The present invention relates to keyboard-actuated devices, and more particularly to a novel device engageable with the key bars to prevent the depression of two keys or more at a time. The invention may be used in many different types of apparatus, including typewriters, telegraph apparatus, type-composing machines, calculating machines, and the like.

Faulty operation resulting from the simultaneous depression of more than one key at a time may result in jamming of the type bars, as in a typewriter, or in sending an erroneous signal, as in telegraph or other apparatus using a code selected at the keyboard.

It is accordingly a principal object of the present invention to provide means for prevention of the simultaneous depression of more than one key at a time.

Another object is to provide means of the above type which do not unnecessarily inconvenience the keyboard operator by appreciably modifying the "touch" of the keyboard. It is highly desirable that each key, while being restrained from operating a type bar or other device by reason of the depression of some other key, should nevertheless have a certain freedom of movement, whereby, if the operator begins to depress that key before the other key has been released it will not feel as if it is rigidly "frozen" and will permit the follow-through of the motion of pressing the key as rapidly as the pressure is removed from the key previously depressed.

The invention is described in relation to a preferred embodiment shown in Figs. 1 and 2. Fig. 1 being a fragmentary pictorial representation of a keyboard constructed according to the invention, and Fig. 2 being an end elevation of a depressed key showing certain details of the structure.

Referring to Fig. 1, each key bar such as 2 is formed in a suitable shape for engaging with type bar or permutation bar mechanism, or other devices to be controlled by the keys. In the described embodiment we show an arrangement suitable for a typewriter, in which the key bars are notched and the notches engaged with a stationary bar 4 at the rear of the keyboard, the bar acting as a fulcrum for rotation. The key bars are held securely to the bar 4 by spring mechanism, usually associated with the device to be actuated and schematically represented in Fig. 2 by a spring 6 and wire hook 8. Clockwise rotational movement of the key bars, as illustrated in the drawings, is prevented by a stationary plate 10 as shown in Fig. 2.

A stationary shaft 12 is disposed beneath and at right angles to the key bars, and bears a set of rockers such as 14 and 16, each rocker being free to pivot about the shaft 12.

It will be noted from Fig. 1 that the rockers are of two shapes, mounted alternately upon the shaft 12. Each rocker, regardless of shape, comprises a rectangular body portion perpendicular to the shaft 12, and a pair of lugs on each of its longer dimensions at right angles to the body portion. The two lugs on each side of the body portion project in opposite directions. The lugs on the upper sides, that is the sides nearest the key bars, are of equal length on all rockers, and are each preferably, but not necessarily, set in from the ends of the rockers by the same distance.

The lugs on the underneath side of the rockers are of equal length, and they are staggered, the lugs of rockers such as 14 being flush with the ends, and the lugs of rockers such as 16 being set in from the ends a sufficient distance to clear the lugs of the adjacent rockers.

The rockers of the preferred embodiment are made from sheet metal stampings, with the lugs being bent at right angles to the body portions over a radius preferably, but not necessarily, permitting the underneath lugs of all rockers to lie in the same plane, when assembled in the manner shown in Fig. 1.

Fig. 1, for purposes of illustration, shows a slightly greater separation between adjacent rockers than is ordinarily employed. Thus, the upper lugs 18 preferably, but not necessarily, bear upon the adjacent rockers to insure equal spacing and the proper engagement of the lower, extended lugs with the edges of the adjacent rockers, as illustrated by the engagement of a lower lug of the rocker 14 with the edge of the body portion of the rocker 16 in Fig. 1. It is also possible to provide tubular spacers between the rockers, if desired.

Each key bar such as 2 is mounted above the rockers in such a position that, when depressed, it is brought to bear upon two of the upper lugs of the rockers, one lug being on each side of the shaft 12. Thus, when the key bar 2 is depressed, as shown, it bears upon a lug 20 and a lug 22.

It may be readily ascertained from Fig. 1 that downward pressure upon any lug such as 29 on the upper side of the shaft 12, as shown in the drawing, causes downward movement of all upper lugs on the same side of the shaft 12 to the left of the key bar which is depressed. Similarly, depression of a lug such as 22 causes depression of all corresponding lugs on the same side of the shaft 12 extending to the right of the lug 22. Thus, depression of any key causes clockwise rotation of all rockers on one side of the key bar and counterclockwise rotation of all rockers on the other side of the key bar.

As indicated in the drawing, the transmission of motions from one rocker to the next is brought about in each case by engagement of a lug on the transmitting rocker with an edge of the adjacent rocker on one side of the shaft 12, and by engagement of an edge of the body portion of the transmitting rocker with a lug of the same adjacent rocker on the other side of the shaft 12.

In Fig. 1, the key bar 2 is shown as being depressed, and a key bar 24 is shown as being restrained from downward movement by reason of the upward thrust of a lug 26, to which motion is transmitted by the engagement of the key bar 2 with the lug 22. Fig. 2 shows in solid lines the key bar 2 and the adjacent rockers on each side thereof having lugs engaging with the bar. The phantom lines indicate the positions of the other key bars of the keyboard, into which positions they are held or moved.
by the upper lugs of the rockers respectively engaging therewith. Downward movement of the key bar 2 upon the lug 22 produces upward movement of the opposite lugs on all rockers on the same side of the key bar 2 as the lug 22. This produces constraint of all of the associated key bars at a point A. Similarly, downward movement of the key bar 2 upon the lug 20 produces constraint of all of the key bars on the same side of the bar 2 as the lug 20 at a point represented by B.

It should be noted that engagement of rockers with the key bar is restrained and establishes a limit upon the downward movement of the selected key bar. This limit is preferably somewhat greater than the movement required to actuate the mechanism associated therewith, such as for example the associated type bar on a typewriter, or the permutation bar on a telegraphic or type composing apparatus.

It will be observed that the constraining force upon any key exists only as long as pressure is being applied to some other key, and that this pressure is removed as quickly as the pressure is removed from the key being actuated. In other words, it is possible to begin depressing the next key while the previously selected key is moving from its depressed position back to normal. In addition, the parts may be so modified as to produce any desired amount of play between the rockers, so that in any event the anticipatory depression of one key while another key is already depressed will be prevented from producing an undesired result, while giving the operator an impression that the keyboard has not been "frozen."

In some applications employing keyboards, it is desirable to provide electrically-operated means for preventing the actuation of any key bar. Thus, in a typewriter comprising a register such as is described in our co-pending application, Serial No. 187,476, filed September 29, 1950, now Patent No. 2,690,249, it is necessary to provide means whereby the typing of a line proceeds at a rate not greater than that of the transcription of the preceding line. The present invention provides a simple means for accomplishing this result, since it is merely necessary to provide an extra, "dummy" key bar, that is, a key bar having its end supporting the key removed. An electromagnet is adapted to depress the key bar through direct connection of the key bar with its armature, or by any other convenient linkage.

It will be recognized that while the key bars are described as being adapted for rotation about a fulcrum, the mechanism could be easily adapted, if desired, to provide for merely translational movement of the key bars.

As heretofore indicated, the shape of the key bar 24, or the specific nature of the mechanisms or devices to be actuated by the key bars, are of no immediate concern, since the invention relates to the restraint of the key bars by the device as herein shown and described.

It will also be apparent that once the principle of the invention is clearly understood, certain other modifications of shape, relative dimensions, and arrangement of the parts will suggest themselves to one skilled in the art, according to the dictates of each application including the particular space limitations imposed thereon, and that such modifications or changes do not constitute a departure from the spirit or scope of the invention.

Having thus described our invention, we claim:

1. A key-actuated mechanism comprising the combination of a number of key bars, each key bar being adapted for depression when a key is struck, means actuated by each key bar to indicate the striking of a key, and mechanism permitting only one of said means to be actuated at a time, including a number of mutually-engageable rockers mounted upon a common axis adjacent to the key bars, each rocker having a pair of upper opposed lugs whereby a depressed key bar is engageable with a lug on each of two rockers, the lugs of said two rockers being on opposite sides of said axis, and a pair of lower opposed lugs, one lower lug being engageable with an adjacent rocker in one direction of rotation and the other lower lug being engageable with the opposite adjacent rocker in the other direction of rotation, whereby depression of a key bar causes the rockers to rotate engaged key bars to constrain the movement thereof by reason of all of the rockers on one side of the depressed key bar rotating in one direction, and all of the rockers on the other side thereof rotating in the opposite direction.

2. A key-actuated mechanism comprising the combination of a number of key bars each adapted for depression when a key is struck, means actuated by each key bar to indicate the striking of a key, and mechanism permitting only one of said means to be actuated at a time, including a number of rockers pivotally mounted upon a common axis, each adjacent pair of rockers being engageable with a common key bar to rotate oppositely upon depression thereof, each rocker having a first projection interfering with rotation in one direction of one of its adjacent rockers, and a second projection interfering with rotation in the opposite direction of the other adjacent rocker, whereby depression of a selected key bar causes the rockers to engage all of the remaining key bars to constrain movement thereof.

3. A key-actuated mechanism comprising the combination of a number of substantially parallel key bars each adapted for depression when a key is struck, means actuated by each key bar to indicate the striking of a key, and mechanism permitting only one of said means to be actuated at a time, including a number of rockers pivotally mounted upon a common axis substantially perpendicular to the key bars, each adjacent pair of rockers being engageable with a common key bar to rotate oppositely upon depression thereof, each rocker having a first projection interfering with rotation in one direction of one of its adjacent rockers, and a second projection interfering with rotation in the opposite direction of the other adjacent rocker, whereby depression of a selected key bar causes the rockers to engage all of the remaining key bars to constrain movement thereof.

4. A key-actuated mechanism comprising the combination of a number of key bars mounted upon a first axis, each key bar being adapted for rotation about said first axis when a key is struck, means actuated by each key bar to indicate the striking of a key, and mechanism permitting only one of said means to be actuated at a time, including a number of rockers pivotally mounted upon a second axis situated between said first axis and the keys, each adjacent pair of rockers being engageable with a common key bar to rotate oppositely upon depression thereof, each rocker having a first projection interfering with rotation in one direction of one of its adjacent rockers, and a second projection interfering with rotation in the opposite direction of the other adjacent rocker, whereby depression of a selected key bar causes the rockers to engage all of the remaining key bars to constrain movement thereof.

5. A key-actuated mechanism comprising the combination of a number of key bars each adapted for depression when a key is struck, means actuated by each key bar to indicate the striking of a key, and mechanism permitting only one of said means to be actuated at a time, including a number of rockers pivotally mounted upon a common axis, each rocker having a pair of upper opposed lugs situated on opposite sides of said axis and engageable with adjacent key bars, whereby each adjacent pair of rockers in engageable with a common key bar to rotate oppositely upon depression thereof, each rocker having a first projection interfering with rotation in one direction of one of its adjacent rockers, and a second projection interfering with rotation in the opposite direction of the other adjacent rocker, whereby depression of a selected key bar causes the rockers to engage all of the remaining key bars to constrain movement thereof.

6. A key-actuated mechanism comprising the combination of a number of key bars each adapted for depression when a key is struck, means actuated by each key bar to indicate the striking of a key, and mechanism permitting only one
of said means to be actuated at a time, including a number of rockets pivotally mounted upon a common axis, each rocker having a pair of opposed portions situated on opposite sides of said axis and engageable with adjacent key bars, whereby each adjacent pair of rockers is engageable with a common key bar to rotate oppositely upon depression thereof, each rocker further having a first projection interfering with rotation in one direction of one of its adjacent rockers and a second projection on the opposite side of said axis from said first projection interfering with rotation in the opposite direction of the other adjacent rocker, whereby depression of a selected key bar causes the rocker to engage all of the remaining key bars to constrain movement thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent No.</th>
<th>Inventor</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>566,302</td>
<td>Fairfield</td>
<td>Aug. 25, 1896</td>
</tr>
<tr>
<td>1,157,714</td>
<td>Nelson</td>
<td>Oct. 26, 1915</td>
</tr>
<tr>
<td>1,220,009</td>
<td>Schaller</td>
<td>Mar. 20, 1917</td>
</tr>
</tbody>
</table>