Feb. 16, 1965 E. J. DOMBROWSKI 3,169,701

INTERCHANGEABLE KEY BLANK AND KEY BUTTON COMBINATION

Filed Jan. 3, 1961 2 Sheets-Sheet 1

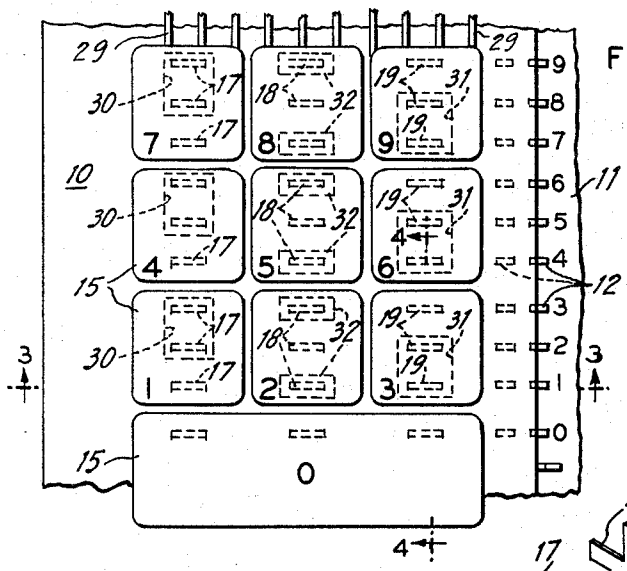


FIG. 1

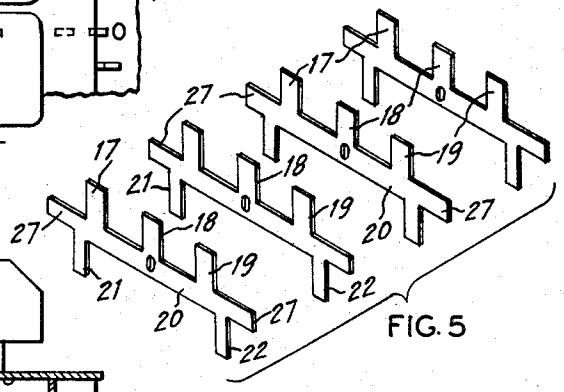


FIG. 5

FIG. 2

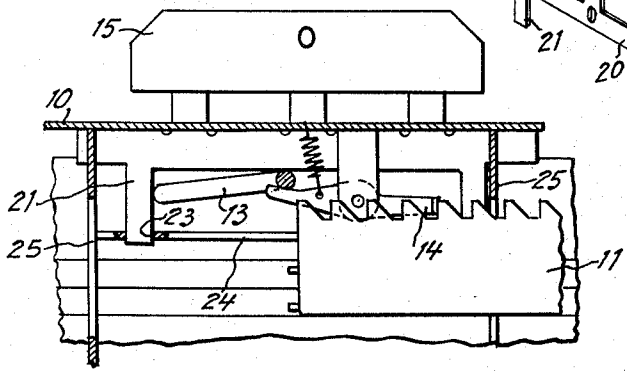


FIG. 3

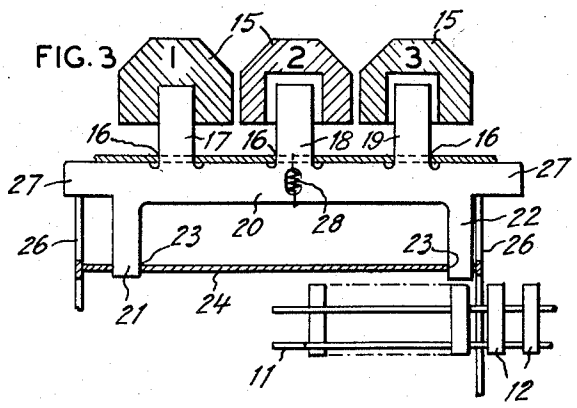
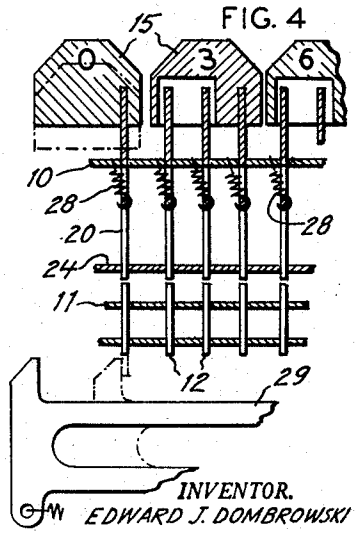


FIG. 4



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FIG. 6

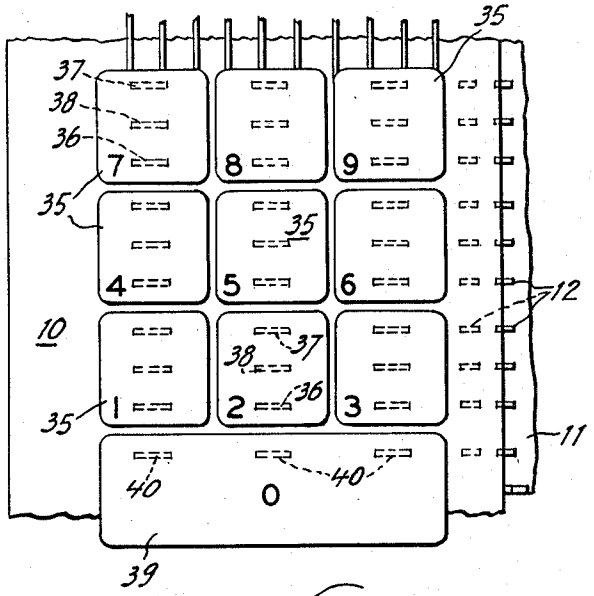


FIG. 7

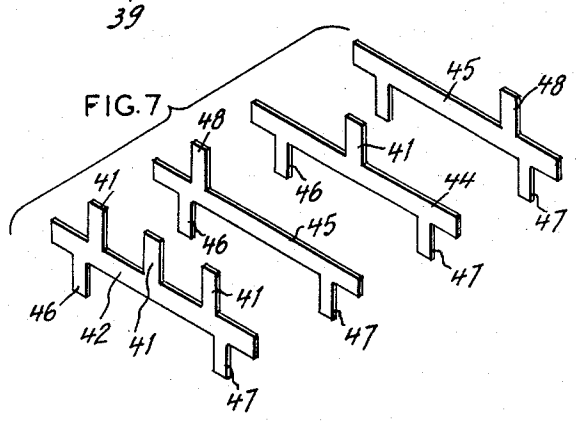
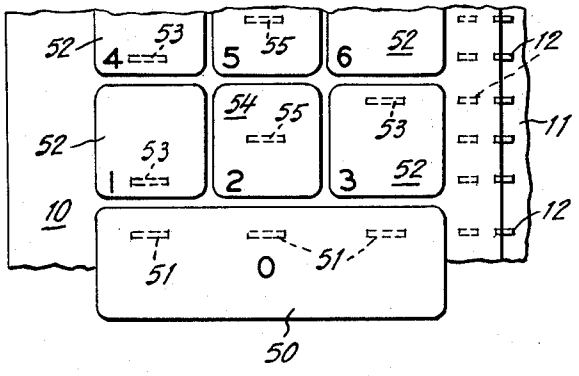


FIG. 8



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INTERCHANGEABLE KEY BLANK AND KEY BUTTON COMBINATION

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6 Claims. (Cl. 235—145)

This invention relates to calculating machines and in particular to the keyboard structure thereof as applied to the ten key type machines.

A particular object of the invention is to provide key button and key stem combinations that require a minimum number of buttons and key stems for the setting of the stops in a movable pin carriage common to this type of calculating machine.

Further objects are to provide key buttons having cavities so arranged that a single key stem form of blank can be used with any button, thus requiring only two differently molded numeral keys and one cipher or zero key and one stamped out blank for use with any key; to provide a key button and stem combination which reduces the cost of producing the machine, and one which lends itself to simplified assembly practice that can be carried out by labor not requiring a high degree of skill.

Other objects and structural details of the invention will be apparent from the following description when read in connection with the accompanying drawing, in which:

FIGURE 1 is a plan view of the keyboard portion of a calculating machine with the stop carriage being partly shown,

FIGURE 2 is a view in end elevation of that portion of the machine shown in FIGURE 1, the stop pin carriage release being also shown,

FIGURE 3 is a section taken on the line 3—3 of FIGURE 1 showing the mounting of one row of key buttons in association with one of the supporting key stem blanks.

FIG. 4 is a section taken on the line 4—4 of FIGURE 1 showing the mounting of several keys of one column in association with a number of supporting key stem blanks,

FIG. 5 is an exploded view in perspective of the key stem blanks used for the zero key and the first row of numeral keys,

FIGS. 6 and 7 correspond to FIGS. 1 and 5 and show another form of the invention, and

FIG. 8 is a plan view showing a modified form of key for the key stems of FIGURE 7.

Referring to the drawing in detail, 10 indicates a part of a cover plate beneath which is disposed a laterally movable spring urged stop pin carriage 11 in which is mounted settable pins 12, to be restored in any well known manner after a predetermined operating cycle of the machine, as the carriage 11 is returned to home position, after operation of a bail 13 which controls step-by-step detent pawls 14, all as well known in this type of machine. The carriage 11 carries any desired number of rows of set pins 12 arranged columnwise and designated as "0" to "9" in FIGURE 1 to correspond with like designations on the key buttons 15. Key buttons 15 are arranged in spaced and parallel rows on the keyboard (FIG. 1), and which rows extend in a longitudinal direction, for example, key button row "1," "4" and "7" and in directions transversely of the longitudinal directions, for example, key button row "1," "2" and "3".

The cover plate 10 is slotted as at 16 to allow passage therethrough of three longitudinally spaced upstanding key stems or tennons 17, 18 and 19 which are an integral part of the body of a key blank 20 which may be stamped out or otherwise formed, as desired, to also provide two longitudinally spaced shank portions 21 and 22, which

pass through suitable slots 23 in a guide plate 24 extending between depending side walls 25. The latter are slotted as at 26 to provide means for guiding ears 27 formed at the opposite ends of said key blank 20. One of the shank portions 22 serves as a stop setting tab means, while the ears 27 serve to maintain the key blanks in true vertical position as they slide up and down against the resistance offered by their individual springs 28 which connect them to the top plate 10. The setting of the stops 12, as is well known, regulate the movement of the spring actuated slides 29 which enter the amounts into the usual accumulators, not shown.

Each key button 15 (FIG. 1) is provided with an open recess, the key buttons 1, 4 and 7 having a recess 30 wide, long and deep enough to receive two key stems 17 freely in the upper underside of the key buttons while the key buttons 3, 6 and 9 have a recess 31 wide, long and deep enough to receive two key stems 19 freely in the lower underside of the key.

Each key button 2, 5 and 8 has a recess 32 wide, long and deep enough to receive one key stem 18, freely in the upper and lower underside thereof. These recesses are dimensioned to allow the key buttons to descend without operating the key blanks whose stems are positioned freely in the recesses.

Each key button 1, 4 and 7 has secured thereto the upper end of a key stem 17 in the lower underside thereof. Each key button 2, 5 and 8 has secured thereto the upper end of a key stem 18, at the center in the underside thereof, and each key button 3, 6 and 9 has secured thereto, the upper end of a key stem 19, in the upper underside thereof.

A single zero key, designated as such, has secured thereto the upper end of each of the key stems 17, 18 and 19 and in the upper underside thereof. When the "0" key is depressed, the shank 22 of the key blank will "set" a zero stop pin in the carriage because each of the key stems 17, 18 and 19 are secured to the zero key. When the 1, 4 or 7 keys are depressed the key stems 17, being secured therein, will set the corresponding stops in the pin carriage. When the 2, 5 or 8 keys are depressed the key stems 18, being secured therein, will set the corresponding stop pins in the carriage and when the 3, 6 or 9 keys are depressed the key stems 19, being secured therein, will set the corresponding stops in the pin carriage.

With this particular combination of key button; positioning of the recesses; and attachment to the key stems; as above set forth, it is possible to use only one zero button; and two numeral key buttons and one form of key blank 20 for a transverse row of key buttons, for example, key button row "1," "2" and "3" because, as seen in FIGURE 1, the buttons 3, 6 and 9, or the buttons 1, 4 and 7, when rotated in a flat plane, can be used as buttons 1, 4 and 7 or as buttons 3, 6 and 9 respectively, so that one molding die is only necessary to produce the six buttons referred to. Also one die is enough to produce all ten of the key blanks necessary for one complete set of keys "0" to "9." This makes for a more rapid assembly of the parts which does not require the use of highly skilled labor thus resulting in a saving to the buyer in the cost of a machine.

Referring to the modified form of the invention as shown in FIGURES 6, 7 and 8, instead of using three different key buttons as in FIGURE 1, the buttons 35 designated "1" to "9" inclusive can be all made alike, each with three slots in the underside thereof, a lower slot 36, an upper slot 37 and a central slot 38, the use of the terms upper and lower referring to the upper and lower or front and back faces of the keys and or the keyboard. In this manner one key button can be used for each numeral and one for the zero which latter button or bar 39 has three

laterally aligned slots 40 into each of which may be secured one of the three key stems or tennons 41 formed on the zero key blank body 42. The other key blank bodies 44 and 45, as well as body 42, each have spaced depending shank portions 46 and 47 acting as guides with 47 constituting stop setting means. The body 45 has a stem 48 at one end and, when reversed in position the stem 48 will be at the opposite end as shown in FIGURE 7. The number of key blank bodies needed will be only three for all ten of the key buttons, which latter will require only two different forms.

In the modified form of buttons shown in FIGURE 8, the zero button or bar 50 will have three laterally aligned slots 51 in which are secured the three stems 41 of the blank 42 (FIG. 7) while the buttons 52 will each have a slot 53 in the underside near one edge thereof and the button 54 will have a slot 55 in the center of the underside thereof. When buttons 52 are rotated, in a plane, they can serve also as buttons 52 for the three, six and nine numerial keys, the stems 48 of the bodies 45 being secured in the slots 53.

It will be evident that the dimensions of the key buttons are such that three of the key blank bodies can be positioned beneath one button with sufficient space between them to allow easy assembly and free operation. The key blank bodies are relatively thin and can be assembled with the buttons with a minimum labor and time.

While there is above described a particular embodiment of the invention, it is possible to produce other embodiments or variations without departing from the inventive concept above disclosed and it is therefore desired that only such limitations shall be imposed on the appended claims as are stated therein, or required by the prior art.

What I claim is:

1. In a keyboard structure,
(*a*) depressible key buttons arranged in spaced and parallel rows,
(*b*) said key buttons having recessed portions on the underside thereof,
(*c*) each of said rows containing at least two key buttons,
(*d*) a plurality of movable key blanks of like configuration in alignment with each row of key buttons and equal in number thereto and arranged to one side of said key buttons,
(*e*) said key blanks being spaced and parallel to each other and extending a distance corresponding to that occupied by the associated key button group,
(*f*) a plurality of identical stem projections on each key blank,
(*g*) and one of said stem projections of each key blank connected to a different key button in the associated row and the unconnected stem projections thereof loosely fitted in the said recess portions of the remaining key buttons in the row whereby depression of one of said last mentioned key buttons is effective to move only the stem projection connected thereto.

2. In a keyboard structure,
(*a*) a keyboard,
(*b*) key buttons arranged in parallel groups on said keyboard,
(*c*) a movable pin carriage spaced from the key buttons and having settable pins arranged in columns therein,
(*d*) a plurality of key blanks of identical configuration for each associated key button group disposed between each key button group and the pin carriage,
(*e*) each of said key blanks having an elongated center portion extending a distance corresponding to that occupied bythe associated key button group,
(*f*) a plurality of stem projections on each key blank,
(*g*) each of said key buttons having a stem retaining recess and at least a stem non-retaining recess located on the underside thereof,
(*h*) one of said stem projections of each key blank being disposed in the stem retaining recess of a key button and the other stems of each key blank being disposed in the non-retaining recess of the associated key button group,
(*i*) and shank portions on each key blank for setting pins in the pin carriage when the key button to which is attached a stem projection is depressed.

3. In a keyboard structure,
(*a*) depressible key buttons arranged in spaced and parallel rows extending in a longitudinal direction and in a direction transversely of the longitudinal direction along the keyboard,
(*b*) each on of said transverse rows containing three key buttons,
(*c*) a key blank provided for each key button in one of said transverse rows in alignment with said key buttons of said one transverse row and arranged to the underside of said key buttons of said one transverse row,
(*d*) the key blanks provided for the outer key buttons of said one transverse row arranged spaced and parallel to each other and both key blanks extending only a distance substantially corresponding to that occupied by the key buttons of said one transverse row, and
(*e*) each of said three key blanks having a stem to connect each of said three key blanks to a separate key button of said one transverse row,
(*f*) said stems on said key blanks associated with said outer key buttons of said one transverse row being equidistant from a point on the middle key button of said one transverse row whereby said key blanks associated with said outer key buttons may be displaced 180° from their positions in said one transverse row as to be interchangeable one with the other for connection to the other outer key button of the row.

4. In a keyboard,
(*a*) depressible key buttons arranged in spaced and parallel rows extending in a longitudinal direction and in a direction transversely of the longitudinal direction along the keyboard,
(*b*) each one of said transverse rows containing three key buttons,
(*c*) a key blank provided for each key button in one of said transverse rows in alignment with said key buttons of said one transverse row and arranged to the underside of said key buttons of said one transverse row,
(*d*) each of said key buttons of said one transverse row having a slot on the underside thereof,
(*e*) the key blanks provided for the outer key buttons of said one transverse row arranged spaced and parallel to each other and both extending only a distance substantially corresponding to that occupied by the key buttons of said one transverse row, and
(*f*) a stem on each of said three key blanks and each stem disposed in a said slot of a separate key button of said one transverse row to connect each key blank of said one transverse row to a separate key button of said one transverse row,
(*g*) the stems on said key blanks associated with said outer key buttons of said one transverse row being equidistant from a point on the middle key button whereby said key blanks associated with said outer key buttons may be displaced 180° from their positions in said one transverse row as to be interchangeable one with the other for connection to the other outer key button,
(*h*) said slots in the outer key buttons being equidistant from a point on the middle key button whereby said outer key buttons may be displaced 180° from their positions in said one transverse row as to be interchangeable one with the other for connection to the other key blank.

5. In a keyboard structure,

(*a*) depressible key buttons arranged in spaced and parallel rows extending in a longitudinal direction and in a direction transversely of the longitudinal direction along the keyboard,

(*b*) each one of said transverse rows containing three key buttons,

(*c*) a key blank provided for each button in one of said transverse rows in alignment with said key buttons of said one transverse row and arranged to the underside of said key buttons of said one transverse row,

(*d*) each of said key buttons of said one transverse row having three spaced and parallel slots on the underside thereof,

(*e*) the key blanks for the outer key buttons of said one transverse row being spaced and parallel to each other and both extending only a distance substantially corresponding to that occupied by the key buttons of said one transverse row, and

(*f*) a stem on each of said three key blanks to connect each of said three key blanks to a separate key button of said one transverse row,

(*g*) said stem of each key blank disposed in only one of said three slots of a key button of said one transverse row for connection thereto with the other two slots of each key button of said one transverse row disconnected to a key blank of said one transverse row whereby the position of any of said three key buttons may be interchanged with another key button of said one transverse row for connection to a key blank of said row,

(*h*) the stems on said key blanks of said one transverse row associated with the outer key buttons being equidistant from a point on the middle key button whereby said key blanks associated with the outer key buttons may be displaced 180° from their positions in said one transverse row as to be interchangeable one with the other for connection to the other outer key button.

6. In a keyboard structure,

(*a*) a keyboard,

(*b*) key buttons arranged in spaced and parallel rows extending in a longitudinal direction and in a direction transversely of the longitudinal direction along said keyboard,

(*c*) a pin carriage spaced from the key buttons and having said pins arranged in columns therein,

(*d*) means providing for relative movement between the keyboard and the pin carriage,

(*e*) each one of said transverse rows of key buttons containing three key buttons,

(*f*) a key blank provided for each button in one of said transverse rows in alignment with said key buttons of said one transverse row and disposed between the key buttons of said one transverse row and said pin carriage,

(*g*) the key blanks provided for the outer key buttons of said one transverse row arranged spaced and parallel to each other and extending a distance corresponding to that occupied by the key buttons of said one transverse row,

(*h*) means on each of said three key blanks to secure each key blank to a different key button in the said one transverse row.

(*i*) the securing means on said key blanks associated with the outer key buttons being equidistant from a point on the middle key button whereby said key blanks associated with the outer key buttons may be displaced 180° from their positions as in said one transverse row to be interchangeable one with the other for connection to the other outer key button,

(*j*) and second means on each key blank of said one transverse row extending in an opposite direction from said securing means adapted for engagement with and to set a pin in the pin carriage when the key button to which the securing means is connected is depressed.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,169,701 February 16, 1965

Edward J. Dombrowski

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 48, for "associated key button group" read -- key buttons of the associated row --; line 70, for "bythe" read -- by the --; column 4, line 13, for "on" read -- one --.

Signed and sealed this 13th day of July 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents

UNITED STATES PATENT OFFICE

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