

March 13, 1962

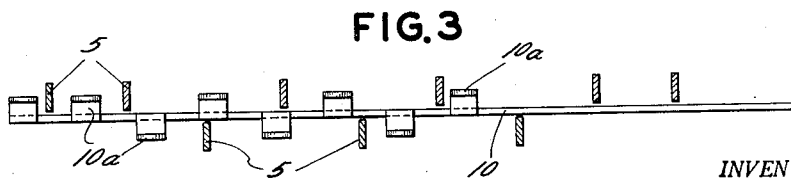
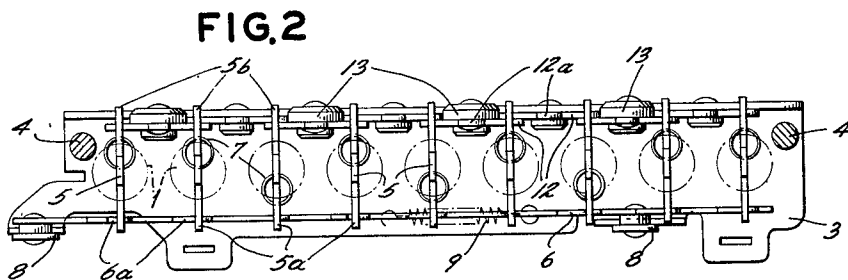
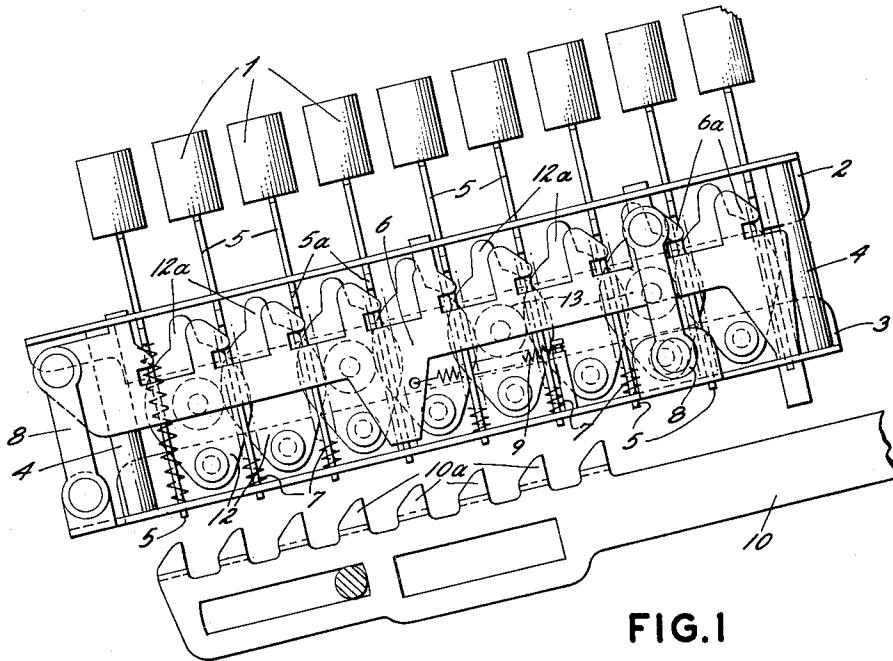
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3,024,988

KEYBOARD MECHANISM

Filed July 1, 1959

2 Sheets-Sheet 1



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FIG. 4

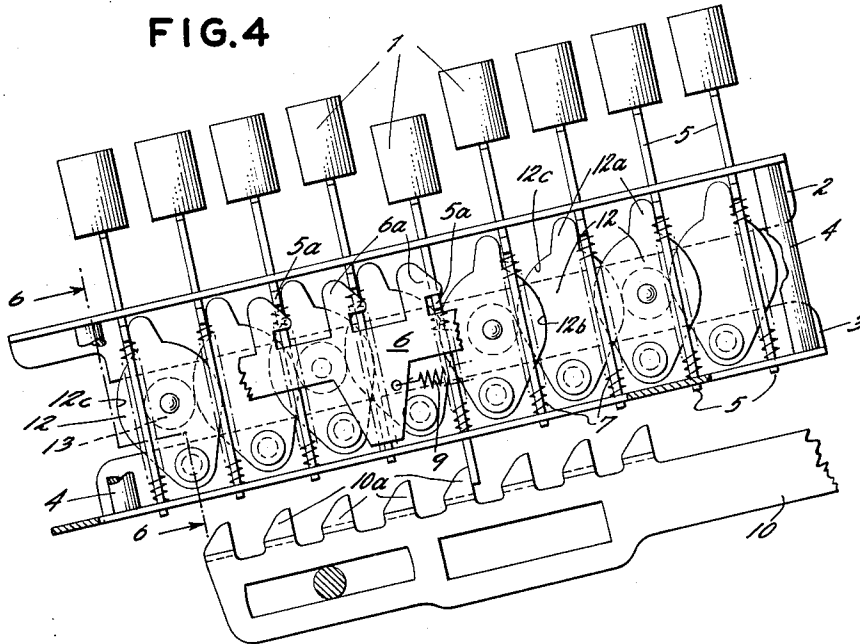


FIG. 5

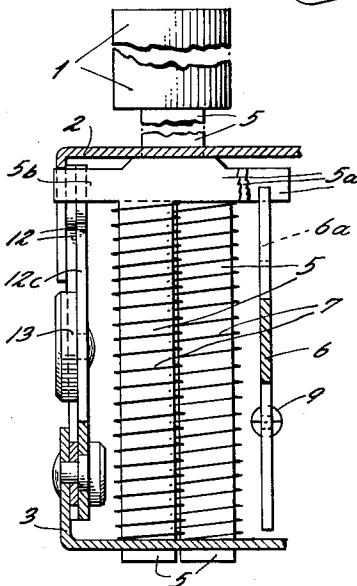
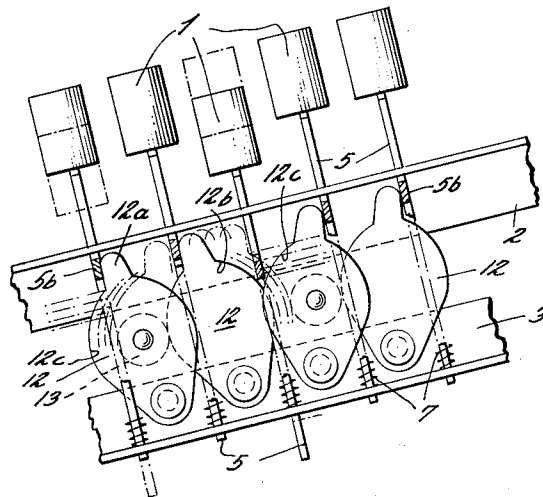


FIG. 6

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KEYBOARD MECHANISM

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4 Claims. (Cl. 235—145)

This invention relates to keyboard mechanism for calculating machines or for other machines embodying such mechanism, and more particularly to flexible keyboard mechanism.

Flexible keyboards include latching means for each column of keys. The latching means is operable to hold any one of the spring retracted keys of the column in depressed position and is operable upon depression of any other key or the column to hold that key depressed while releasing the previously latched key. Suitable interlock means is usually provided to prevent depression of more than one key at a time. Otherwise two or more keys could simultaneously be depressed. These keys would then be latched and misoperation would result. Simultaneous depression of the keys may result from faulty manipulation or from inattention.

It is accordingly the primary object of this invention to provide improved and simplified interlock means for a flexible keyboard which not only prevents simultaneous depression of a plurality of keys of a column, but which also is operable to positively retract any depressed key when it is unlatched by depression of another key of the column. This action is completely independent of the action of the retraction spring. Therefore it is possible to lighten the retraction springs of the keys so that they are only sufficiently strong to hold the keys in raised position. As a result, a minimum of effort is required to depress the keys, and therefore rapid and unfatiguing operation is effected.

Other objects and advantages of the invention will be evident from the following description of a preferred embodiment with reference to the accompanying drawings in which:

FIG. 1 is a right side view of one column of the keyboard embodying the invention with all of the keys in retracted position.

FIG. 2 is a top plane view of the keyboard column with the top frame plate removed.

FIG. 3 is a top plan view of the selection slide of the keyboard column and the associated key stems in section.

FIG. 4 is a view similar to FIG. 1 with parts broken away and with one of the keys latched in depressed position.

FIG. 5 is a fragmentary side view of the keyboard column with parts in dot-dash position to more clearly illustrate the operation of the invention.

FIG. 6 is a sectional view taken on the line 6—6 of FIG. 4 with parts broken away.

Keys 1 (FIGS. 1, 4, 5, 6) of the column are mounted in a frame comprising a top plate 2 and a bottom plate 3 which are fixed in spaced relationship by spacing studs 4. Stems 5 of keys 1 are guided in suitable slots in top and bottom plates 2 and 3, and each is provided with a front extension 5a and a rear extension 5b to form a T (FIGS. 2, 6). Extensions 5a are adapted to cooperate with a latch plate 6 (later described) whereas extensions 5b are guided in slots in a side wall of top plate 2 and are operable as later described.

Keys 1 are normally held in raised position by compression springs 7 which are located on stems 5 between extensions 5a, 5b and bottom plate 3. As noted before, springs 7 need be only strong enough to hold keys 1 in raised position after they are retracted by the devices of the invention.

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Latch plate 6 (FIG. 1) extends longitudinally of the key column beneath extensions 5a of key stems 5, and is pivotally mounted at either end for longitudinal movement at the upper ends of parallel links 8 which are pivotally mounted at their lower ends on bottom plate 3. Latch plate 6 is normally held to the right by a spring 9, and is guided and limited in its movement by a dependent extension at its right end which engages a slot in bottom plate 3.

Upon initial depression of a key 1, extension 5a will engage a rightwardly extending nose 6a of plate 6 thereby camming said plate toward the left against the tension of spring 9. Upon further depression of the key, extension 5a will pass below nose 6a. As a result, plate 6 will snap to the right to normal by virtue of spring 9, and nose 6a will be positioned above extension 5a (FIG. 4) thereby latching the key in depressed position. Upon depression of another key 1, plate 6 will again be cammed to the left to unlatch the first depressed key and then will be restored to the right to latch the presently depressed key.

The end of stem 5 of a depressed key 1 is adapted to limit the excursion of a selection slide 10 (FIGS. 1, 4) which, on rightward movement, will bring an upstanding lug 10a into engagement with said end of the key stem as shown in FIG. 4. Selection slide 10 therefore will be arrested in its rearward movement in accordance with the value of the depressed key. It will be noted that key stems 5 and lugs 10a are in staggered relationship (FIG. 3). This provides for the proper longitudinal spacing of the parts without interference and has no significance with respect to the invention. Selection slide 10 may directly operate actuating mechanism or it may effect a setting operation. The invention, however, is not concerned with operation of the selection slide.

The locking means which prevents simultaneous depression of a plurality of keys 1 comprises a series of upstanding substantially pear-shaped plates 12 (FIGS. 1, 4, 5, 6). Each plate 12 is pivotally mounted at its lower end on a side wall of lower frame plate 3, and is centrally located between and below rear extensions 5b of a pair of adjacent key stems 5. Plates 12 therefore are adapted for clockwise and counterclockwise movement. Located in central position at the apex of each plate 12 is a protrusion 12a which acts as a limit stop by engagement with extension 5b of key stem 5 at its right upon clockwise movement of the plate, and by engagement with extension 5b of key stem 5 at its left upon counterclockwise movement of the plate (FIGS. 4, 5).

The right side of each plate 12 includes an arcuate cam edge 12b extending downwardly from protrusion 12a and the left side includes a like opposed arcuate cam edge 12c. Each alternate plate 12 (FIG. 2) is located with its rear face flush with the front faces of plates 12 at its respective sides, and with its cam edge 12b overlapping cam edge 12c of the plate at its right and its cam edge 12c overlapping cam edge 12b of the plate at its left. Accordingly each overlapping pair of cam edges 12b, 12c is in the downward path of movement of an extension 5b of a key stem 5. It will be noted that a single cam edge 12b is in the path of movement of extension 5b of the rightmost key stem and a single cam edge 12c is in the path of movement of extension 5b of the leftmost key stem.

Movement transmission means is operable to transmit equal clockwise movement from a plate 12, to the successive plates 12 toward the right and conversely equal counterclockwise movement to the successive plates toward the left as shown in FIGS. 4, 5. The movement transmission means comprises a disc or button 13 (FIGS. 2, 6) secured on the rear face of each of the afore-described alternate plates 12. Button 13 is of such size

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that, when its plate 12 and the right and left adjacent plates 12 are in exact vertical position (FIG. 1), said button will engage the left side edge of the right adjacent plate and will engage the right side edge of the left adjacent plate. Consequently, if any plate 12 is rocked, the plates extending in the direction of the rocking movement will all be rocked accordingly.

When a key 1 is depressed to latched position (FIG. 4) extension 5b of its stem 5 will engage cam edge 12c of plate 12 at its right and will engage cam edge 12b of plate 12 at its left. As a result, as shown in FIG. 4, the successive plates 12 to the right of the depressed key will be rocked clockwise and those to the left will be rocked counterclockwise. It will be noted that the plates are rocked a distance which brings protrusions 12a into engagement with the respective extensions 5b of key stems 5, and that cam edges 12b, 12c are then a short distance below said extensions. Therefore if a second key is depressed a short distance, its extension 3b will be brought into engagement with a cam edge 12b or 12c. Obviously, therefore, the second key cannot be depressed to latched position as long as the first key is manually held depressed in latched position. If the first key is not manually held, depression of a second key will effect positive retraction of the first key as follows.

With reference to FIG. 5, a key 1 is shown in depressed position and the retraction of this key will be described as effected upon depression of the leftmost key. Cam edge 12c of the leftmost plate 12 is in the path of movement of extension 5b of leftmost key 1. However the key will be depressed a short distance before engagement of the cam edge by the extension, and this movement is sufficient to release latch plate 6 (FIGS. 1, 4). The depressed key therefore will be freed for retraction. Further depression of leftmost key 1 will engage extension 5b with cam edge 12c of leftmost plate 12. This will rock the plate clockwise as shown in dot-dash lines and the next plate to the right will likewise be rocked by transmission disc 13. Cam edge 12b of this plate engages extension 5b of the depressed key. Therefore as this plate is rocked clockwise, cam edge 12b will cam the depressed key upwardly. This operation will continue until leftmost key 1 is fully depressed to latched dot-dash line position and the depressed key is cammed upwardly to fully raised dot-dash line position. Therefore as noted before, springs 7 need be only strong enough to hold keys 1 in raised position after retraction by the cam means.

Although I have disclosed and described a preferred

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embodiment of the invention, it will be obvious that modifications may be made without departing from the principle of operation as defined in the appended claims.

I claim:

1. In a keyboard mechanism; a column of depressible keys each having a stem, and means operable when any one of said keys is in depressed position to lock all of the other keys against depression until retraction of the depressed key and operable upon depression of any one of said keys to cam any depressed key upwardly, comprising a series of adjustable locking plates each having a pair of opposed cam edges at its sides, the cam edge at one side of each plate being adjacent the cam edge at the other side of the next plate and each adjacent pair of cam edges being in the path of downward movement of the stem of one of said keys, and movement transmission means cooperating with said plates and operable upon adjustment of a pair of plates by engagement of their adjacent cam edges by the stem of the associated key upon depression to adjust all other of said plates.

2. The invention according to claim 1 wherein the cam edges of each plate overlap the adjacent cam edges respectively.

3. The invention according to claim 2 wherein said movement transmission means includes a projection on one of the faces of each alternate plate for engagement with the plate at each side respectively of said alternate plate.

4. In a keyboard mechanism; a column of depressible keys each having a stem, and means operable when any one of said keys is in depressed position to lock all of the other keys against depression until retraction of the depressed key and operable upon depression of any one of said keys to cam any depressed key upwardly, comprising a series of locking plates each having a pair of opposed arcuate cam edges at its sides and each pivotally mounted at its bottom, the cam edge at one side of each plate overlapping the cam edge at the other side of the next plate and each pair of overlapping cam edges being in the path of downward movement of the stem of one of said keys, and a projection on one of the faces of each alternate plate for engagement with the plate at each side respectively of said alternate plate.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,024,988

March 13, 1962

Heinrich W. Wagemann

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 1, line 17, for "or" read -- of --; line 45, for "plane" read -- plan --; column 3, line 19, for "3b" read -- 5b --.

Signed and sealed this 20th day of August 1963.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents