a cash register and indicator, the combination of a segment-rack, a pivoted operating-key provided with a pawl, a latch for holding the pawl out of engagement with the rack during the registering-stroke of the key, and a trip for said latch, substantially as and for the purpose described.

12. In a cash register and indicator, the combination of an operating-key and two stationary racks, with one of which the key is engaged during its stroke in one direction and with the other of which it is engaged during its stroke in the opposite direction, substantially as and for the purpose described.

13. In a cash register and indicator, the combination, with two stationary racks, of an operating-key provided with two pawls, one of

which is free from both of the racks during the registering-stroke of the key and engaged with one of the racks during its opposite stroke and the other of which is engaged with the other of said racks during the registering-stroke of the key and is free from both of the racks during its opposite stroke, substantially as and for the purpose described.

14. In a cash register and indicator having a series of keys, the combination of a registering-shaft, a driving-pinion loose on said shaft, a clutch between said pinion and shaft, and a shifter for automatically disengaging the clutch at the completion of the registering-stroke of an operated key, substantially as and for the purpose described.

15. In a cash register and indicator having a series of operating-keys, the combination of a registering-shaft, a driving-pinion loose on said shaft, a clutch between said pinion and shaft, a shifter for automatically disengaging the clutch at the completion of the registering-stroke of an operated key, a latch for holding the clutch out of engagement during the opposite stroke of the key, and a trip for said latch, substantially as and for the purpose described.

16. In a cash register and indicator having a series of operating-keys, the combination of a registering-shaft, a driving-pinion loose on said shaft, a clutch between said pinion and shaft, a movable bar extending across the keys and moved by the operation of any one of them, and a shifter actuated by said bar to automatically disengage the clutch at the completion of the registering-stroke of an operated key, substantially as and for the purpose described.

17. In a cash register and indicator having a series of operating-keys, the combination of a registering-shaft, a driving-pinion loose on said shaft, a clutch between said pinion and shaft, a movable bar extending across the keys and moved by the operation of any of them, a shifter actuated by said bar to automatically disengage the clutch at the completion of the registering-stroke of an operated key, a latch for holding the clutch out of engagement during the opposite stroke of the key, and a trip for said latch, substantially as and for the purpose described.

18. 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 registering-shaft, a driving-pinion loose thereon and meshing with the rack, a clutch between the pinion and shaft, and a shifter for automatically disengaging the clutch at the completion of the registering-stroke of an operated key, substantially as and for the purpose described.

19. In a cash register and indicator, the combination of a series of operating-keys of different values, a segment-rack actuated to dif-

ferent degrees by the operation of the different keys, a registering-shaft, a driving-pinion loose thereon and meshing with the segment-rack, a clutch between the pinion and shaft, a shifter for automatically disengaging the clutch at the completion of the registering-stroke of an operated key, a latch for holding the clutch out of engagement during the opposite stroke of the key, and a trip for said latch, substantially as and for the purpose described.

20. In a cash register and indicator, the combination of the rack T and operating-key C, carrying the pawl *f* and latch *h*, substantially as and for the purpose described.

21. In a cash register and indicator, the combination of the rack T, operating-key C, pawl *f*, latch *h*, ledge *l*, and stop *j*, substantially as and for the purpose described.

22. In a cash register and indicator, the combination of the rack U and operating-key C, carrying the pawl *o* and latch *m*, substantially as and for the purpose described.

23. In a cash register and indicator, the combination of the rack U, operating-key C, pawl *o*, latch *m*, trip *p*, and stop *q*, substantially as and for the purpose described.

24. In a cash register and indicator, the racks T U, in combination with the key C, carrying the pawls *f o* and latches *h m*, substantially as and for the purpose described.

25. In a cash register and indicator, the slotted guide-plate B, provided with the racks T, one adjacent to each of the slots in said plate, in combination with the operating-keys C, which are engaged with said racks during their forward stroke and disengaged therefrom during their opposite stroke, substantially as and for the purpose described.

26. In a cash register and indicator, the slotted guide-plate B, provided with the racks U, one adjacent to each of the slots in said plate, in combination with the operating-keys C, which are free from said racks during their forward stroke and engaged therewith during their opposite stroke, substantially as and for the purpose described.

27. In a cash register and indicator, the slotted guide-plate B, provided with the racks T U, one of each adjacent to each of the slots in said plate, in combination with the operating-keys C, which are free from the rack U and engaged with the rack T during their forward stroke, and free from the rack T and engaged with the rack U during their opposite stroke, substantially as and for the purpose described.

28. In a cash register and indicator having a series of operating-keys, the combination of the segment-rack L, registering-shaft N, pinion M, loose on the shaft N and meshing with the rack L, the clutch between the pinion M and shaft N, shifter V, and bar I, which actuates the shifter V at the completion of the stroke of a key to disengage the clutch be-

tween the pinion M and shaft N, substantially as and for the purpose described.

29. In a cash register and indicator having a series of operating-keys, the combination of
5 the segment-rack L, registering-shaft N, pinion M, loose upon the shaft N and having clutch-teeth on one of its hubs, the clutch-hub b, tight on the shaft N, the shifter V, actuated

by the bar I, the latch y, and the link X, engaged by the bar I to trip the latch y, substantially as and for the purpose described. 10

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