Sept. 16, 1941. H. T. AVERY 2,255,909

CALCULATING MACHINE

Filed Oct. 7, 1936 2 Sheets-Sheet 1

FIG. 1.

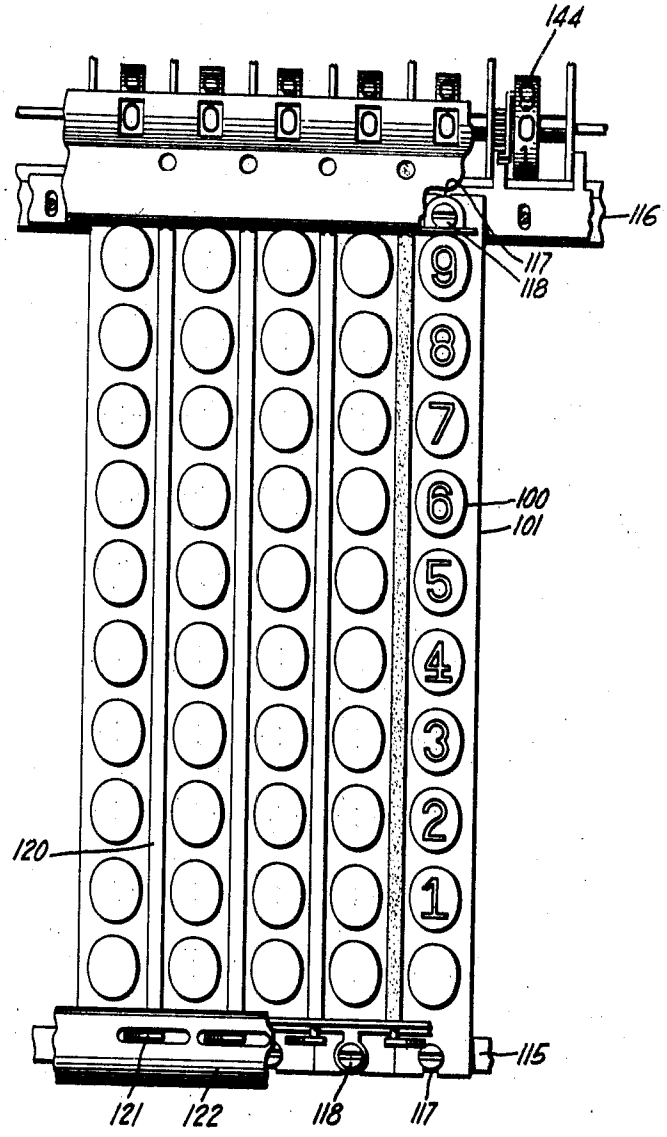

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FIG. 3.

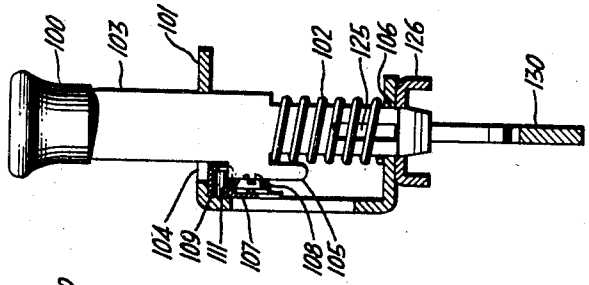

FIG. 2.

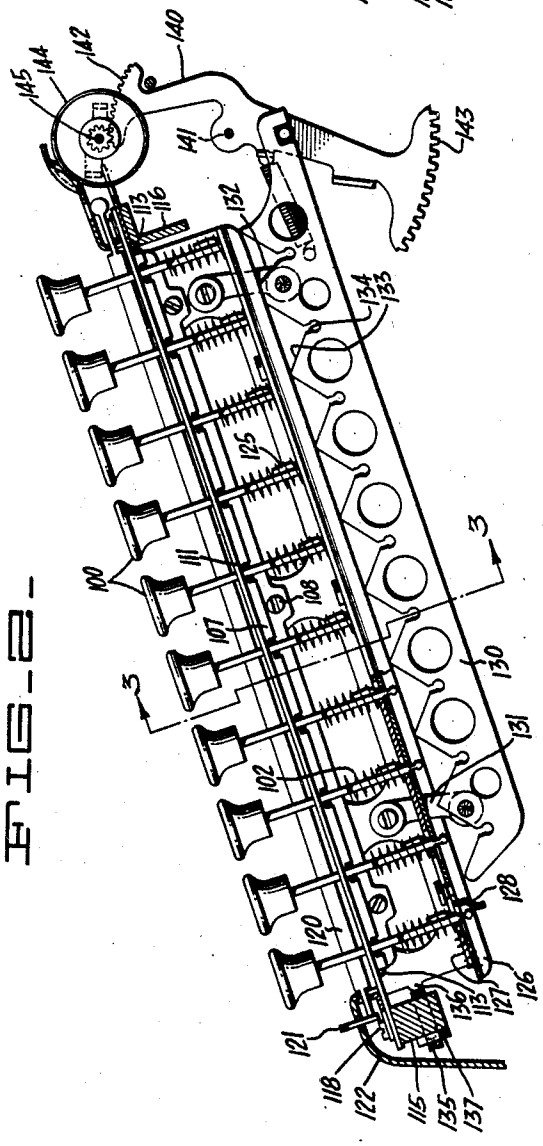

FIG. 4.

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CALCULATING MACHINE

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Application October 7, 1936, Serial No. 104,471

1 Claim. (Cl. 235—145)

The present invention relates to keyboard controlled machines, and is disclosed as applied to calculating machines.

This application is a continuation-in-part of application Serial No. 653,207, filed January 23, 1933, and since matured into Patent Number 2,229,630, issued on January 28, 1941, and of application Serial No. 702,949, filed December 18, 1933, and since matured into Patent Number 2,211,736, issued on August 13, 1940, disclosing calculating machines of a type to which the present invention is adaptable.

It is an object of the present invention to provide an improved keyboard construction.

It is an object of the invention to provide a keyboard composed of removable sections separately adjustable as to their cooperative relation with the machine.

Other objects and advantages will appear in the following specification, wherein the preferred form of the invention has been disclosed, when the same is read in connection with the accompanying drawings in which:

Figure 1 is a plan view of a keyboard embodying the invention, certain parts being broken away;

Figure 2 is a side elevational view, partly in section, of a single bank of keys with portions of the supporting and cooperating devices;

Figure 3 is an enlarged sectional view taken on the line 3—3 of Figure 2; and

Figure 4 is a detail view of the resilient limit stop device.

In a machine designed for calculation in the decimal system, the keys are preferably arranged, as shown in Figure 1, in a series of banks of ten keys each with decimal bars lying between each pair of key blanks, the number of banks provided in each machine depending upon the magnitude of the factors with which the machine is designed to deal.

Details of the construction of one bank of keys are shown in Figures 2 and 3 of the drawings. Each key section comprises the usual number of value keys 100, which are slidably mounted in a channel key frame 101, and are normally maintained in raised position by suitable coil springs 102. The key stems 103 are assembled into the channel frame 101 (see Figure 3) by insertion from the top, the slot 104 in the upper side of the channel member being of sufficient width to pass the projection 105 of the key stem, but the aligned slot 106 in the lower side being of lesser width, so that the key stem cannot drop through; the projection 105 being adapted to contact the lower portion of the channel 101 adjacent slot 106 to provide a limiting stop.

After the key stems 103 have been inserted, they are retained by securing to the frame member 101 a channelled retainer 107 adapted to be held in place by means such as screws 108. Within the retainer 107 is a strip of buffer material 109, preferably spring metal, portions 110 of which lie adjacent apertures 111 in the sides of the retainer nearest projections 105 of the keys. This strip 109 is also formed with offset portions 112 so proportioned as to be slightly deflected as the strip is inserted within retainer 107, thus maintaining the strip under light constant tension. The upturned ends 113 of the strip are adapted to project beyond the ends of retainer 107 and assist in preventing accidental displacement of the strip.

As a key stem 103 is moved upwardly by spring 102, projection 105 is carried against a portion 110 of the strip 109 which may yield to provide a cushioned stop for the key. The noise incident to release of the keys from their latching means is thus substantially reduced.

Each key section is mounted in the machine between members 115 and 116 which extend between the side plates of the machine. Each end of the channelled key frame 101 is slotted as at 117 (Figure 1) so that the longitudinal position of the key section may be adjusted, each key section being secured in the desired position by the screws 118. After the several key sections have been positioned, flat decimal markers 120 are positioned and suitably journaled between each bank of oval keys. A knurled finger piece 121 extends through a cover member 122 so that the flat decimal marker 120 can be rotated to expose either of its sides, the markers being shown in the two different positions in Figure 1, and in a position occupied while the markers are being turned in Figure 2. As is well known, one side of these markers is colored to correspond with the coloring of the top of channels 101, while the other side thereof is colored contrastingly, so that by turning selected markers the keyboard may be set off decimally in any desired manner. Due to the shape of the keys, view of the markers is unobstructed despite compact assembly of keys and markers.

All the key stems are of the same length and each has a cam extrusion 125 which, upon depression of the key, pushes a slotted key locking slide 126, slidably supported on the lower side of channel 101, to the right, as viewed in Figure 2, releasing any other latched-down key in the

same section. Upon full downward depression of the respective key stem, this slide 126, pressed forward by spring 127, snaps back to initial location and, by overlying the upper end of extrusion 125, locks the depressed key.

The leftmost key (Figure 2) in each section is the zero or clear key, and is provided for the sole purpose of releasing any latched-down key in the same section. The stem 103 and the extrusion 125 of this key are identical with the other keys of the section, but latching down of the key is prevented by the provision, on the locking slide 126, of a lip 128, the lower edge of which lies below the lowest position assumed by the top of extrusion 125. Hence, while the slide is moved to the right upon depression of this key, the lip 128 prevents it from returning leftward during the depression of the key, and latching of the key can not be effected.

When a numeral key stands depressed and it is desired to depress a different numeral key in the same section, the first key must be released during the first part of the stroke of the second key in order to avoid interference between the respective key stems in moving the V-slot bar 130. For this reason the lower edges of extrusions 125 normally lie closely adjacent the locking slide 126. However, in order to avoid inadvertent release of keys when the person or clothing of the operator touches the zero keys, the lip 128 of each locking slide, by means of which it is moved by the associated zero key, is formed away from the cooperating extrusion 125 for a substantial part of its length, as shown in Figure 2, so that the extrusion does not move the slide until the key has moved downwardly through about half of its stroke. Since the zero keys do not contact the V-slot bar 130, this causes no interference.

Disposed underneath the value keys "one" to "nine," inclusive, is a differentially settable bar 130 which is pivotally suspended from the key section frame 101 by means of two parallel links 131 and 132. This bar 130 has nine identical notches 133, each of which has at its bottom a downwardly extending slot 134 adapted to receive the lower end of a key stem 103. The vertical center lines of the key stems 103 are spaced equal distances apart. This distance, however, is slightly greater than the spacing between successive slots 134, so that each succeeding slot 134 will be spaced one increment farther away from its cooperating key stem 103. This spacing is thus proportioned in such a way that depression of a value key will cam the bar 130 to the right, as viewed in Figure 2, a number of increments equal to the value represented by the depressed key.

The longitudinal position of each key section is adjusted by a screw 135 (Figure 2) which engages an ear 136 on the channel frame 101 and is thereafter locked by nut 137 against bar 115. The section can thus be removed and replaced repeatedly without disturbing the adjustment.

Movement of each bar 130 is utilized to set up a mechanical representation of the selected value whereby the calculating mechanism may be accordingly controlled. A swinging segment member 140 is mounted upon a common shaft 141 which supports like members associated with other key banks. This member is provided at opposite ends with arcuate racks 142 and 143, which serve to transmit the movement of the differential bar 130 respectively to a check dial assembly 144 positioned on shaft 145 in alignment with similar dials associated with the other key sections so that the value set up on the entire keyboard is read in a straight line of dials, and to mechanism which is positioned by such movement so as to form a mechanical representation of the number set up whereby the calculating mechanism may be accordingly controlled.

I claim:

In a calculating machine, a key section comprising a channel member having aligned upper and lower slots formed in the flanges thereof with the upper slot of greater length than the lower, a plurality of flat key stems movable in said slots and each formed intermediate its ends with an extension, and means for retaining said stems in the member comprising a single removable retainer secured within said member in position for engagement by said extension.

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