May 20, 1958 C. SCHRODER 2,835,369

KEY INTERLOCK

Filed Nov. 2, 1956

Fig. 1

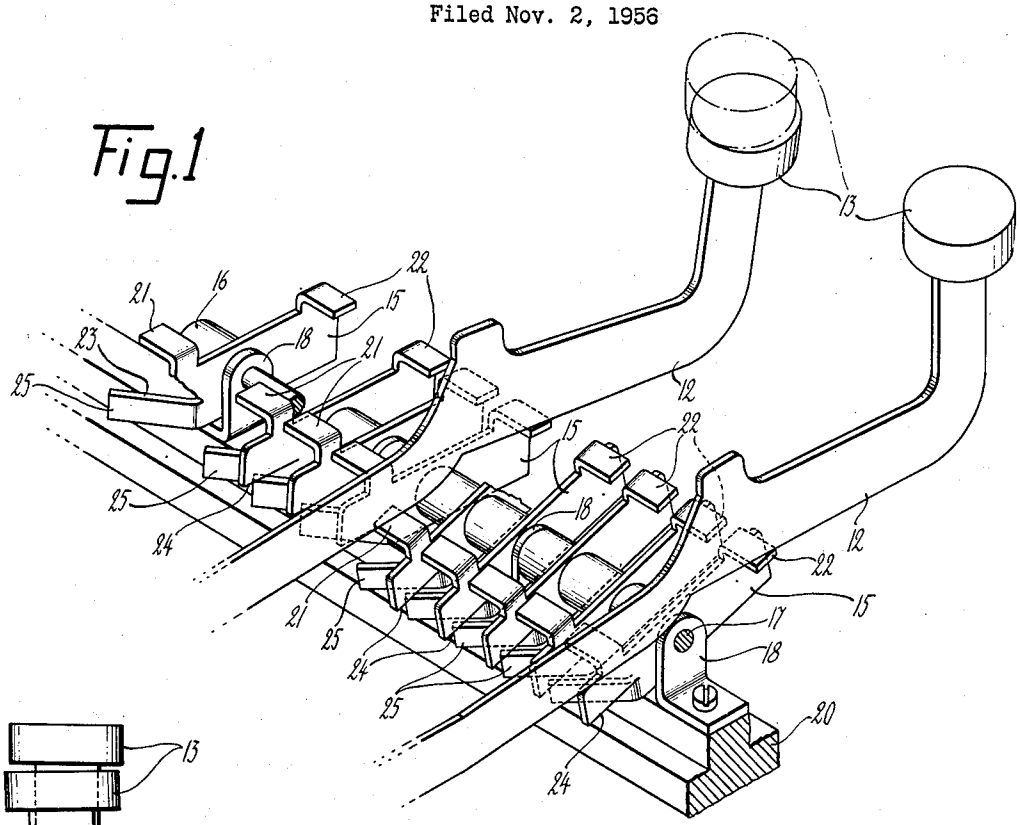


Fig. 2

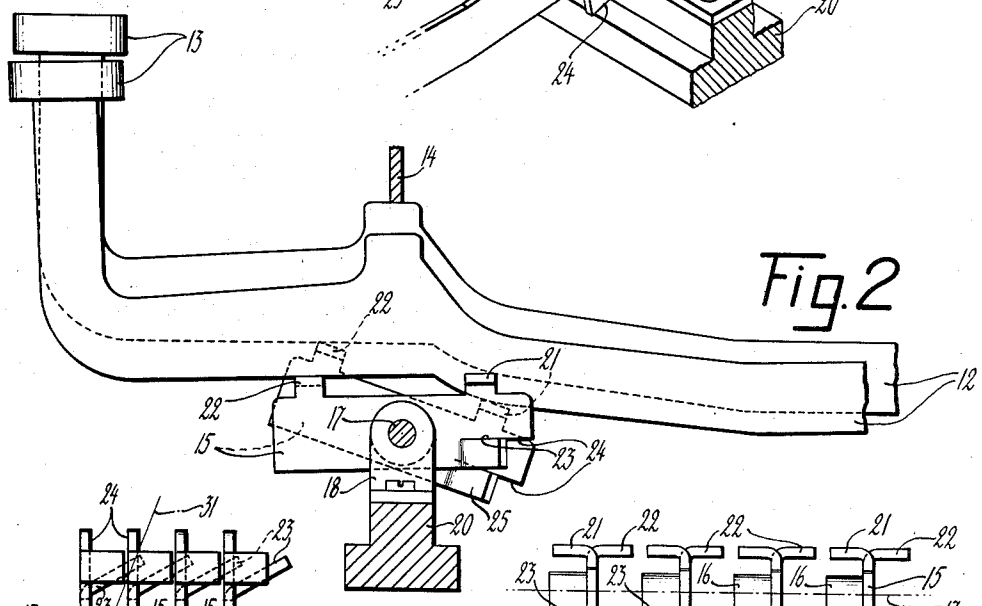
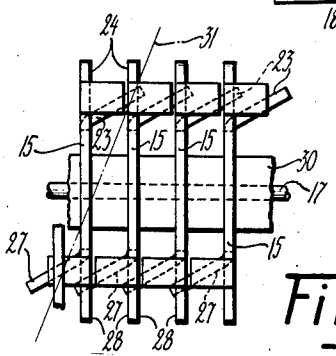


Fig. 3

Fig. 4



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KEY INTERLOCK

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4 Claims. (Cl. 197—107)

This invention relates generally to keyboard controlled facilities, such as typewriters, print composing machines, adding machines, sorting machines, etc., and more particularly to devices whereby keys in a keyboard can be operated only one at a time.

The device of the invention is more particularly an improvement over one disclosed in the patent to Higonnet et al. No. 2,758,693, dated August 14, 1956.

In said patent, a series of rockers overlie key bars or members so that each of the latter will operate a left one of two rockers in one direction and will also operate the right one of such two rockers but in an opposite direction, the rockers including ears branching therefrom laterally whereby all rockers to the left of one becoming key-operated in the said one direction will become similarly rocked, and whereby all rockers to the right of one becoming key-operated in said opposite direction, will become similarly operated. The operation of said rockers oppositely by any operated key will obstruct all other keys against operation and as the finger pressure on any operated key is released, the other keys become operable.

The mechanism of said patent functions admirably for its intended purpose but the installation thereof calls for considerable skill because the stated ears on the rockers require meticulous bending adjustments so that all the rockers laterally to each side of any particular operated key become effectively obstructed against operation. The need for the stated meticulous adjustment of the rocker ears arises because in the manufacture of the rockers, the ears which are bent from the main body of the rockers will make slight recoveries of uncontrollable extent after being produced in a forming die. Due to this, the aggregate error across the full keyboard may amount to as much as 1/10 of an inch. Such error, if not corrected by meticulous bending of at least some of the ears, will render the key locking device defective and impotent. Obviously the cost of bending the rocker ears to perform as required requires expert attention and increases the cost of the machine considerably. An additional condition giving rise to high cost of production of the stated patented device is the provision of two kinds of rockers whereby to allow the nesting of the successive rockers. The requirement of two kinds of dies to produce two kinds of correlated rockers, as well as the appropriate placement in alternate order in the machine thus raises further the production costs.

In view of the above it is a general object of the invention to produce an interlocking device of the kind stated which lends itself to accurate and economical manufacture.

It is a more particular object of the invention to provide an interlocking device of the stated nature wherein the rockers embody accurately correlated faces which do not require bending adjustment of any part of the rocker to perform in their required capacity.

A still further object is to provide locking rockers in a form so that they may be all of identical manufacture,

accurately correlative, and capable of assembling without any special attention.

Still other objects and features of the invention will be apparent upon reading as the detailed description is read in the light of the accompanying drawings.

Referring now to the drawings,

Figure 1 is a rear perspective view showing a row of locking rockers and two key members associated therewith, one operated and one in normal position.

Figure 2 is a right hand sectional side view of the device of the invention.

Figure 3 is a diagrammatic rear view showing some locking rockers axially spread out and illustrating edges thereon in the perfect alignment in which they are cooperative for key locking action.

Finally, Figure 4 is a diagrammatic plan view of a modied form of the invention.

In the illustrated embodiment of the invention the key members are in the form of adjacent key levers **12** which at one end bear key buttons **13** and are pivoted at another end, not shown, on a common pivot rod. Springs, not shown, associated with the key levers bias them upwardly to underlie normally a stop-affording comb plate **14**. Underneath the key levers **12** there is a row of adjacent rockers **15**, all identical and made of sheet metal stock. They are flatwise neighboring and include each a pivot hub **16** whereby they are rockably accommodated upon a common pivot rod **17**. Brackets **18** fast on a stationary, transverse bar **20** in the machine give support to the pivot rod **17** at spaced points, said pivot rod **17** extending through holes in said brackets and through said hubs **16**, some of the latter being slightly shorter than others, to accommodate said brackets **18**. As viewed from the front of the machine, each of the rockers **15** has one lug **21** projecting rightwardly from one of two opposite arms thereof and has another lug **22** projecting leftwardly from the other arm. Operatively overlying the lug **21** and the lug **22** which thus from two immediately neighboring rockers **15** reach leftwardly and rightwardly toward one another is in each instance a key lever **12**. The lugs **21, 22** with reference to each key lever being on opposite rocker arms, it follows that depression of any key lever **12** will operate in one direction that rocker which is immediately to the right and will operate in the other direction that rocker which is immediately to the left. This is evident from Figure 1 in which one key lever is shown depressed. Furthermore as a result, the other lugs **21** or **22** at the ends of the rockers opposite to those acted upon by the operated key lever **12**, become elevated as in Figure 1 to underlie the key levers **12** which to each side of the operated key lever are immediately adjacent, such adjacent key levers thus becoming locked against operation. The other key levers **12** laterally therebeyond become also locked against operation and this is accomplished by overlapping means between all the adjacent rockers **15**, in a manner which will be set forth now.

The said overlapping means comprise edges **23** on the rockers **15** facing circularly in said one direction and other edges **24** facing circularly in said opposite direction, each edge **23** reaching into an overlapping relationship with the next adjacent edge **24** of the rightwardly next adjoining rocker.

The edges **23, 24** on each rocker lie in an identical plane which is parallel to the pivot axis square to the general plane of the rocker.

It will be seen that any rocker which by an operated key is rocked in said one direction, will by its edge **23** overlapping the edge **24** on the next rightwardly disposed rocker, cause also such rocker to stand operated. Similarly all further rightwardly disposed rockers, through

further overlapping edges, will be caused to stand identically rocked.

Furthermore, the rocker which by operation of a key is rocked in the other direction, will by the edge **24** act on the edge **23** of the next leftwardly disposed rocker, to cause also such rocker to stand rocked in said other direction. The farther leftwardly disposed rockers become similarly rocked by the overlaps therebetween comprised by the edges **23**, **24**. Therefore, opposite rocking of the rockers to each side of any operated key, will through those ears **21**, **22** which become upwardly rocked obstruct all other keys against operation. Furthermore, at release of the operating pressure on any operated key, any other key becomes immediately free for operation.

In a typewriter there are usually more than 42 type keys and if there is a discrepancy in the relative positions of the overlapping edges on each rocker of only .002 in., such discrepancy could aggregate across the row of rockers from one end of the keyboard to the other to more than .08 in. With such a loss of motion, a key operated at one portion of the keyboard would fail entirely to lock or block other keys at the other end of the keyboard. Moreover, it is desirable that all keys have substantially equal locking action with respect to any of the other keys and this requires accurate disposition of the edges **23**, **24** on the rockers. It has been found that the rockers of the stated Higonnet et al. patent are not adapted to be stamped and formed so that upon assembly they will give readily correct and accurate key locking effect. The trouble is that the bent lips or ears therein forming the overlaps are subject to minute recovery after being bent in the forming die, and that the magnitude of the recovery, although small, is unpredictable. Consequently these lips or ears require tedious and expert bending adjustments after the rockers are installed in the machine.

According to the invention the edges **23** and **24** are afforded in a manner so that they are absolutely correctly correlated. This is accomplished by producing the edges **23**, **24** by shearing the rockers squarely to the general plane thereof along a single line which is substantially radial to the pivot axis. The sheared edges **23**, **24** so produced on each rocker face circularly of the pivot axis **17** in an identical plane toward each other. In accompaniment with shearing said rocker along said line an ear **25** is bent from the main plane of the rocker to swing the edge **23** in the exact plane in which the shear is effected. Any partial recovery of the bent ear after being produced in the shearing and bending die has thus no disturbing effect at all on the required accurate disposition of the edge **23** relative to the edge **24**. Referring to Figure 4, wherein the rockers are shown in identical rotative positions and spread axially, it will be appreciated that all the edges **23** line up accurately with the edges **24**. It follows thus that as any rocker at one or the other side of an operated key becomes rocked by operation of such key in said one or said other direction it will support all other rockers farther to the side in identically rocked positions, whereby at operation of any one key all other keys stand obstructed against operation. It is to be understood that the edges **24** may be provided on ears bent from the rockers to the opposite sides of the ears **25** which afford the edges **23**. In other words the edges **24** and **23** may reach from any two neighboring rockers into overlapping relationship. The provision of the sheared edges **23**, **24** makes possible the installation of the rockers **15** in accurately functioning correlation and without any necessity for cost-increasing adjustments.

In the form of the invention shown in Figures 1 to 3, the rockers **15** have pivot hubs **16** which fit closely upon the pivot rod **17**. The rockers are thus guided to turn in parallel planes so that the edges **23**, **24** perform their

function with the precision in which they are provided.

In the modified form of the invention seen in Figure 4, the rockers **15** comprise a set of overlapping edges **27**, **28**, which are additional to the edges **23**, **24** across the pivot axis **17**. The edges **27**, **28** supplement the edges **23**, **24** in their function to transmit the rocking motion from rocker to rocker, oppositely to each side of any operated key. The dual set of edges provide that in each instance the transmittal of pressure or motion from one rocker to another is effected at two locations which are substantially diametrically opposite to the pivotal point of the rocker, as is indicated by the dot-and-dash line **31** in Figure 4. Consequently the rockers **15**, although not necessarily including broad pivot hubs, will not skew sidewise and will solidly oppose operation of any key while another key is held operated. The rockers of Figure 4 may operate in guide slots provided in a bar **30** having the fulcrum rod **17** imbedded therein.

What is claimed is:

1. The combination with a row of laterally adjacent key operable members, of a row of locking rockers of sheet material arranged in flatwise neighboring relations and pivoted intermediate two ends on a common axis, the right one of any considered pair of rockers being rockable by one key operable member in one direction and the left rocker of the same pair being rockable by the same key operable member in said other direction, each rocker which neighbors another to the right having an edge facing in said one rocking direction and each rocker which neighbors another to the left having an edge facing in said other rocking direction, the oppositely facing edges of any two neighboring rockers being overlapping laterally in respect to one another and the oppositely facing edges on each rocker being formed by shearing the rocker transversely of the sheet material of which the rocker is formed thereby to provide two sheared, laterally offset edges in exactly the same plane, operation of any key operable member, by rocking its two related rockers oppositely and acting through said overlapping rocker edges, causing the more leftwardly and rightwardly disposed rockers to stand similarly rocked oppositely, whereby the key operable members are operable only one at a time.

2. The combination with a row of laterally adjacent key operable members, of a row of locking rockers of sheet material arranged in flatwise neighboring relations and pivoted intermediate two ends on a common axis, the right one of any considered pair of rockers being rockable by one key operable member in one direction and the left rocker of the same pair being rockable by the same key operable member in said other direction, each rocker which neighbors another to the right having an edge facing in said rocking direction and each rocker which neighbors another to the left having an edge facing in said other rocking direction, the oppositely facing edges of any two neighboring rockers being overlapping laterally in respect to one another and the oppositely facing edges on each rocker being one in the general plane of the rocker and the other on an ear branching laterally from the rocker, both such edges being produced by shearing the rocker transversely to the sheet material of which it is formed along a line which is generally radial of the rocker pivot and therefore being in exactly the same plane, operation of any key operable member, by rocking its two related rockers oppositely and acting through said overlapping rocker edges causing the more leftwardly and rightwardly disposed rockers to stand similarly rocked oppositely whereby the key operable members are operable only one at a time.

3. The combination with a row of laterally adjacent key operable members, of a row of locking rockers of sheet material arranged in flatwise neighboring relations and pivoted intermediate two ends on a common

axis, the right one of any considered pair of rockers being rockable by one key operable member in one direction and the left rocker of the same pair being rockable by the same key operable member in said other direction, each rocker which neighbors another to the right having on each of two opposite rocker arms an edge facing in said one rocking direction and each rocker which neighbors another to the left having on each of two opposite rocker arms an edge facing in said other rocking direction, the oppositely facing edges of any two neighboring rocker arms being overlapping laterally in respect to one another and the oppositely facing edges on each rocker arm being formed by shearing each such rocker arm transversely of the sheet material of which the rocker is formed thereby to provide two sheared, laterally offset edges in an identical plane, operation of any key operable member, by rocking its two related rockers oppositely and acting through said overlapping rocker edges, causing the more leftwardly and rightwardly disposed to stand similarly rocked oppositely, whereby the key operable members are operable only one at a time.

4. A rocker element for a device which compels the operation of operable elements singly, the rocker element made of sheet metal and having its pivot axis extending squarely to the general plane thereof and further having two sheared edges which lie in an identical plane extending parallel to the said axis facing circularly of the rocker axis in opposite directions and which are offset in respect to each other transversely of the general plane of the rocker, said edges being produced by a shearing cut made transversely of the sheet metal of which the rocker is made.

No references cited.