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B. M. SHIPLEY

2,210,099

CASH REGISTER

Filed May 20, 1937

FIG. 1

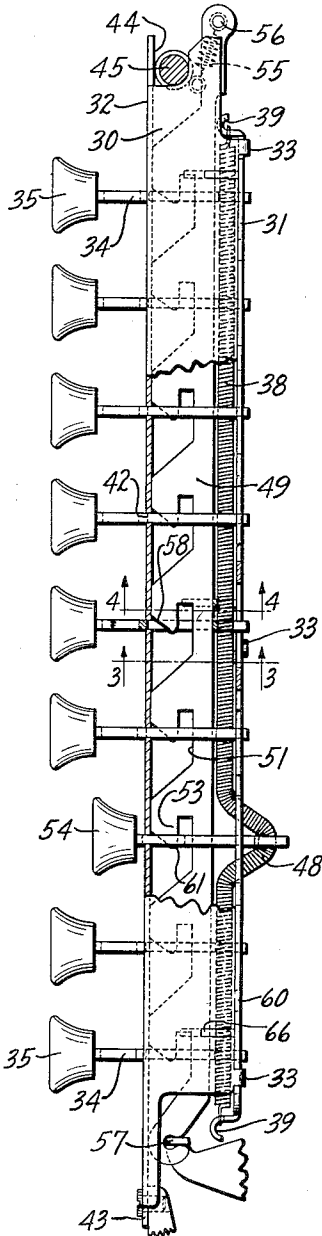


FIG. 2

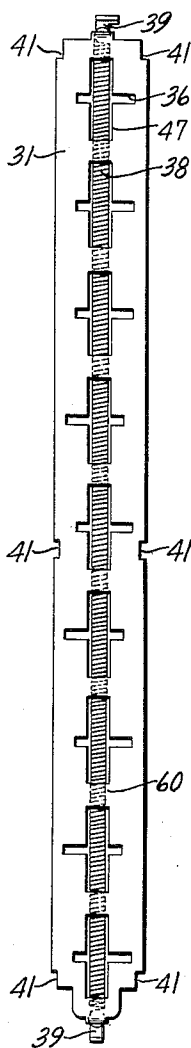


FIG. 7

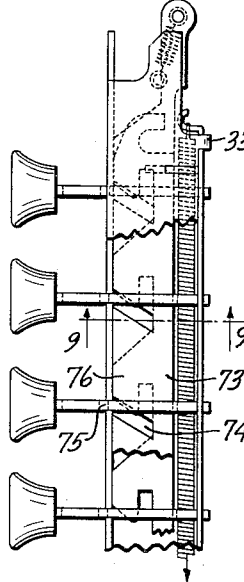


FIG. 9

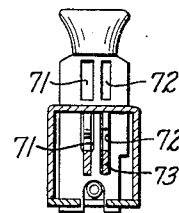


FIG. 8

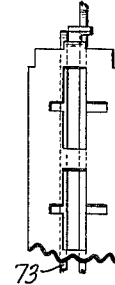


FIG. 5

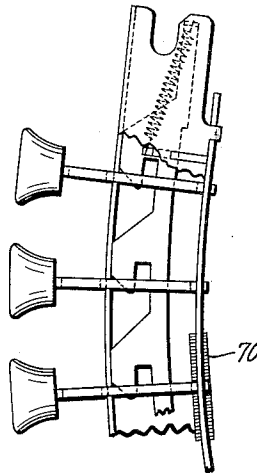


FIG. 6

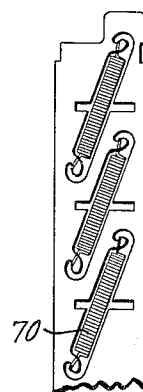


FIG. 3

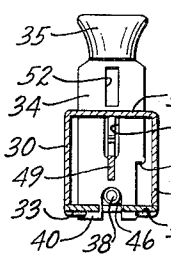


FIG. 4

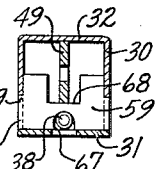
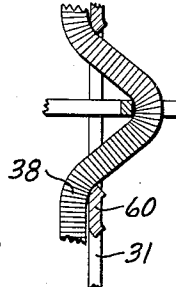


FIG. 10



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UNITED STATES PATENT OFFICE

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CASH REGISTER

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Application May 20, 1937, Serial No. 143,650

7 Claims. (Cl. 235—145)

This invention relates to an improved keyboard for cash registers, calculating machines, and the like.

The general object of the invention is to provide a keyboard or keybank of unit construction and flexible action with the advantages of few parts and simplicity of assembly and operation.

Particularly novel and desirable is the means disclosed for supporting and guiding the key stems and for returning the keys to normal position by the use of the same medium for a number of keys, thus reducing the number of parts.

Another advantage presented by this disclosure is the ease of assembling the various parts owing to the method of combining the framework and moving parts to support and interlock with each other.

A further object is to provide an interchangeable, unitary keyboard or keybank, enclosed by its own framework.

With these and incidental objects in view, the invention includes certain novel features of construction and combinations of parts, the essential elements of which are set forth in appended claims and a preferred form or embodiment of which is hereinafter described with reference to the drawing which accompanies and forms a part of this specification.

Of said drawing:

Fig. 1 is a side view of the keyboard or keybank with part of the framework broken away.

Fig. 2 is a bottom view of the bottom plate of the keyboard or keybank with a single coil spring showing through the openings in the bottom plate.

Fig. 3 is a cross section of the keyboard or keybank at line 3—3 in Fig. 1.

Fig. 4 is a cross section of the keyboard or keybank at line 4—4 in Fig. 1, with the keys removed.

Figs. 5 and 6 show respectively a side view (partly broken away) and a bottom view of a modified form of the invention applied to a curved keyboard.

Figs. 7, 8, and 9 show respectively a side view (partly broken away), a bottom view, and a cross section at reference line 9—9 in Fig. 7 of a modified form using double slotted keys to accommodate more than one key control or locking plate.

Fig. 10 is an enlarged cross section of the web between two spring clearance slots.

The keyboard or keybank unit, as illustrated, is adapted for use in any machine using manipulative keys of the general type shown.

The frame of the keyboard unit is a rectangular tube formed of two pieces. One of the pieces is bent to form three sides of the tube, and the second piece forms the fourth side, or bottom, of the tube. Referring to Fig. 3, the side parts 30 of the frame and the top part 32 of the frame are formed of the one piece, while the fourth side or bottom plate 31 is the second piece. The top piece and the bottom plate of the framework are joined together by ears 33 locked into notches 41 (Fig. 2). These ears and notches have the additional function of keeping the upper and lower slots, which guide the key stems, in alignment. The top and side pieces have suitable projections at 44 (Fig. 1) for engaging a rod 45 and at 43 for a screw, for mounting the unit to its machine.

Keys 35 (Fig. 1) having flat stems 34 (preferably struck from sheet metal) are inserted in slots 42 (Fig. 1) cut in the top of the frame 32 at right angles to its length. These keys, in their normal position, are adjusted to penetrate slots 36 (Fig. 2) in the bottom plate, directly beneath slots 42 in the upper plate, just far enough that the key stem ends 40 (Fig. 3) emerge beneath the bottom plate 31. These slots in the top and bottom plates, accommodating the key stems, are cut accurately to the dimensions of the stem and act as guides and support against lateral movement. The bottom portion of the key stems 34 may be cut away on one side or another as shown at 37 (Fig. 3) and placed in the keyboard with the cut-away portion to the left or right to serve key-controlled devices positioned to one side or the other of the median line of the keyboard, and the slot in the bottom plate is cut accordingly to receive the key stem. Slots 36 in Fig. 2 are shown positioned to receive the key stems for a particular bank of control keys, their particular arrangement not being essential to this presentation.

Fastened on the inner side of the bottom plate 31 (Figs. 1 and 2) is a single coil spring 38 (Figs. 1 and 2) extending on the middle line the entire length of said plate and fastened to hooks 39 (Fig. 1) integral with it. Normally this spring is under slight tension to hold the keys 35 in the normal undepressed position by supporting the key stems on the bottom. To enable this to be done and yet permit the key stem ends 40 to emerge from the slots 36, a bifurcation or arch 46 (Fig. 3) is cut in the inner ends of the key stems, to straddle the spring 38. This is clearly shown in Fig. 3, and it should be noted that the bifurcation of the key stems and the slotted bot-

tom plate prevents lateral movement of the spring 38, so that the key stem ends and the spring are always in engagement.

Depression of any key 35 (Fig. 1) would tend to force the spring 38 through slot 36 (Fig. 2). This being impossible by reason of the dimensions of the slot, a cross slot or spring clearance slot 47 (Fig. 2) is cut the width of spring 38 across and at right angles to each slot 36 (Fig. 2). This enables a key to be depressed as shown at 48 (Fig. 1), carrying the coil spring in the bifurcated stem end to the position shown. When a key is depressed, as shown at 48 (Fig. 1), a portion of the coil spring 38 is displaced through the slot 47 corresponding to the key used. The spring 38 is stretched over its entire length when any key is depressed, as it is perfectly free to move through arches 46 (Fig. 3) and arches 67 (Fig. 4). As an additional aid to its freedom of movement, the metal webs 60 (Fig. 2) between slots 47 are rounded, as shown in cross section in Fig. 10. These rounded spring bearing webs keep the spring from being cut and abraded by constant chafing and allow the spring 38 to equalize any extension over its entire length. Release of any key 35 (Fig. 1) will result in the key's returning to normal position due to the tension of spring 38. The coil spring 38 is formed with the turns closely wound and of great elasticity, so that more than one key may be depressed at the same instant (if desired) without undue pressure by the operator being necessary and without causing the coils to separate sufficiently to foul the key stems.

To limit the travel of the keys in their frames and to lock a key in depressed position, a single locking detent plate 49 (Fig. 1) is inserted through slots 50 (Fig. 3) formed in all of the key stems in each bank. The slots 50 are long enough to allow depression of the keys from normal position to operative position when the locking plate is placed so that its narrowest parts 51 (Fig. 1) cooperate with the slots 50 in the key stems. Immediately above slots 50 in each key shank are similar slots 52 (Fig. 3). These slots are designed to engage locking projections or detents 53 on plate 49 (Fig. 1) after a key or keys have been depressed, in order to hold the keys in the depressed and operating condition. To accomplish such engagement of the detents with the slots 52, the plate 49 holding the detents must be moved from its normal position as shown in Fig. 1 slightly to the right, so that the locking point of the detent 53 is clear of the descending key shank. When a key reaches the depressed condition, as shown at 54 (Fig. 1), the plate 49 is then moved slightly to the left and the locking point of the detent 53 enters slot 52 in the key stem 34 and prevents it from rising in response to the tension of the spring 38.

Spring 55 (Fig. 1) normally holds the plate 49 to the left so the detents 53 engage either slot 50 or slot 52 in each key stem. A key may be released from the depressed condition by moving the detent plate 49 slightly to the right. This is done in either of two ways: first, the ends of the detent plates 56 and 57 (Fig. 1) may be connected to special release mechanism so designed as to move the detent plate 49 to the right as desired; or, second, the depression of another key will force the upper end of slot 50 against a bevelled surface 58 on its detent 53, causing, by resultant force, the movement of detent plate 49 to the right far enough to release the formerly depressed and caught key. Chamfering the de-

tent nose 61 (Fig. 1) on the under side insures the release of a depressed key when another key is depressed by causing the depressed key to force the nose of the detent to the right once the chamfer has been reached by the movement of the detent to the right. The newly depressed key will, in turn, be caught if momentarily held in the depressed condition until the first depressed key is restored, due to the action of spring 55.

For the purpose of supporting the detent plate 49 so that its weight will not rest on the spring 38, there are placed at intervals, supporting plates 59 (Fig. 4). These supporting plates 59 are engaged in slots in the sides 30 of the rectangular tube, as shown at 66 (Figs. 1 and 4). Cut out of the bottom of said supporting plate 59 is an arch or clearance notch 67 for the passage of coil spring 38, and in the top of said supporting plate is cut a flat-bottomed depression 68 (Fig. 4), which is the resting point and runway for detent plate 49.

The supporting plates are secured by the bottom plate 31 holding them in the slots 66 against shoulders 69 (Fig. 4). These plates 59 also act as stiffening members for the keyboard frame.

Figs. 5 and 6, illustrating a portion of a curved or radial keyboard bank, show certain modified constructions in which, instead of a single spring 38 for all the keys, separate springs 70 (Figs. 5 and 6) are used for each key, to avoid chafing of the spring material against the bottom plate. These separate springs are mounted in diagonally placed slots to provide greater length for each spring. This construction may also be used on a flat keyboard if it is not desirable to use a single spring.

Figs. 7, 8, and 9 show a modified form of the invention in which the key shanks have two sets of slots, as shown in Fig. 9. One set, an upper and a lower slot, accommodates the detent plate previously described. The slots for the detent plate are shown at 71 (Fig. 9) and the other slots, 72 accommodating a locking plate, lie parallel. The locking plate 73 (Fig. 7) moves to the left and right on supporting plates 39 (Fig. 4) in the same manner as the detent plate. Cut into the locking plate are diagonal parallel-sided notches 74 (Fig. 7) with the mouth ends opening to receive the bars 75 (Fig. 7) separating the upper and lower slots in the key shanks. Whenever a key is depressed, the locking plate is moved to the right with the detent plate by the movement of the bar 75 against the inclined notch 74. Between the notch mouths on the locking plate are flat surfaces 76. When the depressed key causes the locking plate to move to the right, the flat surfaces 76 are moved under the bars 75 of the other keys, thus locking them against depression. Moving the locking plate to the left by other means allows the depressed key to rise and allows other keys to be depressed.

As the ease of assembling this keyboard unit is of importance, it will be briefly described. The guide plates 59 (Fig. 4) are inserted in slots 66 in the top piece. Next, the bottom plate 31 and the spring 38 (Figs. 1 and 2) are joined by hooking the looped spring ends over hooks 39. The bottom plate is then fastened to the top piece by ears 33 bent into notches 41. The keys are inserted and the detent plate is pushed through the slots 50. The spring 55 is hooked to the detent plate and the unit is ready to be installed in the machine by hooking onto rod 45 and driving screw 43 into the frame.

Although the keyboard as shown comprises a

single unit assembly for each row of keys, it is obvious that a single top and bottom plate for a plurality of rows of keys might be provided, dispensing with the side plates of each bank as shown, but retaining all other items of construction which are disclosed.

While the form of mechanism herein shown and described is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the one form or embodiment herein disclosed, for it is susceptible of embodiment in various forms, all coming within the scope of the claims which follow.

What is claimed is:

1. A keyboard bank of unit construction, for a key controlled machine, comprising a top and a bottom plate; alined slots formed in said top and bottom plates; a single elastic medium mounted above said bottom plate and crossing all of the aforementioned slots; depressible keys having stems slidably mounted in said alined slots and bifurcated at their inner ends to straddle said elastic medium and hold it against lateral movement; and a second set of slots formed in said bottom plate directly beneath said elastic medium and intersecting said first mentioned slots to permit the depressed bifurcated key stems to carry a portion of the elastic medium through the bottom plate under tension.

2. A keyboard bank, of unit construction, for a key controlled machine, comprising a top and a bottom plate; alined slots formed in said top and bottom plates; a single spring mounted above said bottom plate and crossing all of the aforementioned slots; depressible keys having stems slidably mounted in said alined slots and bifurcated at their inner ends to straddle said spring and hold it against lateral movement; and a second set of slots formed in said bottom plate directly beneath said spring and intersecting said first mentioned slots to permit the depressed bifurcated key stems to carry a portion of the spring through the bottom plate under tension, the webs between each two of said second slots in said bottom plate acting to support said spring at points intermediate each pair of key stems as a key is depressed providing even action for all the keys.

3. A keyboard bank of unit construction, for a key controlled machine, having an enclosed frame; a plurality of keys having stems bifurcated on the inner ends slidably mounted in alined slots in the top and bottom of the frame; locking means; plates stiffening the frame and supporting said locking means; a single elastic medium resting on the topside of the bottom of the frame so as to be normally enclosed within the frame and straddled by the bifurcated key stems; and a second set of slots in the bottom of

the frame intersecting the first mentioned slots allowing downward movement through a slot and preventing lateral movement of that portion of the elastic medium adjacent to each key stem when such key is depressed.

4. A keyboard for a key controlled machine, comprising a top and bottom plate; alined slots formed in said top and bottom plates; a second set of slots formed in the bottom plate intersecting the first mentioned slots; keys slidably mounted in the alined slots and having stems whose inner ends are bifurcated; and resilient means located above the bottom plate and embraced by the bifurcations of the keys for restoring the keys to normal position, said second slots accommodating the resilient means when displaced and acting in conjunction with the bifurcated key stems to keep the resilient means in effective position.

5. A keyboard frame for a key controlled machine comprising a channel piece, forming a top and sides; a bottom plate; slots in the top of the channel piece alined with slots in the bottom plate; keys having bifurcated stems slidably mounted in the alined slots; resilient means within the frame and embraced by the bifurcated keys for restoring depressed keys to normal position but leaving the key freely withdrawable therefrom; and a second set of slots in the bottom plate intersecting the first mentioned slots for accommodating the resilient means for restoring depressed keys to normal.

6. In a keybank for a key-controlled machine, the combination of an enclosed frame having a slot in the top and a slot in the bottom thereof alined with the first-mentioned slot, and a second slot in the bottom thereof intersecting the first-mentioned bottom slot; a depressible key slidably mounted in the alined slots, said key having a bifurcated stem; and resilient key restoring means within the frame embraced by the bifurcated key and carried through the second-mentioned slot in the bottom plate under tension when the key is depressed, said bifurcated key stem and slot cooperating to keep the resilient means in effective position at all times.

7. In a keybank, in combination, a key plate having key guiding slots and a clearance slot intersecting each key guiding slot; a resilient means supported longitudinally across said intersecting clearance slots; and a notched key slidably mounted in each of the guide slots with the notches embracing the resilient means which is supported intermediately of the keys by the webs between the clearance slots in such a manner as to keep the keys normally in undepressed position, said resilient means being displaced through a clearance slot when the key associated with said slot is displaced.

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