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ADJUSTABLE BALANCE RAIL FOR KEYBOARDS

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2 Sheets-Sheet 2

Fig. 3.

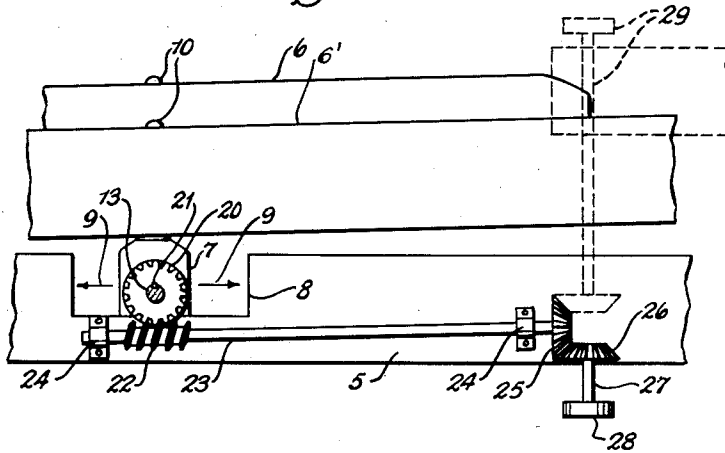
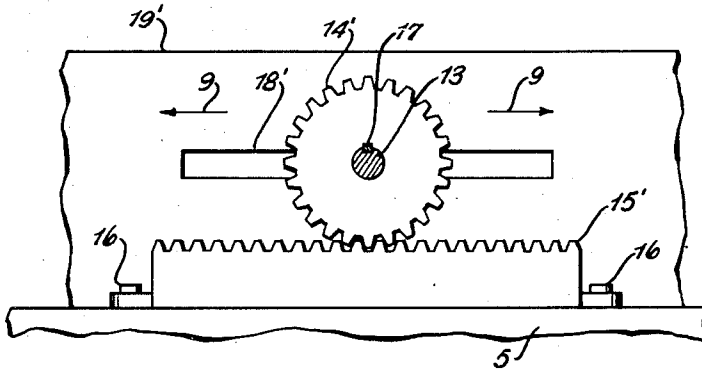


Fig. 4.



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ADJUSTABLE BALANCE RAIL FOR KEYBOARDS

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3 Claims. (Cl. 84—435)

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This invention relates to new and useful improvements and structural refinements in musical keyboard structures, more specifically, to a keyboard structure for pianos, organs, accordions, or the like, in which the balance rail which provides the fulcrum for the keys, may be adjusted in order to vary the "touch" or force with which the keys are actuated.

In this manner, the keyboard may be readily and conveniently adjusted in accordance with the sensitivity of the players' fingers and the advantages of the invention, particularly where several persons are using the same instrument, thus become readily apparent.

A further object of the invention is to provide a keyboard structure in which the adjustment of the balance rail does not in any way interfere with the hammer action and the conventional operation in general, of the keys.

Another object of the invention is to provide a keyboard structure in which the adjustment of the balance rail may be quickly and conveniently made by simply rotating a suitable button or knob provided at the side of the keyboard frame.

An additional object of the invention is to provide a keyboard structure which is of simple character and in which precautions are taken to prevent undesirable displacement of its component parts.

With the above more important objects in view, and such other objects as may become apparent as this specification proceeds, the invention consists essentially of the arrangement and construction of parts as illustrated in the accompanying drawings, in which:

Figure 1 is a top plan view of the keyboard, partially broken away.

Figure 2 is a cross-sectional view, taken in the plane of the line 2—2 in Figure 1.

Figure 3 is a cross-sectional view, taken in the plane of the line 3—3 in Figure 1, and

Figure 4 is a cross-sectional view, taken in the plane of the line 4—4 in Figure 1.

Like characters of reference are used to designate like parts in the specification and throughout the several views.

Referring now to the accompanying drawings in detail, the invention consists of the conventional keyboard frame 5, provided with the usual row of keys designated collectively by the reference character 6, 6'. The balance rail 7 provides the fulcrum for the keys and is transversely slidable in a recessed groove 8 formed in the frame 5, as indicated by the directional arrows 9 in the accompanying Figure 3.

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The balance rail is provided with a plurality of upwardly projecting pins 10, the same being longitudinally aligned on the balance rail and engaging longitudinally extending slots 11 formed in the keys 6, 6'.

The balance rail 7 is formed with a longitudinally extending bore 12 adapted to rotatably receive a shaft 13, the same projecting at both ends of the bore, as will be clearly apparent from the accompanying drawings.

Pinions 14, 14' are mounted adjacent the ends of the shaft 13, these pinions being in engagement with toothed racks 15, 15' respectively, secured by suitable bolts 16 to the keyboard frame 5. The pinions 14, 14' may be secured to the shaft 13 in any suitable manner, such as by a key 17, as illustrated in the drawings.

The ends of the shaft 13 are freely receivable in recessed slots 18, 18' formed in the end pieces 19, 19' respectively, of the frame 5 and a worm gear 20 is also secured to one end of the shaft 13 by means of the key 21.

This worm gear in turn, meshes with a worm 22 secured to a rod 23, the latter being rotatably journaled in suitable bearing blocks 24 secured to the keyboard frame 5. The rod 23 also carries a bevelled gear 25 in mesh with a further, similar gear 26, this being secured to a rotatable stem 27 of an adjusting knob 28.

The stem 27 may be suitably journaled in the keyboard frame so that the knob 28 is disposed on the underside at one end of the keyboard as shown in the drawings. Alternatively, the stem may extend upwardly so that the knob 28 is positioned above the keyboard, as is collectively designated in the drawings by the phantom lines 29.

It will be noted that the bottom of the recessed channel 8 as well as the longitudinal axis of the rod 23 are disposed in parallel with the normal plane of the keys 6, 6'.

A U-shaped channel 30 is secured to the frame 5 adjacent the inner ends of the keys, both sides of this channel being arcuated substantially as shown and the inner side being provided with a plurality of open-ended slots 31, defining keeper seats. A keeper element 32 is provided in the inner end of each of the keys 6, 6', each of these keepers engaging one of the seats 31. Each keeper is also provided with a head 33, the same being receivable between the sides of the channel 30, as will be clearly apparent from the accompanying drawings.

When the invention is placed in use, rotation of the knob 28 will be transmitted through the rod 23 and through the associated gearing 20, 22,

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25 and 26, to produce a corresponding rotation of the shaft 13. The associated pinions 14, 14' however, will coact with the respective stationary racks 15, 15' and resultingly, the shaft 13 and the balance rail 7 will be slid inwardly or outwardly in the recessed channel 8, as indicated by the arrows 9.

It will be noted that in this manner, the sliding of the balance rail will vary the location of the fulcrum of the keys, thereby increasing or decreasing the leverage of the same and varying the "touch" or force required for their actuation.

As the keys are depressed, the keeper elements 31 together with the associated heads 32 will be free to slide in the channel 30, without interfering with the operation of the keys. The purpose of the channel 30 and the keeper elements is to anchor the keys, so to speak, so as to prevent the same from sliding longitudinally, within the limits of movement of the pins 10 in the slots 11.

The balance rail and keys as a whole, are prevented from lifting upwardly by the ends of the shaft 13 engaging the aforementioned slots 18, 18'.

The connection of the keys to the hammers is in no way effected by the sliding movement of the balance rail, this being assured by the parallel relationship of the bottom of the recess 8 and of the axis of the rod 23 with respect to the plane of the keys, as has been already explained.

While in the foregoing there has been shown and described the preferred embodiment of this invention it is to be understood that minor changes in the details of construction, combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as claimed.

What I claim as my invention is:

1. In a musical keyboard structure, the combination of a row of keys, a balance rail positioned under and slidable longitudinally of said keys and providing an adjustable fulcrum therefor, said balance rail being formed with a longi-

tudinally extending bore, and means for sliding said rail comprising a shaft rotatably positioned in said bore, a pinion on said shaft, a stationary toothed rack, said pinion engaging said rack, and means for rotating said shaft.

2. A musical keyboard structure comprising in combination, a keyboard frame, a row of keys and a balance rail forming a fulcrum therefor, each of said keys being formed with a longitudinally extending slot, a plurality of projecting pins on said balance rail each engaging one of said slots, said balance being slidable transversely on said frame and formed with a longitudinally extending bore, a shaft rotatably positioned in said bore and projecting at both ends therefrom, a pinion at one end of said shaft, a worm gear and a further pinion at the remaining end of said shaft, rack strips secured to said frame and engaging said pinions, an adjustment rod rotatably journaled on said frame, a worm mounted on said rod and engaging said worm gear, means for rotating said rod and further means for anchoring said keys.

3. The device as defined in claim 2, in which said means for anchoring said keys comprises in combination, a U-shaped channel secured to said frame adjacent the inner ends of said keys, the sides of said channel being arcuated, a keeper element at the inner end of each of said keys, a head on each of said elements, one side of said channel being formed with a plurality of open-ended slots defining keeper seats, said keepers engaging said seats and said heads being disposed between the sides of said channel.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,224,994	Anelli	May 8, 1917