United States Patent

Grilli et al.

[15] **3,654,831**

[45] **Apr. 11, 1972**

[54] KEYBOARD

[72] Inventors: **Umberto Grilli; Bruno Sturba; Artemio Vivani,** all of 60020 Sirolo, Italy

[22] Filed: **June 20, 1969**

[21] Appl. No.: **835,137**

[30] **Foreign Application Priority Data**

Aug. 29, 1968 Italy.....39379 A/68

[52] **U.S. Cl.**.....**84/435**

[51] **Int. Cl.**.....**G10c 3/12**

[58] **Field of Search**.....84/433–437, 376; 74/519, 523, 524

[56] **References Cited**

UNITED STATES PATENTS

1,246,998	11/1917	Pickard et al.	84/435
2,470,659	5/1949	Sloan	84/435
3,175,451	3/1965	Klann	84/433
2,514,978	7/1950	Terlinde	84/376
2,826,953	3/1958	Scherer	84/434 X
3,002,413	10/1961	Scherer	84/433 X

FOREIGN PATENTS OR APPLICATIONS

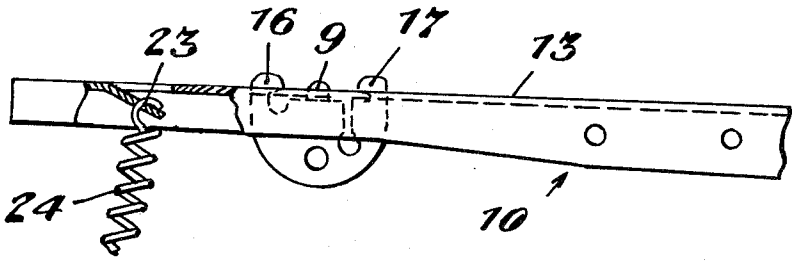
616,106	1/1961	Italy	84/376

Primary Examiner—Richard B. Wilkinson
Assistant Examiner—Lawrence R. Franklin
Attorney—Hofgren, Wegner, Allen, Stellman & McCord

[57] **ABSTRACT**

A key and mounting assembly for use in a keyboard of a musical instrument and the like. The assembly includes a key lever and a mounting element for pivotally mounting the key lever in the keyboard. Improved means are provided for connecting the mounting element to the key lever.

14 Claims, 6 Drawing Figures



PATENTED APR 11 1972

3,654,831

Fig. 1

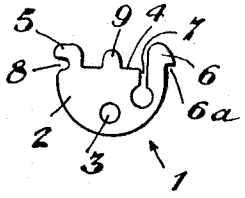


Fig. 2

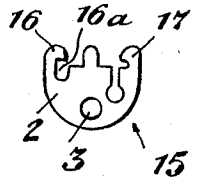
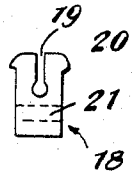


Fig. 3



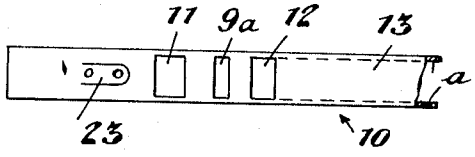


Fig. 4

Fig. 5

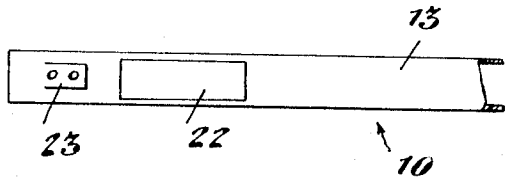
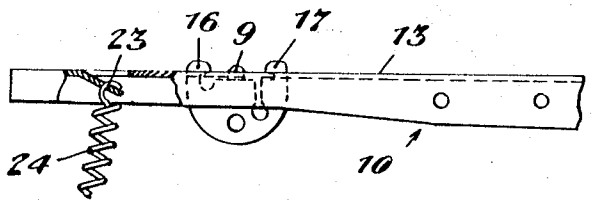


Fig. 6



INVENTORS
Umberto Grilli
Bruno Sturtha
Artemio Vivani
BY
Hoffgren, Wagner, Weller, Stellman & Cole
ATTORNEY

KEYBOARD

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to keyboards for musical instruments and the like such as keyboards for pianos, organs, accordions, etc.

2. Description of the Prior Art

In one conventional key and mounting assembly for use in musical instrument keyboards, a fastener is disengageably associated with a lever to define a rotatable pivot support for the key. Such assemblies provide for easy and quick installation of the keys in the keyboard. They may be rapidly replaced by unskilled personnel without the need for removing the pivot element of the keyboard as the lever may be disengaged from the fastener while leaving the fastener in place in association with the keyboard pivot element.

Such conventional fasteners consist of cylinders provided with two deep grooves, within which corresponding tongues of the key levers are retained by friction.

To hold together the cylinder and key levers, a preselected pressure of the key lever tongues on the walls of the cylinder grooves is required. Thus, the cylinder grooves and tongues must be manufactured to close tolerances. However, the materials of which the cylinders and key levers may be formed are limited because of the requirement for resiliency therein.

The known structures have a serious disadvantage in that during violent actuation of the keyboard, the levers could separate from the cylinder grooves of the fastener. Further, some motion of the key lever tongues within the grooves of the fastener occurs causing undesirable noise particularly where the keyboard is used in an electric or electronic musical instrument.

SUMMARY OF THE INVENTION

The present invention comprehends an improved key and mounting assembly eliminating the disadvantages of the above described prior art structures in a novel and simple manner.

The present invention further provides an improved key and mounting assembly providing for facilitated adjustment of the biasing of the keys in the assembled keyboards. Further, the adjustment provides for improved biasing accuracy.

More specifically, the invention comprehends an improved assembly wherein the key lever is provided with aperture means for receiving latching means of a mounting element. The mounting element defines the pivot axis means for mounting the assembly on the pivot means of the keyboard. The mounting element latching means provides for facilitated releasable connection to the key lever. The latching means is arranged to preclude movement between the mounting element and the key lever by a preselected spacing between the latch hook element and an opposed shoulder on the mounting element body. Further, the mounting element is adapted for snug fit in a U-section portion of the key lever for precluding lateral movement of the mounting element relative to the key lever.

The invention comprehends different hook arrangements broadly within the scope thereof.

The mounting element may be formed of a suitable material such as plastic to limit noise in the operation of the keyboard.

To provide for adjustable biasing of the keys, the key lever is provided with connecting means which are adjustably positionable on the key lever.

BRIEF DESCRIPTION OF THE DRAWING

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a side elevation of a mounting element embodying the invention;

FIG. 2 is a side elevation of another form of mounting element embodying the invention;

FIG. 3 is a front elevation of a further mounting element embodying the invention;

FIG. 4 is a fragmentary top plan view of a key lever suitable for use with the mounting elements of FIGS. 1 and 2;

FIG. 5 is a fragmentary top plan view of another form of key lever suitable for use with the mounting element of FIG. 3; and

FIG. 6 is a fragmentary side elevation of a key and mounting assembly embodying the invention utilizing the mounting element of FIG. 2 and the key lever of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A mounting element generally designated 1 is shown in FIG. 1 to comprise a body 2 having a through bore 3 adapted to receive the pivot element of a keyboard (not shown). Body 2 is provided with an upper shoulder 4. A first hook 5 extends upwardly from the body at one end thereof and is turned laterally outwardly above a recess or groove 8. A second hook 6 extends upwardly from the opposite end of the body 2 and is turned outwardly therefrom to define a downwardly facing shoulder 6*a*. Hook 6 is resiliently carried by body 2 as a result of the provision of a vertical cut 7 in body 2 extending downwardly from between hook 6 and shoulder 4. A projection 9 is provided on body 2 extending upwardly adjacent shoulder 4 substantially at the mid-portion of the body.

Mounting element 1 is adapted for use with a key lever such as key lever generally designated 10 as shown in FIG. 4. Key lever 10 includes a pair of rectangular openings 11 and 12 in the bight, or back, portion thereof. Lever 10 defines a U-section element further having side flanges 10*a* and 10*b*. Openings, or apertures, 11 and 12 are adapted to receive hooks 5 and 6 which engage the bight portion 13 of the key lever when the hooks are projected through the apertures in the assembled arrangement of the structure. An aperture 9*a* is further provided in bight portion 13 to receive the projection 9 of the mounting element. The dimensions of projection 9 are accurately correlated with the apertures 9*a* to assure a snug fit of the projection in the aperture to prevent longitudinal displacement between the mounting element and the key lever. The spacing between hooks 5 and 6 is preselected to assure the latched association of the latch means defined by the hooks and apertures 11 and 12. The resiliency of hook 6 permits the hooks to be brought together somewhat during the insertion thereof through apertures 11 and 12 for facilitated assembly of the structure.

The vertical distance between the level of shoulder 4 and the level of shoulder 6*a* is preferably smaller than the thickness of the key lever bight portion 13 so that when the hooks are in the key lever engaging position in the assembled arrangement of the structure, the bight portion is snugly retained against shoulder 4.

As a result of the above-discussed structure of mounting element 1 and key lever 10, substantially no relative movement of the key lever relative to the mounting element is possible in any direction thereby eliminating noise. Further, as the mounting element may be formed of plastic material, pivotal movement thereof causes substantially no audible sound. Still further, the structure effectively precludes undesired disconnection of the lever from the mounting element notwithstanding violent manipulation of the key lever such as during violent play of the keyboard. However, when it is desired to detach the lever from the mounting element, this may be readily effected by lateral displacement of the hook 6 to clear the aperture 12 and thereby permit ready removal of the key lever therefrom.

Turning now to the embodiment of FIG. 2, a modified form of mounting element generally designated 15 is shown to comprise a mounting element generally similar to mounting element 1 but having a modified hook construction wherein a pair of hooks 16 and 17 are provided at opposite ends of the mounting element body to project upwardly therefrom. Hooks 16 and 17 are inturned and a second recess 16*a* is provided in body 2 adjacent hook 16 to provide for resilient adjustability of the disposition of hook 16.

Mounting element 15 may be utilized in conjunction with key lever 10 generally similar to the utilization of mounting

element 1 therewith. However, the hooks 16 and 17 of mounting element 15 engage the inner edges of apertures 11 and 12 rather than the outer edges thereof as engaged by the hooks 4 and 6 of mounting element 1. In all other respects, the assembly of mounting element 15 and key lever 10 is similar to and functions similarly to the assembly of mounting element 1 and key lever 10 as discussed above.

Turning now to the embodiment of FIG. 3, a further modified form of mounting element generally designated 18 is shown to comprise a mounting element generally similar to mounting element 1 but having a pair of hooks 20 turned outwardly from the side faces of the mounting element rather than from the ends of the mounting element as in mounting element 1. A single longitudinal groove 19 is provided in the center of the mounting element to provide for resilient adjustability of the positions of hooks 20. A through bore 21 is provided in the body of the mounting element corresponding to bore 3 of mounting element 1.

Mounting element 18 is adapted for use with a modified form of key lever generally designated 110 as shown in FIG. 5. In key lever 110, the bight portion 13 thereof is provided with a single relatively long rectangular aperture 22. Hooks 20, when passed through recess 22 from the underside of the key lever, engage the bight portion 13 at the sides of the aperture 22 along the entire longitudinal extent thereof.

The invention further comprehends an improved means for adjusting the bias of the key lever under the action of a biasing spring 24. Thus, as best seen in FIG. 6, key lever bight 13 may be provided with a tongue 23 struck therefrom and turned downwardly at a desired angle. Spring 24 may be connected to the tongue and, thus, by suitably adjusting the angle thereof may have adjusted tension permitting equalization of the tension of each of the springs associated with each of the key levers of the keyboard. Spring 24 maintains the key lever in its rest position and, thus, it is important that the tension of the different springs be similar to preclude a variation thereof in the different keyboard keys. The simple adjustment of the tension by adjustment of the angle of the tongue 23 avoids the lengthy and complicated adjustment required in the prior art keyboards. As shown, the improved spring connecting means may be utilized with any of the different mounting elements and key levers within the scope of the invention.

What we claim is:

1. A key and mounting assembly comprising: a key lever provided with aperture means; and a mounting element having a first portion provided with pivot axis means, resilient latch means releasably latched to said aperture means fixedly locking the mounting element to the key lever to provide a pivotal support of the key lever, and cooperating projection and slot means on said lever and mounting element for preventing relative movement between said lever and mounting means when in locked association, other than by manipulation of said latch means with said first portion fixedly positioned relative to said lever.

2. The key and mounting assembly of claim 1 wherein said mounting element comprises a body having a recess means providing for resilient movement of the latch means relative to the body for resilient displacement of the latch means during insertion thereof into said aperture means.

3. The key and mounting assembly of claim 1 wherein said aperture means comprises a pair of spaced apertures and said mounting element comprises a body having a pair of hooks and a recess means providing for resilient movement of at least one of the hooks relative to the body for resilient displacement thereof during insertion thereof into said apertures.

4. The key and mounting assembly of claim 1 wherein said aperture means comprises a pair of spaced apertures and said mounting element comprises a body having a pair of hooks and a pair of recesses one each adjacent said hooks providing for resilient movement of the hooks relative to the body for resilient displacement of the hooks during insertion thereof into said aperture.

5. The key and mounting assembly of claim 1 wherein said key lever includes spaced turned edge flanges and said mounting element includes a portion between said flanges having a thickness substantially equal to the spacing between the flanges for preventing movement of the mounting element relative to the key lever in the direction between the flanges.

6. The key and mounting assembly of claim 1 wherein said mounting means includes a fixed shoulder engaging one face of the key lever adjacent the aperture means and said latch means comprises a shoulder spaced from said fixed shoulder less than the thickness of said mounting means therebetween and engaging the opposite faces of the key lever.

7. A key and mounting assembly comprising: a key lever provided with aperture means; and a mounting element having a first portion provided with pivot axis means, and resilient latch means releasably latched to said aperture means fixedly locking the mounting element to the key lever to provide a pivotal support of the key lever, said lever comprising a U-section member having depending leg portions and an upper bight portion, said mounting member being received between said leg portions and said latch means being releasably secured to said bight portion.

8. The key and mounting assembly of claim 7 wherein said aperture means include a locating aperture and said mounting means includes a locating projection snugly received in said locating aperture to retain the mounting element against lateral movement relative to the key lever.

9. The key and mounting assembly of claim 7 further including means for adjustably tensioning a biasing spring connected thereto.

10. The key and mounting assembly of claim 1 wherein said latch means comprises a pair of outturned hooks engaging outer edge portions of said aperture means.

11. The key and mounting assembly of claim 1 wherein said latch means comprises a pair of inturned hooks engaging inner edge portions of said aperture means.

12. The key and mounting assembly of claim 1 wherein said latch means comprises hook means turned parallel to said pivot axis.

13. The key and mounting assembly of claim 7 wherein said aperture means is provided in said bight portion.

14. The key and mounting assembly of claim 13 wherein said latch means projects upwardly through said aperture means to terminate above said bight portion.

* * * * *