Oct. 7, 1952 L. B. GREENLEAF ET AL 2,612,812

KEYBOARD CONSTRUCTION

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Fig. 1

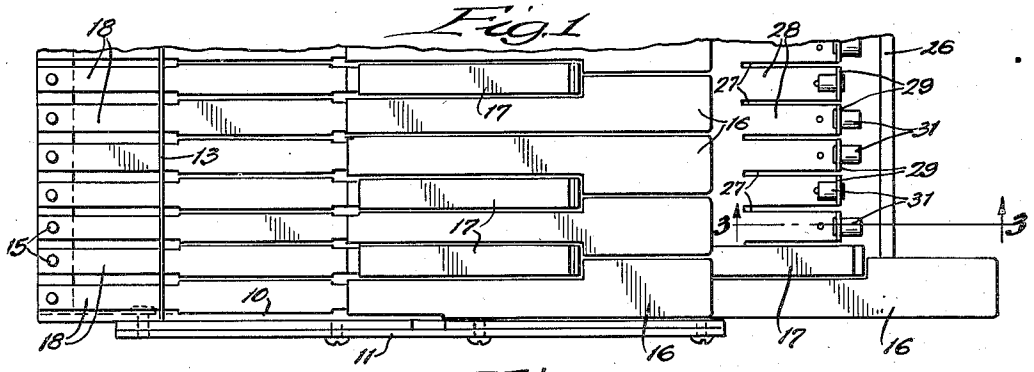


Fig. 2

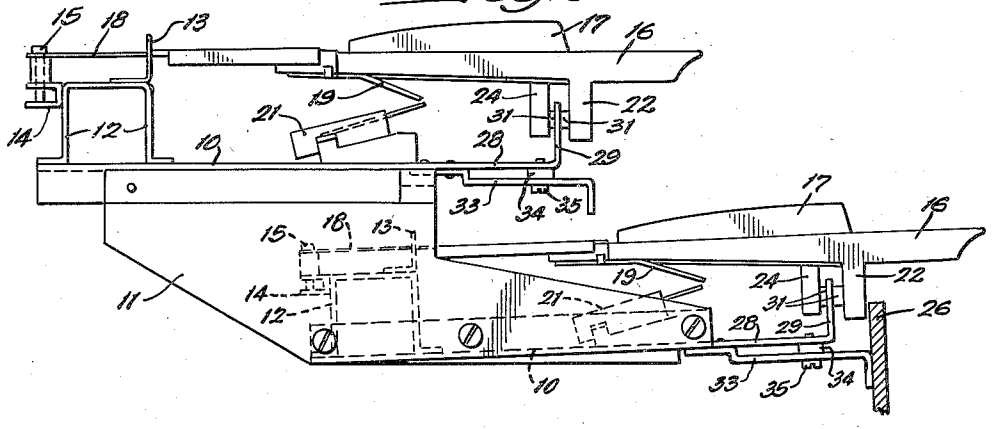


Fig. 3

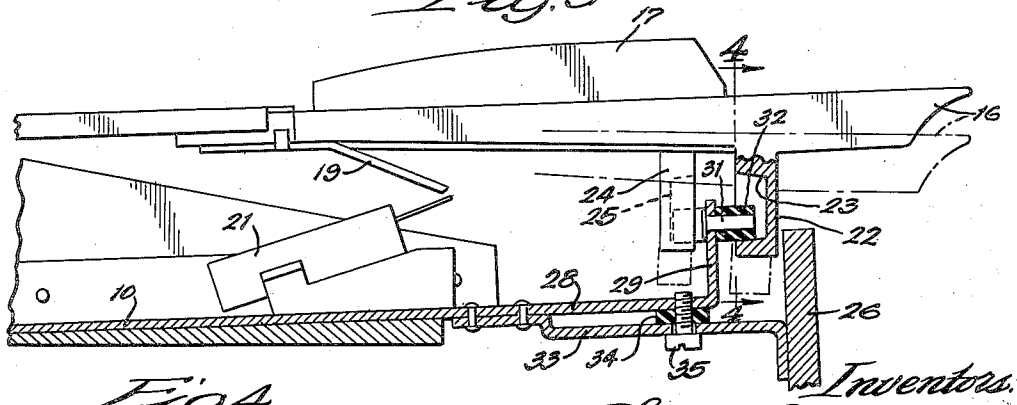
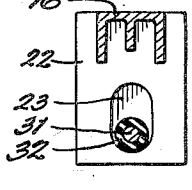


Fig. 4



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KEYBOARD CONSTRUCTION

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8 Claims. (Cl. 84—433)

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This invention relates to keyboards and more particularly to guiding and limiting means for the keys thereof.

Keyboards as heretofore constructed have included various types of devices for guiding the keys and for limiting pivotal movement thereof, but as a general rule these devices have been relatively complicated and expensive to build or have been difficult to adjust to maintain accurate alignment of the keys. The principal object of the present invention is to provide a keyboard construction which is relatively simple and inexpensive to manufacture, which is easy to install, and which is readily and simply adjustable.

Another object is to provide a keyboard construction in which the keys are guided and limited by slidable connections to resilient strips whose positions can easily be adjusted through adjustable connections to a fixed supporting plate or the like.

Still another object is to provide a keyboard construction in which the resilient strips are urged in one direction by resilient pads and in the other direction by tension fastenings such as screws. In this construction the pads serve to urge the strips upward and may also function as cushioning stops to limit downward movement of the keys.

A further object is to provide a keyboard construction in which the resilient strips are formed by slitting the edge of a plate or sheet of metal. In this way a large number of strips can be formed easily and inexpensively and can easily be handled during assembly.

A still further object is to provide a keyboard construction in which the keys are formed with vertically slotted projections slidably receiving horizontal pins which serve both to guide the keys and to limit vertical movement thereof.

The above and other objects and advantages of the invention will be more readily apparent when read in connection with the accompanying drawing, in which—

Figure 1 is a partial plan view of a keyboard construction embodying the invention with certain of the keys omitted;

Figure 2 is an end elevation looking from the bottom of Figure 1;

Figure 3 is a partial enlarged section on the line 3—3 of Figure 1; and

Figure 4 is a partial section on the line 4—4 of Figure 3.

As shown, the keyboard construction of the invention is applied to a double manual keyboard of the type commonly used on organs, although it will be apparent that it could be employed in other keyboard instruments such as pianos, accordions and the like. Each of the keyboard manuals, as shown, comprises a supporting plate 10 extending throughout the length of the keyboard and which may be flanged at its ends for connection to end plates 11 holding the two manuals in the proper relative positions. Toward the back end of each of the plates 10 there is carried an inverted channel member 12 forming a support for the keys. In the construction shown, each channel member carries at its forward edge a vertical flange or plate 13 having horizontal slots therein and has at its back edge a bracket 14 for threadedly receiving an adjusting screw 15.

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A series of keys 16 corresponding to the white keys of the piano and similar complementary keys 17 corresponding to the black keys on the piano are pivotally supported on the channels 12. As shown, each of the keys has secured thereto a resilient spring strip 18 extending rearwardly therefrom through one of the slots in the flange 13. The rearmost ends of the spring strips 18 are urged downward by the adjusting screws 15 so that the spring strips tend to raise the keys. By adjusting the screws 15, the tension of the springs 18 can be varied to control the touch of the instrument. Any desired type of mechanism may be operated by movement of the keys, but in the form shown, each key has a finger 19 projecting downward therefrom to control a switch 21. The key mounting as illustrated and described forms no part of the present invention, being more particularly described and claimed in the copending application of Earnest F. Swanson, Serial No. 599,866, filed June 16, 1945 and now matured into Patent No. 2,466,511.

In order to guide the keys during vertical swinging movement and to limit movement thereof, each of the keys 16 is provided near its forward end with a downwardly extending projection 22 of substantially the same width as the front finger portion of the key. In its rearward face each of the projections 22 is provided with a vertically elongated slot 23 whose length is substantially equal to the desired stroke of the key. The black keys 17 are formed with similar projections 24 having recesses 25 in their forward faces similar to the recesses 23. The projections 22 on the white keys not only serve as guide and stop members but also serve to close the space between the parts of the keys and a front board of the instrument, as shown at 26.

To cooperate with the projections 22 and 24, the plates 10 are formed with a series of spaced parallel slits 27 near the forward edges of the plates to divide the plates into a series of spaced flexible strips 28. The strips 28, as best seen in Figure 2, underlie the keys, respectively, and

are generally parallel thereto. Each of the strips 28 terminates at its forward end in a vertically upstanding finger 29 with the fingers 29 lying adjacent and substantially parallel to the projections 22 and 24. Each of the fingers 29 carries a pin 31 which may, if desired, be covered with felt or the like 32 and which slidably fits into one of the recesses 23 or 25. It will be noted from Figure 1 that the pins 31 corresponding to the white keys project forwardly while those corresponding to the black keys project rearwardly to enter the recesses 25 in the forward faces of the projections 24.

In order to position the fingers 29 and the pins 31 carried thereby, a rigid supporting plate 33 is secured to the plate 10 underlying the strips 28 at the forward edge thereof. The plates 33 may connect to the front board 26 or to other structural parts of the instrument, if desired, but in any case are rigid and extend throughout the length of the keyboard. Between each of the strips 28 and the plate 33 is positioned a resilient pad 34 which may conveniently be in the form of an annular ring or washer and which is of thickness such that it will normally urge its corresponding finger away from the plate 33. An adjustable tension member such as a screw 35 extends through an opening in the plate 33 through the resilient washer 34 and threads into each of the strips 28, as best seen in Figure 3. By tightening the screws 35, the strips can be flexed downward against the resilient pads 34 so that they will be held in any desired adjusted position.

With the parts assembled, as shown, it is a relatively simple matter to adjust the screws 35 so that the several keys are accurately aligned across the keyboard. In playing the instrument, as the keys are depressed, they will be guided against lateral swinging movement by the pins 31 sliding in the recesses 23 or 25, and their downward movement will be limited by engagement of the pins 31 with the upper ends of the recesses. Downward movement of the keys will be cushioned not only by the padding 32 on the pins 31, but in the case of relatively hard blows will also be resiliently cushioned by the pads 34.

While one embodiment of the invention has been shown and described in detail herein, it will be understood that this is illustrative only and is not to be taken as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. A keyboard construction comprising a pivotally mounted key, a flexible strip underlying and generally parallel to the key, interengaging parts on the key and the strip to limit relative movement therebetween, a fixed rigid member underlying the flexible strip and an adjustable tension fastening connecting the flexible strip and the rigid member.

2. A keyboard construction comprising a pivotally mounted key, a flexible strip underlying and generally parallel to the key, interengaging parts on the key and the strip to limit relative movement therebetween, a fixed rigid member underlying the flexible strip, an adjustable tension fastening connecting the flexible strip and the rigid member, and a resilient pad between the strip and the rigid member urging them apart.

3. A keyboard construction comprising a pivotally mounted key, a flexible strip underlying and generally parallel to the key, interengaging parts on the key and the strip to limit relative movement therebetween, a fixed rigid member underlying the flexible strip and an adjustable tension fastening connecting the flexible strip and the rigid member, and a resilient annular washer around the tension fastening between the strip and the rigid member.

4. A keyboard construction comprising a pivotally mounted key, a flexible strip underlying and generally parallel to the key and having an upturned finger at its end, a pin projecting from the finger, a projection on the key formed with a guide slot slidably receiving the pin to guide the key and to limit movement thereof, a fixed rigid member underlying the strip and an adjustable tension connection between the rigid member and the strip.

5. A keyboard construction comprising a pivotally mounted key, a flexible strip underlying and generally parallel to the key and having an upturned finger at its end, a pin projecting from the finger, a projection on the key formed with a guide slot slidably receiving the pin to guide the key and to limit movement therof, a fixed rigid member underlying the strip, an adjustable tension connection between the rigid member and the strip, and a resilient pad between the rigid member and the strip urging them apart.

6. A keyboard construction comprising a series of parallel pivoted keys, a plate underlying the keys having a series of slits in one edge in planes parallel to the keys to form a series of resilient strips corresponding to the keys, interengaging parts on the keys and the strips to limit relative motion therebetween, a fixed plate underlying the strips, and adjustable tension connections between the fixed plate and the strips.

7. A keyboard construction comprising a series of parallel pivoted keys, a plate underlying the keys having a series of slits in one edge in planes parallel to the keys to form a series of resilient strips corresponding to the keys, interengaging parts on the keys and the strips to limit relative motion therebetween, a fixed plate underlying the strips, adjustable tension connections between the fixed plate and the strips, and resilient pads between the fixed plate and the strips urging them apart.

8. A keyboard construction comprising a series of parallel pivoted keys, a plate underlying the keys having a series of slits in one edge in planes parallel to the keys to form a series of resilient strips corresponding to the keys, the strips having upwardly turned fingers at their outer ends, pins projecting from the fingers, projections on the keys formed with guide slots slidably to receive the pins, a fixed plate underlying the strips, resilient pads between the fixed plate and the strips urging them apart, and adjustable tension connections between the fixed plate and the strips.

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