Aug. 16, 1966 G. H. HUBER 3,267,215

CODE BAR SWITCH ACTUATOR

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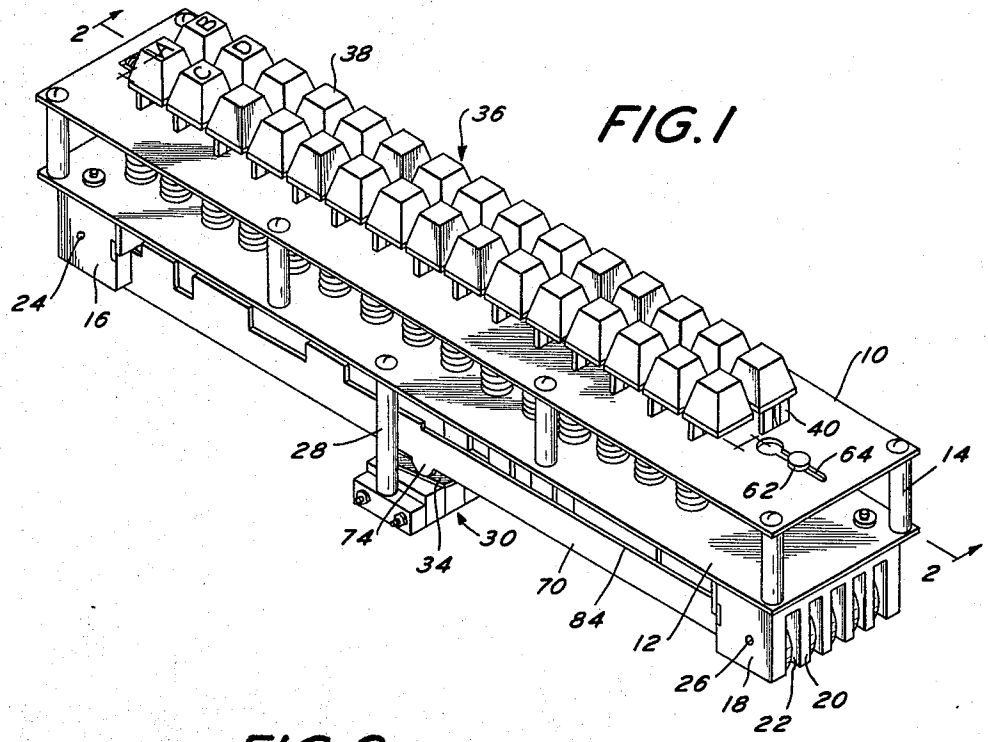
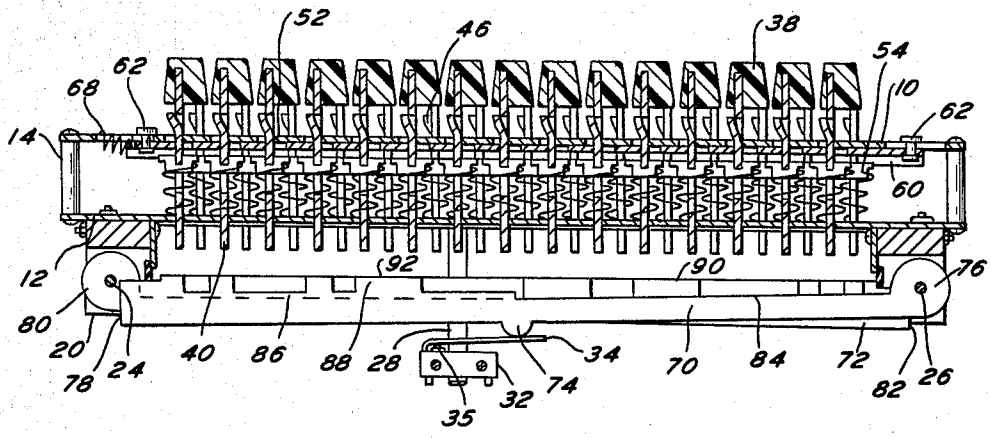


FIG. 1

FIG. 2



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FIG. 3

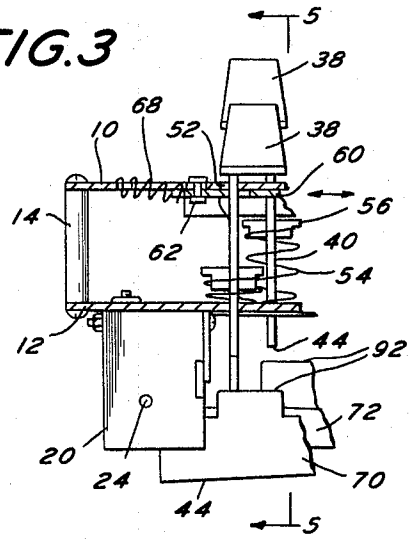


FIG. 6

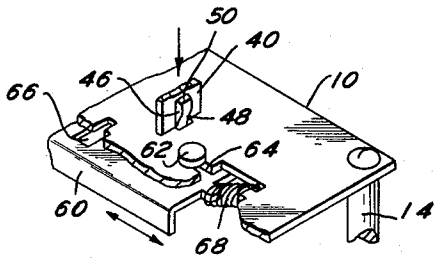


FIG. 4

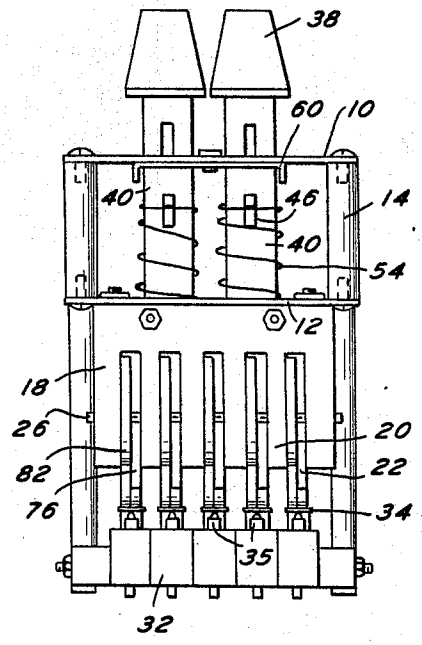
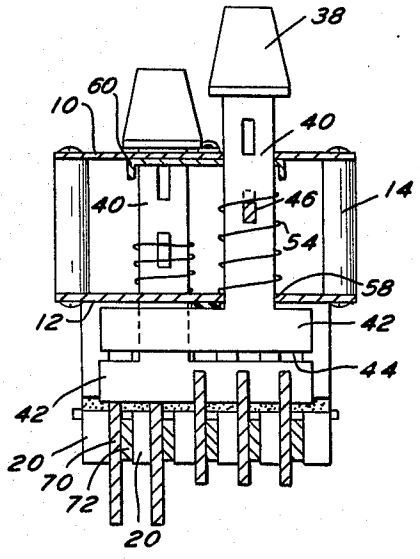


FIG. 5



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CODE BAR SWITCH ACTUATOR

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7 Claims. (Cl. 178—79)

This invention relates to a manually operable code bar switch actuator mechanism for use in data processing systems and the like.

The invention utilizes banks of keys which, when selectively depressed, impart movement to one or more code bars and thereby energize one or more switches in electrical data processing circuits. The combination of switches that are actuated is predetermined and provides coded signals in accordance with the character of the depressed key.

An object of the invention is to provide a new and improved keyboard code bar switch actuator in which the keys can be depressed and the switches actuated by finger tip pressure.

Another object of the invention is to provide a new and improved code bar switch actuator which is relatively simple and economical to manufacture and assemble.

A particular feature of the invention in an embodiment thereof is the provision of elongated code bars which are paired in side by side relation for each switch and pivoted, one at one end and the other at the opposite end. Only that half of each bar at the non-pivoted end is provided with elevated actuator portions. Thus, while the bars as a pair present actuator portions to the keys over their entire length, each individual code bar is actuated at the non-pivoted half thereof to provide a relatively long moment arm, thereby reducing the pressure required to depress the keys and the individual code bars.

Another feature of the invention is the provision on pivoted code bars of code sections having actuator surfaces which are flat or normal to those surfaces of the key actuators which contact them when the keys are depressed in a sliding translatory movement. Thereby, more positive and easier pivoted movement of the code bars is attained as contrasted with the conventional sliding code bar arrangement using inclined actuator surfaces at the code sections.

Yet another feature of the invention is the use of spring arms on the switches to return bias the pivoted code bars, thus simplifying the construction by obviating the need for using other additional return biasing members.

These and other objects and features of the invention will become more apparent as the following description proceeds in conjunction with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a code bar actuator embodying the instant invention;

FIG. 2 is a sectional view taken on the line 2—2 of FIG. 1;

FIG. 3 is an enlarged fragmentary elevational view, partly in section, of a portion of the actuator and illustrating the position of key depression;

FIG. 4 is an end elevational view of the actuator;

FIG. 5 is an enlarged sectional view taken on the line 5—5 of FIG. 3; and

FIG. 6 is an enlarged perspective view of a detail of construction.

Specific reference is now made to the drawings wherein similar reference characters are used for corresponding elements throughout.

The actuator comprises a frame having an outer elongated plate 10 held in spaced relation upon an inner plate 12, which is substantially coextensive therewith, by means of appropriate spacer fasteners 14. Depending from the end portions of the inner plate 12 are blocks 16 and 18 each having a plurality of parallel slots therein forming spaced plates 20. Pins 24 and 26 extend transversely through the plates 20 and slots 22 of the members 16 and 18, respectively, for a purpose later to appear.

Secured centrally to the inner plate 12 as by fasteners 28 is a unit 30 which mounts a plurality of encoding microswitches 32 adapted for electrical connection in data processing circuits. Each microswitch 30 has a bent leaf spring arm 34 extending over its inner surface and over a switch actuator element 35.

It will be noted that two rows or banks of key actuators 36 are provided, each consisting of a knob 38 upon which a characteristic alphabetic or numeric character or legend is affixed. The knob is carried upon a flat, substantially rectangular shank 40 whose free end is provided with a cross bar 42 (FIG. 5) which approximates the width of the inner plate 12. The actuator surface 44 of the cross bar is flat and substantially parallel to the plate 12. Adjacent to the knob, the shank 40 has an outstruck keeper 46 (see FIG. 6), one surface 48 of which is an inclined cam while the surface facing the knob is squared as at 50. The keepers on all the shanks face in the same direction.

The plate 10 is provided with as many openings 52 as there are keys, the openings being configurated to conform to the shanks 40 plus the keepers 46 so that the shanks and keepers are freely slidable therethrough. A relatively weak spring 54 is wound about each shank 40 and bears terminally on the inner plate 12 and on a retainer 56 (FIG. 3) carried intermediate the ends of the shank. The springs 54 are biased to return each key to its outward or non-depressed position. The shanks 40 also extend slidably through appropriate slots 58 in the inner plate 12, the cross bar actuators 42 being disposed on the underside of plate 12, remote from plate 10.

A latch plate 60 is provided which is mounted under plate 10 for sliding movement against the inner face of the outer plate 10 by means of headed pins 62 which are carried at the ends of the latch plate. The shanks of the pins 62 extend slidably through longitudinal slots 64 in the outer plate 10. The latch plate is provided with as many substantially rectangular slots 66 (see FIG. 6) as there are keys, the shanks 40 of the keys passing slidably therethrough. A compression spring 68 bears against one end of the latch plate 60 and the plate 10 and biases the latch plate towards a position in which the edges of the slots 66 bear against the side surfaces of the shanks 40. Thus, when a key is depressed, the cam surface 48 of the keeper 46 on its shank 40 bears on the edge of the slot 66 of the latch plate 60 through which it passes and thereby urges the latch plate against the action of the spring 68 until the keeper 46 clears the latch plate. Whereupon, the latch plate is urged by the spring 68 until the edge of the slot 66 releasably locks over the squared surface 50 of the depressed keeper. When a second key is depressed, it is locked in a similar fashion, and the camming of the latch plate as the key is depressed releases the previously latched key.

For each microswitch, a pair of side by side elongated code bars 70 and 72 are provided each with a center protuberance 74 bearing on the microswitch spring arm 34. The corresponding ends of each pair of code bars extend into the corresponding slots 22 between the plates 20. One of the bars 70 is mounted at one of its ends 76 for pivotal movement around pin 26, while its other free end 78 is free of the other pin 24. The end 80 of the next bar 72 which is adjacent to the free end 78 of

bar **70** is mounted for pivotal movement about pin **24**, the other or free end **82** of bar **72** being free of the pin **26**. It will be noted that the upper surfaces **84** and **86** of the code bars **70** and **72** are flat or planar from their center protuberances **74** to their respective pivots **26** and **24**, whereas the upper surfaces of the other halves of the code bars from their center protuberances **74** to their respective free ends **78** and **82** are provided with spaced elevated code actuator sections **88** and **90**. Thus, only that half of each code bar which is remote from its pivot pin can be actuated by the depression of a key. By pivoting each pair of bars at its opposite ends, each microswitch can be actuated by any combination of keys along the entire keyboard, yet each code bar acts as an elongated lever. The uncoded portion of each bar adjacent to its pivot is effective in providing a long lever arm. The upper surfaces **92** of the code sections are flat and substantially normal to the longitudinal axes of the key shanks **40** so that their engagement with the actuator surfaces **44** of the cross bars **42** facilitates the movement of the code bars upon depression of the keys.

By means of the squared construction of the code sections of the code bars, these code bars **70** and **72** may be simply fabricated by stamping from flat metal stock. Due to the mounting of the keys for translatory movement along their axes, the corresponding parts of the coded sections **88** or **90** are readily aligned with the cross bars **42** which form the actuator portions of the keys. The corresponding sections **88** (and sections **90**) are readily aligned with each other so that each key cross bar extends over the coded sections of five code bars, **70** or **72**, as well as the uncoded sections **84** or **86** of the other code bars. The arrangement of the keys in a plurality of columns, as shown in FIG. **1**, permits the key shanks **40** in one column to be staggered with respect to those in the other. The space between adjacent key cross bars is effectively very large so that the cross bars do not have to be critically positioned with respect to the associated actuatable parts or coded sections of the code bars. No special care need be taken with finishing the cut sides of the coded sections after being stamped out since they are not involved in the actuation of either the switches or the cross arms of the keys. The L-shaped key member formed by the shank **40** and the cross bar **42** is generally the same in configuration for each key. The key members are also simply fabricated by a stamping operation or the like from flat stock, and an L-shaped configuration is used so that the key members in one column are simply reversed from those in the other column (as seen in FIG. 5). The only difference between the key members in the two columns is that the keeper **48** is lanced or struck out from opposite faces of the key shanks **40** so that they all face in the same direction when mounted.

The pivoted arrangement of the code bars together with the mounting of the keys for translatory movement makes it relatively easy to actuate the keys. There is little wear on the moving parts since the code bars simply pivot about a pin, and the actuating surfaces are square with one hitting directly against the other. All of the force applied to depress a key is effectively applied to actuate the code bars.

The pivoted arrangement of the code bars permits a relatively large travel of these bars for the purpose of actuating the switches. Thus, even though the keys are mounted compactly (for example, a column of 15 keys in about 7½ inches, and code bar lengths of about 8½ inches), the order of a substantial fraction of an inch of travel at the protuberance **74** may be provided for the purpose of moving the spring arm **34**. Variations in movement of this protuberance with actuation by differently positioned keys is relatively small and readily taken up by the resilience of the switch spring arm **34** and by the positioning of the switching elements **35** at intermediate points of the springs **34**.

The protuberances **74** of all the code bars are readily aligned at the center so that the switches may also be aligned, and each switch may be actuated by either of the code bars in the associated pair. At the same time, the spring arm **34** of each switch provides the upward bias for the associated pair of code bars; no other biasing of the code bars is needed. When one of the code bars is actuated, the other code bar of the pair does not require any upward bias.

The coding of the code bars by cutting out portions therefrom in those locations where the associated key is depressed may be in accordance with any desired code such as a binary code. As shown in FIG. 1, two columns of keys may be compactly arranged for alphabetic characters. However, this invention is not limited in its application to any particular keyboard. In practice, it has been found convenient to arrange a plurality of banks of keys such as those shown in FIG. 1 adjacent to each other in order to establish electrical signal combinations representative of alphabetic combinations. One place where such alphabetic combinations are used is to identify the stocks and other securities in the stock market, and this invention has particular application in a stock quotation system. Thus, simultaneous operation of a key from each one of these key banks provides corresponding combinations of code signals.

In place of the coded sections on the code bars **70**, the coded sections may be formed on the cross arms **42** of the keys. That is, each one of the code bars may have a uniform actuatable surface in place of the coded section thereof, and the cross bars **42** of the keys may have cut-out sections in coded form representing an unactuated code bar as well as projecting sections where code bars are to be actuated. The combinatorial arrangement of each key cross bar **42** would be in accordance with the character that it represents. However, the embodiment of the invention illustrated in the drawing is preferred in that fewer elements have to be coded, utlizing the coded sections on the code bars (e.g. ten code bars as compared to thirty keys), and this makes for simplicity of manufacture and assembly.

In operation, any selected key may be depressed to actuate an individual combination of code bars, and thereby, the associated combination of switches is appropriately operated. As viewed in FIG. 2, the keys to the left of the aligned protuberances **74** are associated with the code bar **70** of each of the pairs and the keys to the right of the protuberances **74** are associated with the code bars **72** for the purposes of actuation. Thus, even the keys close to the center of the column have a long effective moment arm which is at least half the length of the code bar.

This invention is especially adapted for a keyboard system in which an operator selects a code combination of characters such as alphabetic characters. One such system is described in the copending patent application Serial No. 113,690 filed May 31, 1961, and it includes four sets of manually operated switches for establishing alphabetic codes. These codes identify the names of various stocks. The operation of each set of switches establishes a different coded signal combination that is effective in a data processing system to obtain various information related to stock transactions, such as high, low or last stock prices. The obtained information is displayed as price indicia on a display device positioned adjacent to the keyboard so that the information is readily related to the stock identified by the keyboard settings.

The present invention is incorporated in such a system by arranging four banks of keyboard switches side by side in parallel; each bank is the same and is constructed and operated in the manner described above. One key of each bank can be operated and latched, and the four operated keys of the four banks together establish the four-character alphabetic code as well as the

corresponding coded signal combinations. The display device is similarly positioned next to the keyboard.

In such a stock transaction system, the four banks of keyboard switches are compactly arranged in parallel columns and, by way of illustration, need only take up an area of less than 8 by 10 inches, since each bank may be constructed to be less than 2 by 10 inches. The operated key in each bank is latched in depressed position and recognized at a glance, whereby the displayed price information can be readily associated with the stock identified by the combination of operated keys. The pivoted code bar actuator of the present invention is especially adapted to provide a columnar arrangement of the keyboard formed by four parallel banks and to the overall compactness of the four-bank keyboard. Moreover, this columnar arrangement makes it convenient for an operator to recognize the four operated keys by scanning across the keyboard.

From the above description, it is seen that the code bar actuator of this invention is simple to manufacture and assemble. It is compact so that a large number of keys may be arranged in a small space. Yet, the individual operation of the keys is relatively simple and convenient, and the effective operation of the switches by the keys is reliable.

What is claimed is:

1. A key-actuated coding switch device which comprises
(a) a plurality of switch-actuating bars extending longitudinally in side-by-side relationship,
(b) first and second pivoting means longitudinally spaced with respect to said bars for pivoting corresponding first and second pluralities of bars for angular movement about respective transverse axes,
(c) a plurality of switches positioned for actuation by said bars at respective actuating points intermediate said first and second pivoting means,
(d) a plurality of actuating members extending transversely of said switch-actuating bars at longitudinally spaced points therealong between said first and second pivoting means,
(e) said transverse actuating members toward each pivoting means having portions engaging portions of the switch-actuating bars pivoted by the other pivoting means in coded configuration for actuating the bars in different coding combinations,
(f) and a plurality of keys mounted for actuating said transverse actuating members respectively.

2. A device in accordance with claim 1 in which said transverse actuating members are mounted for movement approximately perpendicularly to said switch-actuating bars.

3. A device in accordance with claim 1 in which said transverse actuating members have similar engaging edges and said switch-actuating bars have raised sections for contact with said similar edges in coding combinations.

4. A device in accordance with claim 1 in which said switch-engaging bars are arranged in pairs with the bars of each pair pivoted by said first and second pivoting means respectively and each of said plurality of switches is positioned for actuation by a respective pair of bars.

5. A device in accordance with claim 2 in which said transverse actuating members have extensions in the direction of movement thereof on which said keys are mounted.

6. A key-actuated coding switch device which comprises
(a) a row of depressable keys mounted on respective actuating members,
(b) a plurality of pairs of switch-actuating bars extending in the direction of said row in side-by-side relationship,
(c) said actuating members extending transversely of said switch-actuating bars at longitudinally spaced points therealong and mounted for movement approximately perpendicularly to the bars,
(d) first and second pivoting means for pivoting respective bars of each of said pairs for angular movement about respective transverse axes longitudinally beyond said actuating members at respective opposite ends of said row,
(e) a plurality of switches positioned for actuation by respective pairs of bars at actuating points intermediate said first and second pivoting means,
(f) said actuating members having similar edges for engaging said switch-actuating bars,
(g) said switch-actuating bars having raised sections between approximately said intermediate points and the free ends thereof for engaging said edges of corresponding actuating members in different coding combinations,
(h) and releasable latching means for latching a depressed key and releasing the latching upon depressing another key.

7. A device in accordance with claim 6 which comprises a plurality of rows of depressable keys mounted on respective actuating members extending transversely of said switch-actuating bars, the actuating members of one row alternating with the actuating members of another row along said bars.

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