

Dec. 26, 1961

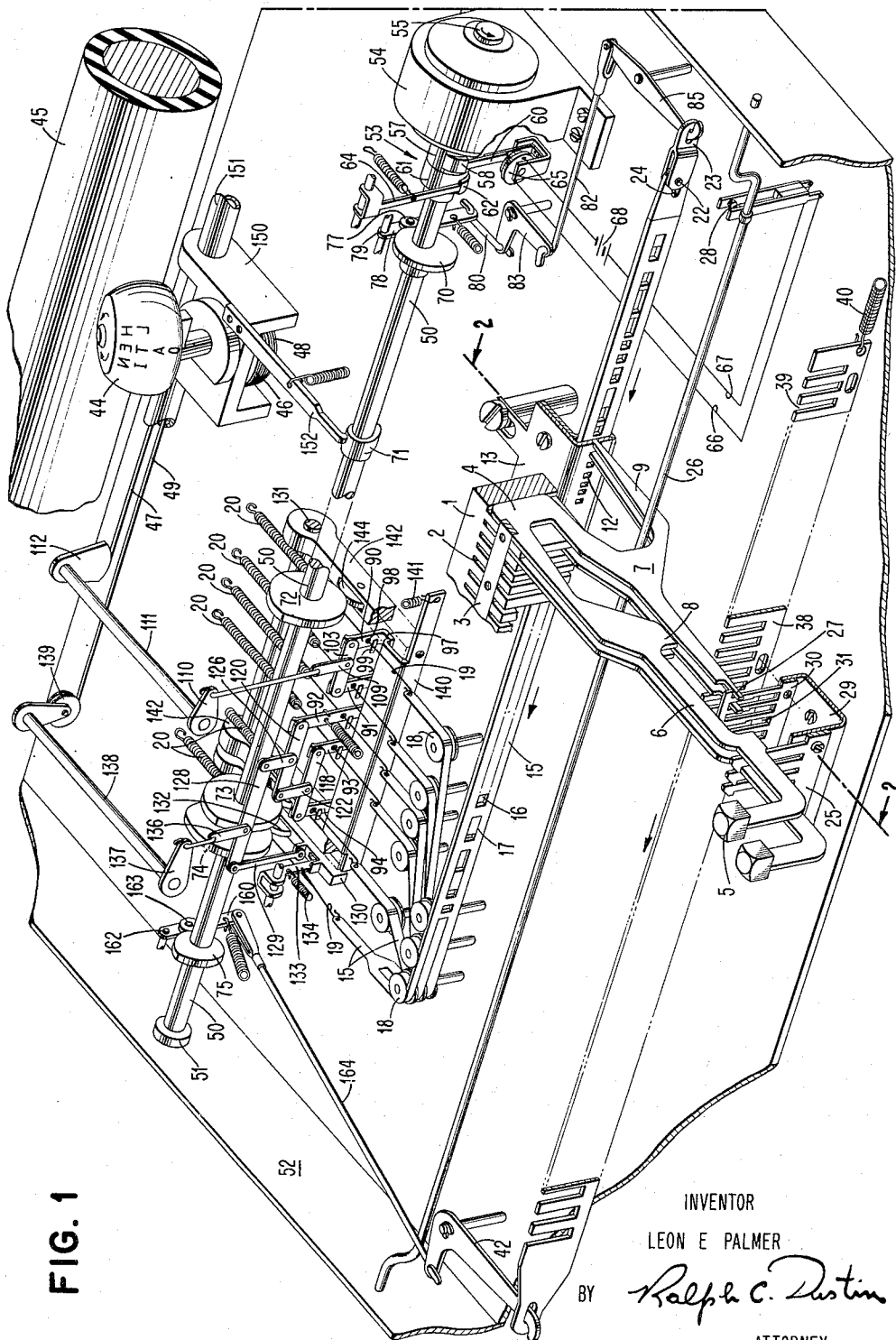
L. E. PALMER

3,014,569

KEYBOARD MECHANISM

Filed March 28, 1960

3 Sheets-Sheet 1



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KEYBOARD MECHANISM

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FIG. 2

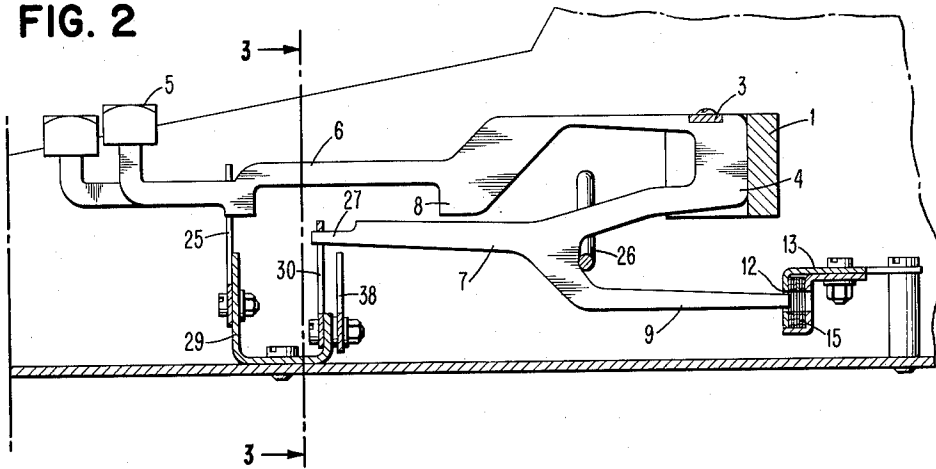
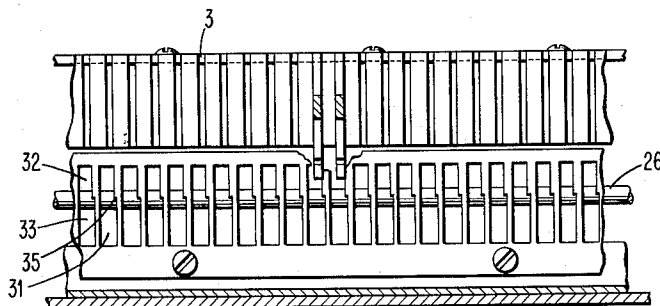


FIG. 3



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FIG. 4a

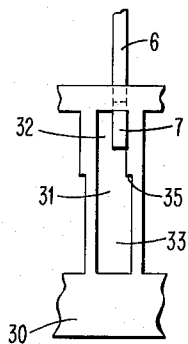


FIG. 4b

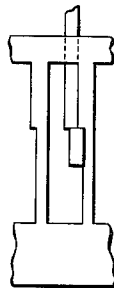


FIG. 4c

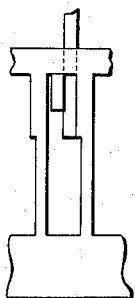
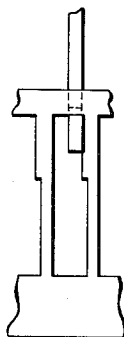


FIG. 4d



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3,014,569

KEYBOARD MECHANISM

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7 Claims. (Cl. 197-16)

This invention relates to key operated machines and more particularly to an improved keyboard for controlling the operation of a selecting mechanism in such machines.

The type of selection mechanism to which reference is made is one having a number of contiguous thin strips or tapes which are movable longitudinally from an inoperative position to an operative position in response to the actuation of a key. A mechanism of this type is described in patent application, Serial No. 846,400, filed October 14, 1959, now Patent No. 2,978,086.

A first object of this invention is to provide an improved keyboard for key operated machines.

Another object of this invention is to provide an improved light weight keyboard for controlling the operation of selecting elements in a key operated machine.

Still another object is to provide a keyboard having key actuated elements which are latched in operative positions until mechanisms controlled thereby have become effective to perform their various functions.

A still further object of this invention is to provide a keyboard element that lends itself to being fabricated as a single unit.

Yet another object of this invention is to provide an improved key operated machine.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

FIGURE 1 is a perspective view of an improved keyboard with mechanisms controlled thereby for positioning a single element printing head.

FIGURE 2 is a sectional view of the keyboard taken along lines 2-2 of FIGURE 1.

FIGURE 3 is a transverse sectional view of the keyboard taken along lines 3-3 of FIGURE 2.

FIGURES 4a-4d are enlarged views of a portion of the mechanism in FIG. 3 and show one of the key levers and its interposer in different positions.

There is shown in FIG. 1 a key operated machine having a bar 1 extending transversely thereof. Formed in the bar are a plurality of equidistantly spaced transverse grooves 2 in each of which is an element 4 held in place by a bar 3. Each element 4 comprises a key button 5, a key lever 6, and an interposer 7 molded or fabricated as a single resilient unit. It should be understood of course that each key element 4 can also be fabricated in separate parts, if desired.

Each key lever 6 is provided with a shoulder portion 8 which acts on the top edge of the interposer 7. A finger portion 9, formed integral with the interposer 7, normally extends a short distance into an opening 12 formed in a channel shaped guide member 13 (FIG. 2). Arranged within the guide member 13 are thin, elongated elements or tapes 15 having, at different points along their lengths, either openings 16 which are just large enough to receive the finger portion 9 or openings 17 which are long enough to permit substantial movement of the tapes 15 when the finger portion 9 extends through them. The left hand ends of the tapes 15 pass around guide rolls 18 and are connected by wire links 19 to springs 20 which urge them

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to the left against a pin 22 held by an end piece 23 and extending through elongated slots 24 in the tapes.

When a key button 5 is depressed to rock key lever 6 downwardly within the limits defined by a conventional guide comb 25, the shoulder portion 8 acts on interposer 7. As the interposer 7 is flexed downwardly, it rocks a bail 26 extending transversely of the machine to close contacts 28 for effecting engagement of a one revolution clutch 53 which will be described later.

Arranged parallel with the guide comb 25 and attached to the same bracket 29 is a plate 30 in which are formed a plurality of openings 31 into which a reduced portion 27 of the interposer 7 extends. As best seen in FIGS. 3 and 4a to 4d, the top portion 32 of opening 31 is a slight degree wider than twice the width of the interposer 7 while the bottom portion 33 is wider than the portion 32 by the width of a shoulder 35. The plate 30 is slightly offset to the left in order to bias the interposer arm 7 to the left when in its upper position. The guide comb 25 may also be slightly offset to the left for holding the key lever in vertical alignment with the interposer when the latter is in its normal raised position.

As the interposer 7 is forced downwardly into the bottom portion 33 of opening 31, the reduced portion 27 flexes to the right and is latched under the shoulder 35 (FIG. 4b).

In order to restore the interposer arm 7 to its normal position, an interposer knockoff bar 38 is arranged parallel to the plate 30 and is supported for longitudinal movement transversely of the typewriter by the bracket 29. Formed in the bar 38 are a plurality of slots 39 for receiving the interposer arm 7 when flexed downwardly. The right end of the bar 38 is connected to a spring 40 while its other end is connected to a bellcrank 42. Mechanism to be described later operates the bellcrank 42 for moving the bar 38 to the left in FIG. 1 until the interposer 7 is clear of the key lever 6 and can flex upwardly to the position shown in FIG. 4c. As the interposer flexes upwardly, the finger portion 9, is withdrawn from openings in the tapes 15 and the bail 26 is released to permit opening of the contacts 28. This assures only one cycle of operation even though a key lever may be held depressed. As soon as the key lever is released, the interposer returns to its position under the key lever as shown in FIG. 4d. If the key lever is released quickly enough after operation, the interposer will return to the position shown in FIG. 4d as soon as it is moved from under the shoulder 35.

There are also shown in FIGURE 1, the driving mechanism and selection linkage for actuating a single element type head 44 to print a character corresponding to that of the key button 5 which has been actuated. The head 44 may be rotated or tilted from a home position to place any one of various type elements in a position for printing characters on a record sheet supported by a platen 45. The type head and mechanism for rotating and tilting the head may be like those shown in the Hickerson et al. Patent No. 2,895,584, dated July 21, 1959. As disclosed by this patent, a tape 47 drives a pulley 46 different amounts to effect a tilting of the head while another pulley 48 is operated by a tape 49 to rotate the type head different amounts for presenting any one of various type elements in a position for printing.

As shown in FIG. 1, a drive shaft 50 has one end journaled in a bearing 51 in the side frame 52 and has its other end connected through a conventional one-revolution clutch 53 to a motor 54 which rotates continuously in the direction indicated. The clutch 53 may comprise a helical spring (not shown) surrounding a motor shaft 55 and an end portion of the shaft 50. The spring frictionally engages the hub and the shaft when released

and tends to grip them tightly when its ends turn relative to each other on picking up the load on the shaft. Fixed to one end of the spring is a sleeve 57 loosely mounted on the shaft 55 and having a shoulder 58 engageable with an arm 60. The other end of the spring is attached to a sleeve 61 fixed on the shaft 50 and having a shoulder 62 engageable by a spring urged dog 64, as shown. With the arm 60 and the dog 64 engaging the shoulders 58 and 62 respectively, the clutch spring is held free of the shafts 50 and 55. When the arm 60 is retracted by a magnet 65, the clutch spring locks the two shafts together. The magnet 65 is connected by conductors 66, 67 in series with the contacts 28 across a battery 68 so it is energized each time contacts 28 are closed. If the magnet 65 is immediately de-energized, the arm 60 engages the shoulder 58 on the sleeve 57 at the end of one revolution and holds one end of the clutch spring. The shaft 50 turns some due to inertia and causes the sleeve 61 to turn to a position permitting the dog 64 to drop behind its shoulder 62. The clutch spring is unwound during this time and is held in such condition by the dog 64 and the arm 60.

For actuating the various parts of the mechanism, there are provided on shaft 50 cams 70, 71, 72, 73, 74 and 75. For returning the tapes 15 to their normal position, cam 70 is engaged by a roller 77 mounted on a spring urged lever 78 pivotally supported at 79. The other end of lever 78 is connected by links 80 and 82, bell crank 83 and lever 85 to the end piece 23.

In order to select the proper character there are shown five selecting links 90, 91, 92, 93, 94 of identical construction. These links are of a type shown and described in the L. E. Palmer Patent No. 2,919,002, dated December 29, 1959. Each link has a foot section 97 and an opening 98 through which one of the wire links 19 passes. Fixed to each wire link is an element 99 engageable with the associated selecting link for moving the latter with the wire in one direction. Links 90 and 91 are pivotally connected to a floating link 103 by means which permits each to swing away from the keyboard relative to link 103. A link 109 pivotally connects the floating link 103 to a crank arm 110 on a tilt shaft 111 carrying an arm 112 to which the tape 47 is attached. In a manner described in the Palmer Patent No. 2,919,002, a movement of one or more of the selecting links 90, 91 downwardly a predetermined distance causes the tilt arm 112 to be rocked clockwise by increments of one, two or three units for tilting the printing head 44 from its home position. Selecting links 92, 93 and 94 are pivotally connected, through floating links 118, 120 and tie links 122, 126, to one end of a floating link 128. The other end of link 128 is pivotally connected by a link 129 to an arm 130 pivotally supported by a shaft 131 and having a roller 132 engageable with the cam 74. A spring, not shown, urges the arm 130 upwardly to maintain engagement between the roller 132 and the cam 74. A dog 133 is normally held by a spring 134 in a position to engage a flange on the arm 130 for preventing upward movement of the arm 130 under spring action. One of the wire links 19 is connected to the dog 133 so that movement of the associated tape 15 results in a release of the dog from the arm 130 under the action of its spring 20. The floating link 128 is pivotally connected by a tie link 136 to an arm 137 on a rotate shaft 138. Fixed to this shaft is a pulley 139 which operates on the tape 49 to rotate the printing head.

As described in the Palmer Patent No. 2,919,002, movement of one or more of the selecting links 92, 93 and 94 downwardly a predetermined distance causes a rotation of the printing head from one to five units in one direction. When the dog 133 is operated to release the arm 130, the latter moves upwardly to cause rotation of the printing head five units in the opposite direction. If one or more of links 92 to 94 are moved downwardly simultaneously with the upward movement of the arm 130, the printing

head is rotated in the opposite direction one to four units.

For moving the selecting links downwardly there is provided a bail member 140 extending over the foot portion 97 of the selecting links 90 to 94 and normally held in a raised position by a spring 141. Attached to member 140 at each end is a bail arm 142 pivotally supported on the shaft 131 and having a roller 144 mounted thereon engaging cams 72 and 73 respectively.

The printing head 44 is mounted on a carrier 150 which swings about trunnions 151 for engaging the head with the platen. Fixed to the carrier is an arm 152 engaging the cam 71 on the shaft 50. This cam operates at the proper time to effect a printing of the selected character on the head.

A rocking of the bellcrank 42 for moving the interposer knockoff bar 38 to the left in FIG. 1 is accomplished by a lever 160 pivotally mounted at 162 and carrying a roller 163 engaging the cam 75. Connected between the lever 160 and the bell crank 42 is a link 164 which may be adjusted in length as desired.

With the parts described in positions shown in FIGS. 1 and 2, depression of a key button 5 results in the flexing of its associated key lever 6 and interposer 7 causing the finger portion 9 to engage the openings in the tapes 15. As the reduced portion 27 of the interposer moves below the shoulder 35, the interposer flexes in a direction to position the portion 27 under the shoulder. This results in a holding of the interposer in its operative position until the tapes 15 have been actuated to make the proper character selection. During the downward flexing of the interposer, the bail 26 is rocked closing contacts 28 to engage the clutch 53 for effecting one revolution of the shaft 50. As the shaft 50 rotates, the engaging action of cam 70 and roller 77 permits the springs 20 to pull the tapes in the direction of the arrow unless some of the tapes are held back by the finger portion 9 engaging the ends of openings in the tapes. Those tapes held merely permit the pin 22 to move within the slots 24 in the tapes as the lever 85 rocks in a clockwise direction. In order that the key lever may be available for rapid operation, the engaging action of cam 75 and roller 163 moves the interposer knock off bar 38 in the direction of the arrow to spring the interposer 7 out of its latched position and into its normal position thereby making it ready for its next key lever depression. Should the key lever continue to be held in its depressed position (FIG. 4b), the interposer knock-off bar flexes the interposer 7 to the left beyond the shoulder portion 8 thereby permitting the interposer 7 to spring back up to its normal vertical position but alongside the key lever (FIG. 4c), until the key lever is released at which time the interposer will spring back to the right to its normal horizontal position (FIG. 4d).

The movement of the tapes 15 through the action of their springs 20 causes the selected ones of the links 90, 91, 92, 93, and 94 to be rocked in a direction away from the key levers or out from under bail 140. Cam members 72 and 73 engage rollers 144 to rock the bail 140 downwardly and activate the linkage system to rock the tilt and rotate arms the required number of units to place the selected character in a position to print. As soon as the selected character is in a position to print, the engaging action of cam 71 and arm 152 causes the print head to be rocked toward the platen to print the selected character.

While the driving mechanism and the selection linkage for actuating a single element printing head have been described, it should be understood that the subject invention can be utilized as well with any mechanism controlled by the movement of tapes or similar elements.

While there has been described one form which the invention may assume in practice, it will be understood that it may be modified and embodied in various other forms without departing from the spirit or the scope of the appended claims.

What is claimed is:

1. In a key operated machine having a plurality of elongated elements movable relative to each other for determining machine functions, a keyboard for controlling movement of said elements comprising, in combination, a plurality of key mechanisms, each of said key mechanisms including a key lever made of a flexible material, an interposer underlying said key lever and made of a flexible material, means for clamping said key lever and said interposer at one end against movement, said key lever operating when depressed to flex said interposer downwardly about its clamped end, and a finger portion on said interposer movable into the path of said elements for limiting movement of the latter when said interposer is flexed downwardly.

2. The mechanism of claim 1 in which said key lever and said interposer are formed integral with each other at their clamped ends.

3. A key operated machine comprising, in combination, means including a plurality of elongated elements movable relative to each other to determine machine functions, a power means operable to effect movement of said elements, a clutch engageable to effect a single cycle operation by said power means, a key lever, an interposer underlying said key lever, means supporting said key lever and said interposer at one end, said key lever operating when depressed to move said interposer downwardly about its supported end, a finger portion on said interposer movable into the path of said elements for limiting movement of the latter when said interposer is moved downwardly, means actuated by said interposer during its downward movement for engaging said clutch, means for latching said interposer in its downward position, and means actuated by said power means for releasing said interposer from said latching means after the movement of said elements has been limited by the finger portion of said interposer.

4. A key operated machine comprising, in combination, means including a plurality of elongated elements movable relative to each other to determine machine functions, a power means operable to effect movement of said elements, a clutch engageable to effect a single cycle operation by said power means, a key lever made of a flexible material, an interposer underlying said key lever and made of a flexible material, means for clamping said key lever and said interposer at one end against movement, said key lever operating when depressed to flex said interposer downwardly about its clamped end, a finger portion on said interposer movable into the path of said elements for limiting movement of the latter when said interposer is flexed downwardly, means actuated by said interposer during its downward flexing for engaging said clutch, a

member having a surface engaging one side of said interposer adjacent its free end and biasing the latter slightly in a transverse direction, a shoulder on said member under which said interposer flexes in a transverse direction when the latter is moved downwardly by said key lever, said shoulder acting as a latch for holding said interposer in its downward position, and means actuated by said power means for moving said interposer free of said shoulder after the movement of said elements has been limited by the finger portion of said interposer.

5. The machine of claim 4 in which said last mentioned means comprises a member spaced below said interposer when the latter is in its normal position, a surface on said member engageable with one side of said interposer when moved transversely relative thereto and said interposer is in its downward position, and means actuated by said power means for moving said member transversely of said interposer a distance equal at least to the width of said shoulder plus the width of said key lever.

6. In a key operated machine having a number of elongated elements movable relative to each other from inactive to active positions to perform machine functions, a keyboard for controlling movement of such elements, comprising, in combination, a plurality of resilient key mechanisms wherein each said key mechanism includes a key lever and an interposer formed integral and movable relative to each other between operative and non-operative positions, a finger portion on said interposer engageable with said elongated elements, a manually operable key button for moving said key lever and said interposer to said operative position, means for latching said interposer in said operative position, and means acting on said latched interposer to release the latter from said latching means.

7. The keyboard of claim 6 in which said key mechanism consists of a body portion having first and second opposed sides with a closed end connecting sides, said first side and a third side further comprising a substantially Y shaped body portion, said second side engageable with said first side, said first side engageable with said latching means and said third side limiting movement of said elongated elements.

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