

Nov. 21, 1950

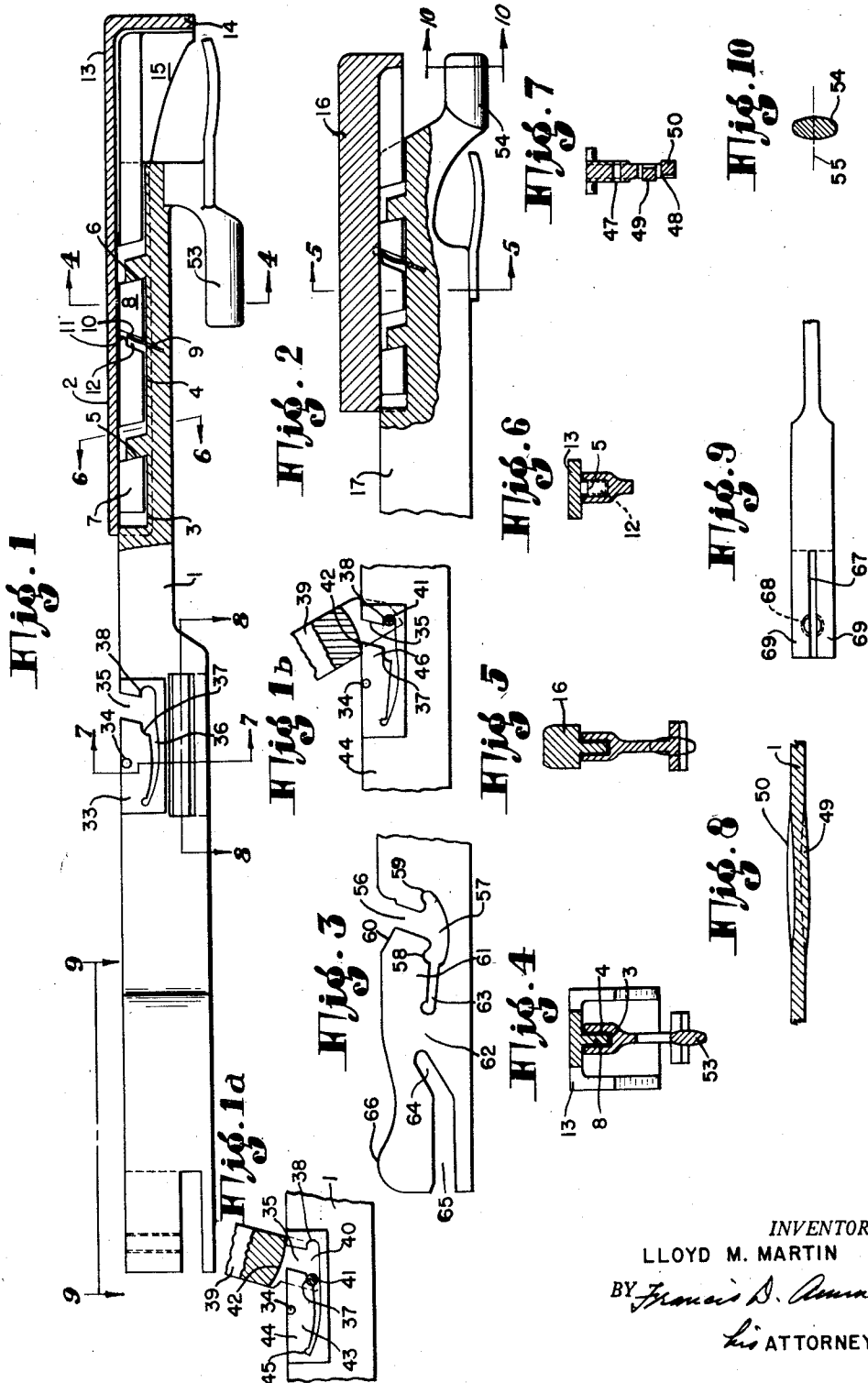
L. M. MARTIN

2,530,832

KEY-FRAME FOR KEY-OPERATED MUSICAL INSTRUMENTS

Filed Aug. 23, 1944

2 Sheets-Sheet 1



INVENTOR.
LLOYD M. MARTIN
BY *Francis D. Ammen*
his ATTORNEY

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L. M. MARTIN

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KEY-FRAME FOR KEY-OPERATED MUSICAL INSTRUMENTS

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2 Sheets-Sheet 2

Fig. 11

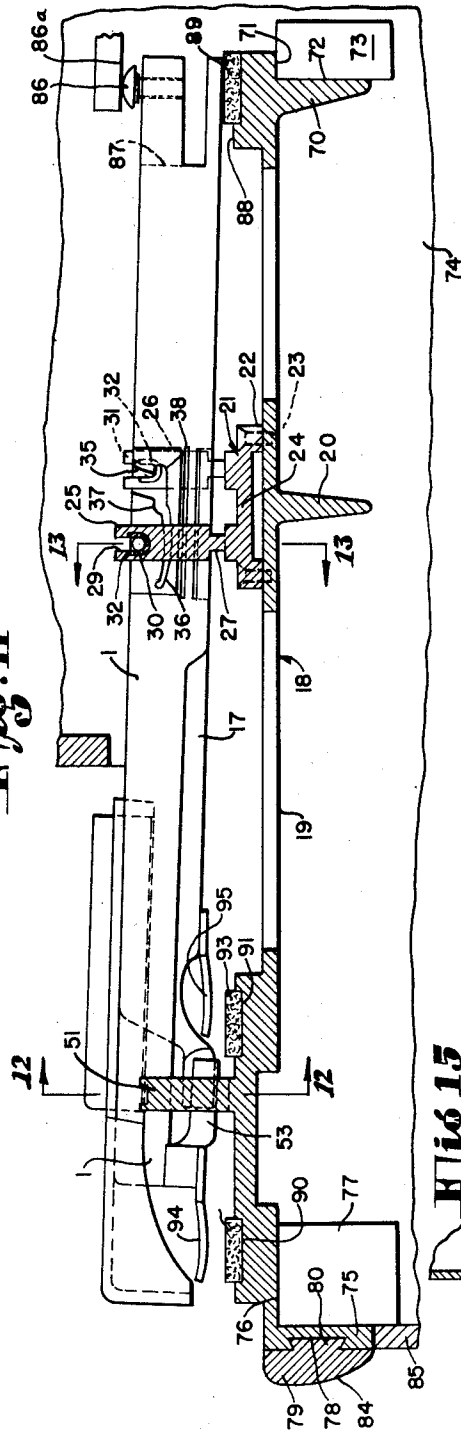


Fig. 12

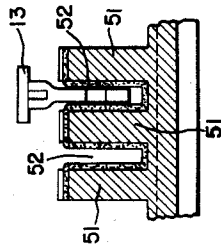


Fig. 13

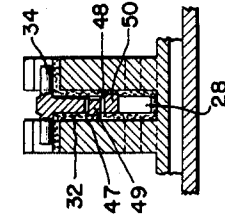


Fig. 14

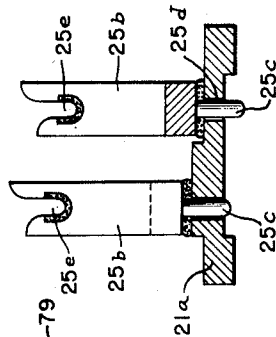
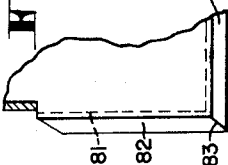


Fig. 15



INVENTOR.
LLOYD M. MARTIN

BY *Francis D. Common*
his ATTORNEY

UNITED STATES PATENT OFFICE

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KEY-FRAME FOR KEY-OPERATED
MUSICAL INSTRUMENTS

Lloyd M. Martin, San Francisco, Calif.

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18 Claims. (Cl. 84-434)

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This invention relates to the construction of pianos, or organs having piano keyboards.

It has been the general practice heretofore to construct the supporting means for piano keys by building a key-bed, and a key-frame to rest upon the key-bed. This key-frame included the balance rail that carried the balance pins, and heretofore the keys have been provided with vertical openings to enable them to fit over the balance pins. These openings fit somewhat closely to the pins at the base of the pins, but are enlarged in the front and rear direction on each key toward the upper edge of the key to permit the key to have its proper movement when struck.

The construction of this key-bed and of the key-frame heretofore has involved a considerable amount of manual labor which has been a large factor in the cost of pianos. The keys toward the ends of the keyboard when constructed of wood must be made specially, that is to say, each key must have its inner end disposed toward the piano action so that it forms an angle with the forward portion of the key which is of course at right angles to the longitudinal axis of the keyboard.

In constructing a piano in the usual way and as referred to above, it was necessary to spend considerable time in leveling up the key-bed and the key-frame which rested on the key-bed and that type of construction necessitated many special operations to insure that the supports for the keys on the balance rail were themselves substantially supported on the keybed so as to insure that the balance rail would not change its level at any point as compared with its level at other points. This type of construction that has heretofore been employed in piano construction is therefore expensive and furthermore the wood that was employed in constructing the key-bed and key-frame was of course considerably affected by the varying degrees of moisture in the atmosphere, the result being that pianos of this type required special attention to individual keys and their mounting and alignment with the other keys.

One of the objects of this invention is to provide a construction and a method of procedure in making a key-operated instrument, for example, a piano or organ which will overcome the difficulties outlined above.

Another object of the invention is to produce a piano construction in which the key-bed and key-frame are combined in a structure which will provide means for supporting the keys in their proper relation and by means which will main-

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tain them in the position in which they are originally placed when they are assembled into the piano; but incidentally providing a balance rail of improved construction in which an axis of rotation for each key is provided in such a way that the axis of rotation is maintained in a fixed position, and at the same time permitting easy removal of any key from the piano when desired.

Another object of the invention is to provide a construction for a piano key-bed or key-frame which can be formed by employing a method known as the extrusion method, that is to say, a method which involves the extruding of a plastic or alloy substance or material through an orifice or die which has the shape in cross section of the key-frame in a front and rear direction; and employing operation upon the extruded blank to enable it to properly pivotally support the keys and guide the same in their movements when they are struck; also to provide a construction of this type in which the balance supports for the keys are formed in such a way that they can be readily adjusted laterally or in a direction extending longitudinally of the key to insure and maintain a proper alignment of each key.

Another object of the invention is to provide a key-frame construction for a piano or organ which is particularly adapted for supporting keys constructed, not of wood, but of a pliable material such as lightweight metal, or plastic, of a pliable character, which enables the keys located toward the ends of the keyboard to be jigged to give their rear portions the proper angle to enable the capstan pin of each key to be properly aligned under the shoulder or toe of a part of the piano action such as the abstract, or any mechanism that imparts the movement of the key to the hammer.

Another object of the invention is to provide a construction for each key involving the use of a pivot pin or fulcrum for each key, mounted on the key in such a way that this fulcrum can be readily adjusted up or down to change its level relative to the key-bar that carries it.

When pianos are shipped, the forward part of the piano box at about the level of the keyboard is sometimes injured and marred in transit. Injury to the wood of the piano box at this point is particularly unfortunate because the location is so prominent and in full view of anyone standing in front of the piano. Such an injury is also difficult to repair in some cases without rebuilding the front of the piano box. One of the objects of the invention is to provide a construction for the key-bed or key-frame that will en-

able it to present a rigid forward face that will protect the woodwork at the piano front and which can readily be repaired if scratched or marred as suggested.

The invention consists in the novel parts and combination of parts described in the following specification, all of which contribute to produce an efficient piano construction.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawings:

Fig. 1 is a side elevation and partial section of a key-lever or key-bar illustrating a demountable "ivory" key-body carried on the same, the key-body and the adjacent portion of the bar being shown in section. The key illustrated in Fig. 1 is a white key, that is to say, a key which corresponds to a white key of an ordinary piano keyboard.

Fig. 1a is a fragmentary view partly in section illustrating how the form of the key-bar in the vicinity of its balance pivot adapts the key for adjusting the level of the balance pivot on the key-bar. This view illustrates the adjacent end of the adjusting tool and shows how the tool can be used to raise the level of the balance pivot of the key-bar.

Fig. 1b is a view similar to Fig. 1a but illustrating how an adjusting tool of this character can be employed for adjusting by depression of the level of the pivot pin with respect to the body of the bar.

Fig. 2 is a view which corresponds to the right end of Fig. 1 and is a similar view of the parts shown at this point in Fig. 1, but illustrating the adaptation of my embodiment to a black key of the keyboard for enabling the body of the key to be easily removable. This view is partly in section.

Fig. 3 is a side elevation of the rear end of a key-bar and illustrating how I may employ the embodiments illustrated in Figs. 1, 1a and 1b for effecting an adjustment of the rear end of the key-bar up or down with respect to the level of the forward portion of the key-bar.

Fig. 4 is a vertical section taken about on the line 4—4 of Fig. 1 and further illustrating details of the interlocking connection between the removable key-body or "ivory," and key-bar. This view also illustrates the preferred form of a guide fin that projects down from the end of the key-bar to guide the descending key in the slot of a key-guide.

Fig. 5 is a view similar to Fig. 4 and is a cross section taken on the line 5—5 of Fig. 2 to illustrate the adaptation of this feature of the invention to a black key.

Fig. 6 is a cross section taken about on the line 6—6 of Fig. 1 and further illustrating details of the interlocking connection between the key-body and the key-bar.

Fig. 7 is a vertical section taken about on the line 7—7 of Fig. 1 and further illustrating details of the construction of the key-bar in the vicinity of the balance pivot.

Fig. 8 is a horizontal section broken away taken about on the line 8—8 of Fig. 1 and particularly illustrating the manner in which the construction of the key-bar is adapted to enable the virtual thickness of the key under the balance pivot to be adjusted to the width of the slot in which the key is mounted.

Fig. 9 is a fragmentary view broken away and

is a plan of the rear end of the key-bar shown in Fig. 1 as viewed from the position of the line 9—9 on Fig. 1.

Fig. 10 is a cross section taken on the line 10—10 of Fig. 2 and illustrating the preferred cross section of a guide fin which projects down from the forward end of the key-bar for guiding the same in the guide-rail when the key is depressed.

Fig. 11 is a view similar to Fig. 1 partly in section showing the key-bed and key-frame embodying my invention and illustrating the improved keys shown in Figs. 1 and 2, mounted on this key-frame. In this view adjacent portions of the piano box are broken away.

Fig. 12 is a vertical section taken about on the line 12—12 of Fig. 11 and particularly illustrating the guide-rail and the manner in which the forward end of the key-bar is guided therein.

Fig. 13 is a vertical section taken about on the line 13—13 of Fig. 11, passing down through the key-rail at a balance post and illustrating the manner in which the key-bar is pivotally supported in the post for rotation on a fixed horizontal axis.

Fig. 14 is a view similar to Fig. 13 partly in section, and illustrating a modified embodiment of my invention in which the balance posts are not formed integral with the balance rail, but in which each post is pivotally supported for rotation on its own longitudinal vertical axis.

Fig. 15 is a diagrammatic plan view showing the construction at the end and front of the piano, where a face rail is provided to protect the front woodwork and the end from injury during shipment.

In Fig. 1 I illustrate a preferred construction for one of the piano keys, which includes a key-bar 1 and a key-body 2. These two parts have an interlocking connection which is so constructed that the parts can be interlocked by movement of these parts relative to each other; preferably this relative movement is in a longitudinal direction of the key. In order to accomplish this, the upper edge of the key-bar 1 is provided with relatively deep notches or sockets 3 and 4, the forward edges 5 and 6 of which are undercut, that is to say, they incline toward the forward end of the key in a downward direction. The key-body or "ivory" 2 may be molded of a transparent plastic material for a reason that will appear hereinafter, and is formed with two downwardly extending fins 7 and 8, which are preferably located on the longitudinal central axis of the key body 2. The forward edges of these two fins 7 and 8 are inclined to correspond with the inclination of the undercut edges 5 and 6 with which they cooperate to hold the key body in place on the key-bar. For this purpose, resilient means is provided that yieldingly presses the key-body 2 downwardly toward the outer end of the bar 1. If desired, the "ivories" may be formed of plastic.

Resilient means is provided for holding these parts interlocked. For this purpose, preferably at the bottom of the socket 4 a leaf-spring 9 is mounted that projects upwardly above the bottom of the socket and inclines toward the forward end of the bar 1, and this spring thrusts against the forwardly inclined edge 10 of a deep notch that is cut in an inclined direction upwardly from the lower edge of the pin 3. This notch 11 is narrow, but back of it a wider notch 12 is cut up into the edge of the bar so as to allow clearance for the back of the spring 9 when

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the key body 2 is being put in place. In doing this, the forward edge of the fin 8 is dropped down into contact with the upper end of the spring 9 and the key-body is then forced longitudinally inwardly on the key-bar 1 until the projecting forward edges of the fins 7 and 8 are located far enough back of the inclined undercut edges 5 and 6; and when this occurs the key-body is pushed down so that the fins 7 are substantially against the bottom edges of the notches 3 and 4. The key-body is then released and the spring 9 will push it forwardly on the bar to interlock the fins with inclined edges 5 and 6. As indicated in Fig. 4, the upper edge of the inner bar 1 is widened out so as to enable me to form the notches 3 and 4 as sockets cut down into this widened edge. This enables the fins 7 and 8 and the sockets 3 and 4 to cooperate to hold the key-body 2 upright. The key illustrated in Figs. 1 and 4 is a white key, the outer end of which is widened out as indicated in Fig. 4 so as to form a head 13 with a downwardly extending forward end or flange 14 reinforced by side flanges 15. Widening the forward end of the white keys enables them to form rectangular spaces between them for receiving the black keys, to be described hereinafter.

In Fig. 11, I illustrate a white key, and a black key disposed along the side of the white key but back of it. A black key-body 16 is mounted on the upper edge of its key-bar 17 in the same manner as the white key-body, as illustrated in Fig. 2, but the details of the end of the bar or lever are slightly altered as regards the guiding means for guiding these two types of keys when they are struck. These details will be more specifically described hereinafter.

In Fig. 11 I illustrate my combination key-bed and key-frame 18, which is shown in cross-section in a front and rear plane. This part is preferably formed by extruding metal through an orifice having the same shape as the cross-section illustrated in Fig. 11. The plate has a uniform transverse cross-section enabling the extruding die to form a blank of the key-frame that may be cut off to the proper length to adapt it to piano keyboards of different lengths. In this way, the blank for a plate body 19 may be formed, and this blank has an integral fin or web 20 extending longitudinally with the plate and preferably located directly under the location of the balance rail 21. This balance rail is preferably also formed of extruded metal and preferably has the cross-section illustrated in Fig. 11; and presenting downwardly extending feet or flanges 22, the bottom faces of which seat against the upper face of the plate 19 and are secured to the same by fasteners such as small screws 23. The balance rail 21, when it is extruded, is preferably given a shape which includes a substantially horizontal web or base 24 from which two balance rail sections 25 and 26 extend upwardly. These extensions 25 and 26 are formed integrally with the base 24, and the orifice through which they are extruded is formed so that these rail sections will present narrow necks 27 just above the base 24 for the purpose that will appear hereinafter. After the blank balance rail 21 is formed, it is machined to form transverse slots 28, that is to say, extending at right angles to the length of the balance rail. These slots 28 cut the rail up so that the rail sections 25 and 26 actually form separated posts 25a (see Fig. 12); and in addition to this the upper end of each of these posts is extruded with slots 29 extending respectively down into the ends of these posts from

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their upper end. The horizontal axes of the slots 29 at the upper ends of the posts extend longitudinally with the balance rail 21, that is to say, in a direction transverse to the direction in which the key levers lie in the instrument. This enables these slots to be formed when the balance rail is extruded through the die that gives it its shape in cross-section, and enables the bottoms of these slots to be given the half round form that enables them to form sockets under the projecting pins 34 that project from the sides of the key levers as will be described hereinafter. The extruding dies give the bottom of each slot a concave shape to form a socket 30 in each post to support the fulcrum pins for the key-bars 1 of the white keys; and also the key-bars 17 of the black keys. These sockets 30 are preferably undercut so as to form shoulders 31 that assist in maintaining felt liners 32 in the bottoms of the sockets.

At the location of these transverse slots 28 that receive the key-bars 1 and 17, the key-bars are formed with abutments 33 (see Fig. 1) which have a thickness that is slightly greater than the key-bars; in other words, the width of these bottoms is substantially the same as the width of each slot 28 that receives it; making allowance, of course, for the thickness of the felt liners 32; and at these abutments each key-bar is provided with a balance pin 34 which, if desired, may be a separate piece from the bar, but is preferably cast as an integral part of the bar. These balance pins 34 project out like trunnions on each side of each bar and lie in the half-round sockets 30 that receive them.

Each key-bar is preferably provided with a construction in the vicinity of the balance pins 34 that will enable the balance pins to be adjusted up or down when desired, so as to regulate their level with relation to the key-bar. For this purpose each key-bar is provided with a wide notch 35 (see Fig. 1) that extends down into it from its upper edge, and this notch communicates with a relatively narrow notch or slot 36 that extends along the key-bar and below the pin 34. At the junction of the narrow slot 36 and the relatively wide notch 35, two oppositely disposed shoulders 37 and 38 are formed. These shoulders are for the purpose of cooperating with an adjusting tool 39 (see Figs. 1a and 1b). This adjusting tool 39 is provided at its end with two side plates 40 between which a transverse pin 41 is located; the end of the body of the tool 39 is formed into a rounded cam face 42. In Fig. 1a I illustrate how the tool would be employed to adjust the balance pin 34 upwardly. This would be accomplished by passing the transverse pin 41 down through the slot 40 and then engaging it under the shoulder 37. The handle of the tool would then be swung toward the right, as viewed in Fig. 1a, which would cause the cam face 42 to support itself on the upper edge of the key-bar just to the right of the slot 35.

This would enable the material of the upper portion of the key-bar 1 that forms a tongue 43 to swing upwardly by bending the material of the key-bar at the relatively narrow point 44 between the upper edge of the bar and the end 45 of the horizontal slot or slit 36.

Fig. 1b illustrates how this same tool 39 would be used to depress the balance pin 34. In order to accomplish this, the pin 41 would be socketed under the shoulder 38 and the handle of the tool 39 would then be swung toward the left instead of toward the right. This would enable the cam face 42 to press down on the unsupported portions

46 at the side of the notch 35 that is adjacent the pin 34. This would cause this material to move downwardly with a rotation approximately around the point 44 as a center. In this way, the balance pin 34 may be adjusted up or down as desired. If desired, the material of each bar, such as the bar 1 or the bar 18 may be provided with an integral means enabling the thickness of the bar to be adjusted at a point below the balance pins 24, so as to adapt it to fill the width of the groove 28 in which the key-bar is mounted. In order to accomplish this, I partially cut out some of the material of the bar, adopting somewhat the same principle as employed in connection with the adjustments of the balance pins 34, except that they are adjusted up or down, whereas in the present instance the material of the bar is in opposite directions. For this purpose I prefer to cut two substantially parallel slots 47 and 48 in the bar so that the material between these two slots forms a strap 49 that can be forced laterally from the vertical plane of the bar, or originally cast in a somewhat laterally displaced position. In any case this strap 49 formed as it is, in a bar of pliable material can be pushed further out or pressed further in so as to alter its position on one side of the bar while the lower edge portion 50 of the bar below the lower slot 48 can be displaced more or less as desired in the opposite direction. Thus the virtual thickness of the bar and also its aligned position in the slot 28 can be adjusted as desired to cooperate with the balance pins 34 and to hold the bar in an upright or vertical position.

It will be evident that by reason of the presence of the reduced neck 27 of the posts, that are formed on each side of the slot 28, these posts can be readily bent toward the front of the piano or toward the back of the piano. This provides an adjustment of the axis of the balance pins in a front and rear direction of the piano.

In order to provide a guide rail I prefer to provide the extruded key-bed and frame 18 with a lateral extension which will form a continuous web or flange for a guide-rail 51 when this key-bed is extruded; and after the key-bed with its integral guide rail 51 is formed, I machine this rail by forming a plurality of transverse slots 52 in it (see Fig. 12). Each of these slots receives a guide tongue such as the guide tongue 53 (see Fig. 11) that is formed integrally with the forward end of the key-bar 1 and extends horizontally therefrom in a depressed position and projecting toward the rear of the piano. The shape of this guide tongue is illustrated in Fig. 4 and is such that it has its greatest width at about its medial horizontal axis.

A similar guide tongue 54 is formed at the forward end of a "black" keybar 17 and this tongue also has its greatest width in its medial horizontal plane indicated by line 55 in Fig. 10. By reason of the malleable character of the key-bars, these guide ends 53 and 54 can be twisted by rotating them on a longitudinal axis. This will give a virtual increased width to the tongues to enable them to fit more closely in their guide slots.

The improvements described in connection with Fig. 1 involving the use of a slot 36 for enabling the balancing pin 34 to be adjusted up or down may also be employed if desired at the rear ends of the key-bars. This is illustrated in Fig. 3, in which a deep notch 56 is provided that operates as a throat to admit the pin 41 of the adjusting tool 39 into the widened lower end 57 of this throat 56, at which point two sockets 58 and 59 are formed. By socketing the pin 41 in the socket

59, the cam 42 of the tool can be rested against the inclined face or edge 60, and when pressure is exerted to move the body of the tool 39 toward the left, this overhanging portion 61 of the material at this point will be bent downwardly, thereby producing a rotation of the material about the narrow neck 62 which is disposed between the end of the long slot 63 and the upward inclined extension 64 of the slot 65 that comes into the key-bar from its rear end. In this way, the rounded heel 66 of the key-bar can be adjusted up or down. This improvement avoids the necessity for employing a capstan screw at this point for effecting adjustment to the abstract's operating shoulder at 66a (see Fig. 11).

In Fig. 9 I illustrate the rear end of the key-bar 1 shown in Fig. 1, and this rear end may have the usual vertical slot 67 that passes down through the threaded socket 68 in which a slightly oversize shank for the capstan screw is seated. In this way the two tongues 69 that are formed in the material of the bar at each side of the central slot 67 exert a yielding clamping action on the capstan screw to hold it in place in any adjusted position it may have.

When the blank is extruded as referred to above to form the combined key-bed and key-frame 18, I also prefer to form the die so that the extruded blank will have an integral downwardly extending rear web or flange 70 (see Fig. 11). This flange preferably is formed near the rear end face of the plate so that an angular shoulder 71 is formed that cooperates with a vertical face 72 of the flange 70 to form a socket to fit onto a block 72 attached at each end against the side wall or check 74 inside the piano box; and furthermore, the die through which the metal is extruded is formed at its other end so as to extrude the metal in another integral flange or apron 75 that extends downwardly at the front of the piano box; and the vertical inner face of this flange cooperates with the under face 76 of the plate at this point to form a socket for supporting the forward edge of the plate 18 on each end wall 74 of the box. For this purpose, a block 77 is provided at each end that is secured to the end walls 74 of the box, like the blocks 73 are secured.

Furthermore, the extruding die is preferably shaped so that the outer face or forward face of the apron 75 presents a dove-tail slot 78, and this slot facilitates the attachment of a face rail 79 that is slid longitudinally into the same from the end of the piano. The inner face of this face-rail 79 is formed with a longitudinally extending dove-tail tongue 83 that fits into the dove-tail slot without requiring any machining or finishing of the contact faces.

If desired, the ends of the plate 18 can also be provided with dove-tail grooves, such as the dove-tail groove indicated by the dotted line 81 in Fig. 15. In this case, the front rail 79 would be slid into position first, and then a short face rail or end rail 82 would be slid forwardly from the rear end of each slot 81, the side rails 82 and the front rails 79 meeting together at a miter joint 83. These face rails 79 and 82 have preferably a convex forward face such as the convex face 84 indicated in Fig. 11. The forward wall 85 of the box would fit up to the lower edge of the apron 75.

These face rails 79 and 82 may be also made up of extruded metal or plastic, and in the latter case can be given any desired color.

Referring again to Fig. 11, and to the rear end of the key-bar which I illustrate, the rear end of the bar may be provided with a capstan screw 86,

the threaded shank of which is screwed down into a socket formed in the rear end of the key, where a vertical slot similar to the slot 67 is provided extending forward to the point indicated by the dotted line 87.

When the plate 13 is extruded, its rear edge and upper side may be formed with a longitudinal rib 88 that cooperates with the upper face of the plate to form a rudimentary socket to receive the rear pad or cushion 89 on which the rear ends of the key-bars rest.

Toward the front of the plate 18, narrow channels 90 and 91 are formed in the upper face of the extruded plate, which form sockets to retain the longitudinal pads or cushions 92 and 93 that operate as rests for the forward ends, or stops, to limit the downward movement of each key when struck. In order to cushion this contact, each key-bar 1 is provided with a projecting tongue 94 and a similar projecting tongue 95 is provided on the "black" key-bar 17. These tongues 95 and 94 may be cast integrally with their corresponding key-bars.

It will be evident that the face rails 79 and 82 operate as effective protection for the ends and forward portion of the piano box to prevent injury to the woodwork at these points. These face rails are of material to resist being marred or broken, but if they are injured in transit, they can readily be repaired, redecorated, or replaced by other rails.

In Fig. 14 I illustrate a construction for the fulcrum posts in which they are not cut out from an extruded rail section, and in which the posts 25b are made as separate pieces with integral pivot pins 25c received in round sockets 25d drilled into a base-rail 21a that has a cross-section corresponding to that of the lower portion of the balance rail 21 shown in Fig. 11. The axis of each pin or pintle 25c is of course in line with the medial plane passing through the socket 25e, so that the post can orient itself on its pivot to adapt it to the vertical plane of the key-lever without causing any shift of this plane if rotation occurs on the axis of the pin.

Many other embodiments of this invention may be made without departing from the spirit of the invention.

I claim as my invention:

1. In a piano or organ, a key-frame including a rigid plate extending longitudinally of the keyboard; a balance rail secured to the upper side thereof; said balance rail having integral fulcrum posts extending upwardly therefrom, with open sockets in their upper ends, the horizontal axes whereof extend longitudinally with the balance rail, for pivotally supporting the keys, said fulcrum posts having slots between the same to receive the bodies of the keys when the keys are pivotally supported in their sockets.

2. In a piano or organ, a key-frame including a plate-form body extending longitudinally of the keyboard, said body having an integral web extending longitudinally of the plate located on its underside at an intermediate point between the front and rear thereof, and operating to prevent the plate body from warping, said plate having a uniform cross-section throughout its entire length, thereby enabling a blank for producing the key-frame to be formed by extruding material through an extruding die.

3. In a piano or organ, a key-frame including a rigid plate extending longitudinally of the keyboard, a balance rail secured to the upper side thereof, said plate having an integral web ex-

tending longitudinally of the plate, located substantially under the balance rail; said balance rail having integral fulcrum posts extending upwardly therefrom with transverse slots extending at right angles to the longitudinal axis of the rail, the upper end faces of said posts having open sockets opening upwardly, the axes of said sockets extending parallel with the longitudinal axis of the web; said posts having flat side faces located in planes disposed at right angles to the longitudinal axis of the web; and pliable key levers lying in said slots respectively, having flat side faces lying adjacent to the side faces of the slots and guided thereby, said key levers having pivots on each side thereof and resting on the sockets, said pliable key levers capable of having their rear ends bent out of line with their forward ends.

4. In a piano or organ, a key-frame including a rigid plate extending longitudinally of the keyboard, said plate having an integral web extending longitudinally of the plate located substantially under the position at which the balance rail is to be located, a balance rail secured to the upper side of the plate, having integral fulcrum posts extending upwardly therefrom with transverse slots between the same, the side faces whereof are disposed at right angles to the plane of the longitudinal axis of the web, the upper end faces of said posts having open sockets opening upwardly, the axes whereof extend parallel to the longitudinal axis of said web for pivotally supporting the key levers, and metal key-levers pivotally supported in said sockets, having flat side faces adjacent the flat side faces of the posts, and held in alignment by the same; said plate having a rest cushion for the rear end of the key-levers, and said key-levers each having a horizontal slot extending into the same from its rear end, and substantially over its point of contact with the rest cushion.

5. The combination of parts according to claim 1, in which the posts are formed with necks of reduced thickness adjacent the balance rail capable of being bent to adjust the position of the socket of each post.

6. In a piano or organ, the combination of a balance rail; and fulcrum posts extending up from the rail, each post integral with the rail with a slot extending down into the same from its upper end, and having an open socket at each side of the slot, and a removable key-lever corresponding to each post lying in the slot, having a pivot pin projecting from its side supported in its corresponding socket.

7. In a piano or organ, the combination of a metal key-frame; a longitudinally extending balance rail with fulcrum posts extending up from the same; key-levers having pins projecting from their sides, resting on the upper ends of said posts; said plate having an integral longitudinally extending guide rail with guide slots therein receiving and guiding the forward portions of the key-levers.

8. The combination of parts according to claim 6, in which each post is provided with a slot passing down through the same in a front-and-rear plane receiving its corresponding key lever, and each key-lever is formed with an abutment on its side located at the said front-and-rear slot and filling the width of the same.

9. The combination of parts according to claim 6 including a key-bed in the form of a plate with a stop cushion for the forward end of the key lever, each key lever having a tongue projecting

over the stop cushion to engage the same and stop the downward movement of the key-lever.

10. The combination of parts according to claim 6 including a key-bed in the form of a plate with a stop cushion supported on the plate, each key having a notch in its lower edge, with an integral tongue projecting under the notch and engaging the cushion stop when the key-lever is struck, to limit its downward movement.

11. The combination of parts according to claim 6, in which each post is formed with a slot extending down into the same to receive the key-lever; the key-lever being composed of pliable material and having laterally movable means integral therewith adapted to be adjusted laterally to fill the width of said slot.

12. A key-frame for a musical instrument having an elongated body of uniform transverse cross-section enabling the same to be produced by extruding the material composing the same through a die, said key-frame having a longitudinally extending guide rail integral with said body, said rail operating to stiffen said body, and having transverse slots therethrough presenting side faces for guiding operating levers of the musical instrument.

13. A key-frame for a key-operated musical instrument, said key-frame having an elongated body of uniform transverse cross-section so as to enable the same to be formed by extruding the material composing it through a die having the shape of the said transverse cross-section, said key-frame having an integral longitudinally extending guide rail, said rail operating to stiffen said body, and having transverse slots dividing the rail into posts for separating the keys of the instrument and having side faces for engaging the sides of the keys while disposed in said slots.

14. A key-frame for a piano, or like instrument having operating keys, said key-frame having an elongated body of uniform transverse cross-section to enable the same to be formed by extruding the material composing it through a die having the shape of said transverse cross-section, said key-frame having an integral, longitudinally extending guide rail at the side thereof located toward the front of the instrument, said guide rail operating to stiffen said body, and having transverse slots therein dividing the rail into posts for engaging the side faces of keys to guide the forward ends of the keys of the instrument while the keys are lying in the slots, said body having a longitudinally extending integral rib on the under side thereof disposed substantially at the location of the balance rail for the keys.

15. A key-frame according to claim 1, including an upwardly extending integral guide rail extend-

ing continuously throughout the length of the frame, disposed forwardly on the plate, said guide rail having transverse slots extending transversely therein, and presenting side faces for engaging and guiding the forward ends of the piano keys when they are struck.

16. In a piano, a key-frame including a plate formed of extruded material, said plate having an upwardly extending integral guide-rail running longitudinally with the plate; said guide-rail having transverse slots extending transversely therein, and presenting side faces for engaging and guiding the piano keys when they are struck.

17. A key-frame including a plate-form body having a uniform cross-section adapting the same to be extruded through an extruding die, having means for supporting the key bars along a line extending longitudinally with the plate, said plate having a downwardly projecting flange at the forward edge thereof, with a substantially dovetail slot on its forward face extending longitudinally, enabling a face rail to be slid longitudinally into the same from the end of the key-frame.

18. A balance rail for a piano key-frame, having a uniform transverse cross-section enabling the same to be extruded through an extruding die having the shape of the said transverse cross-section, said balance rail comprising two extensions projecting upwardly from its upper side disposed apart from each other in a lateral direction on the balance rail, and extending longitudinally throughout the length of the rail, said extensions having transverse slots extending completely through the same, dividing the extensions into posts with flat side faces for engaging flat side faces of key-levers placed in said slots between the posts, the upper ends of said posts having means for supporting the fulcrums of the keys of the instrument.

LLOYD M. MARTIN.

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