

Sept. 8, 1931.

L. LOAR

1,821,978

PIANO

Filed July 10, 1929

3 Sheets-Sheet 2

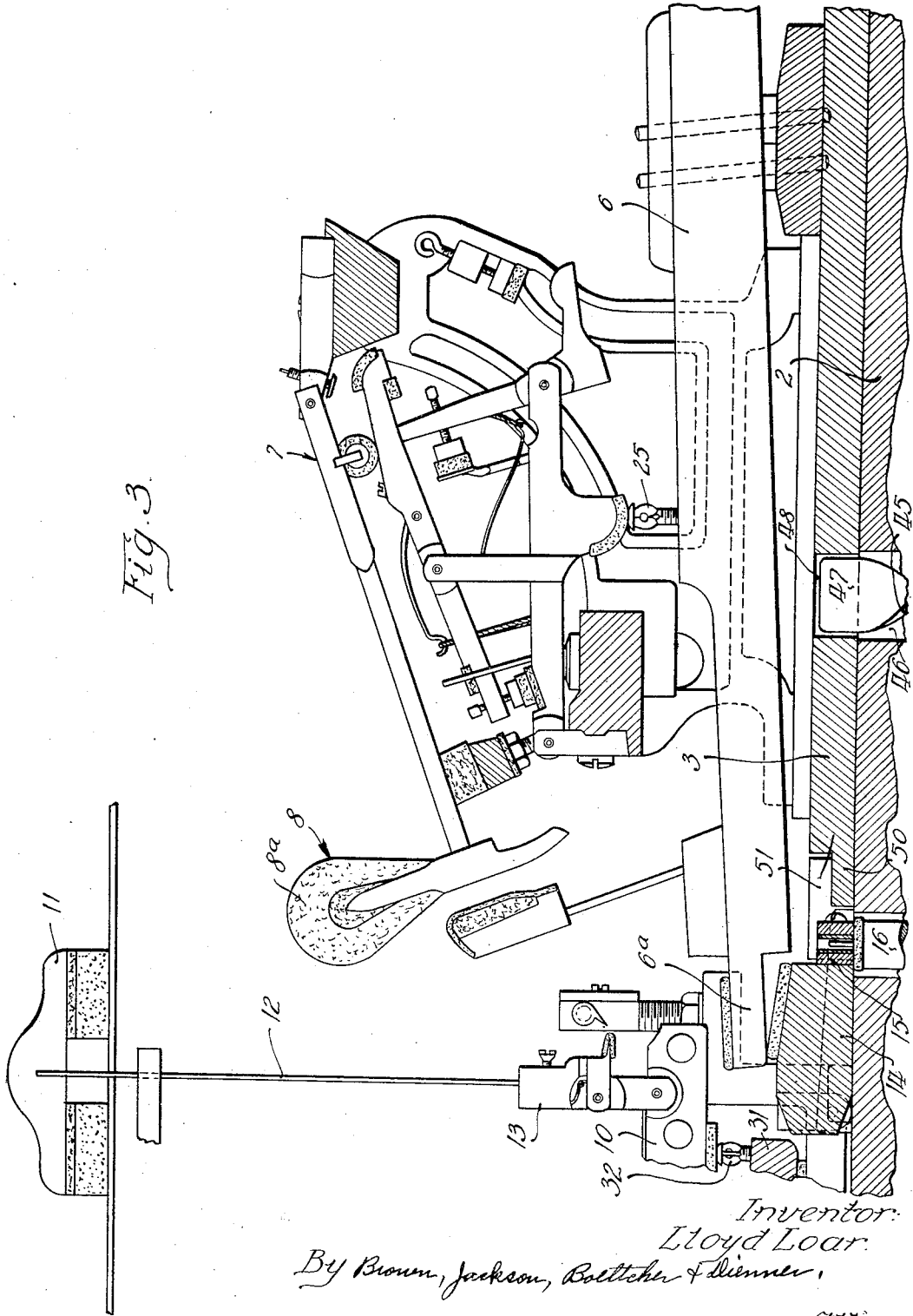


Fig. 3.

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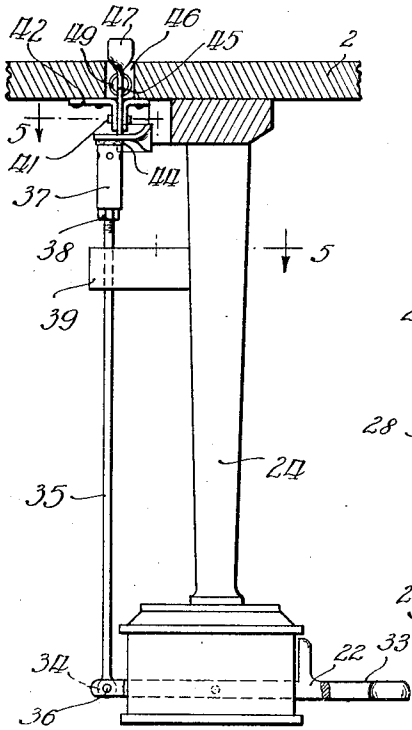


Fig. 4.

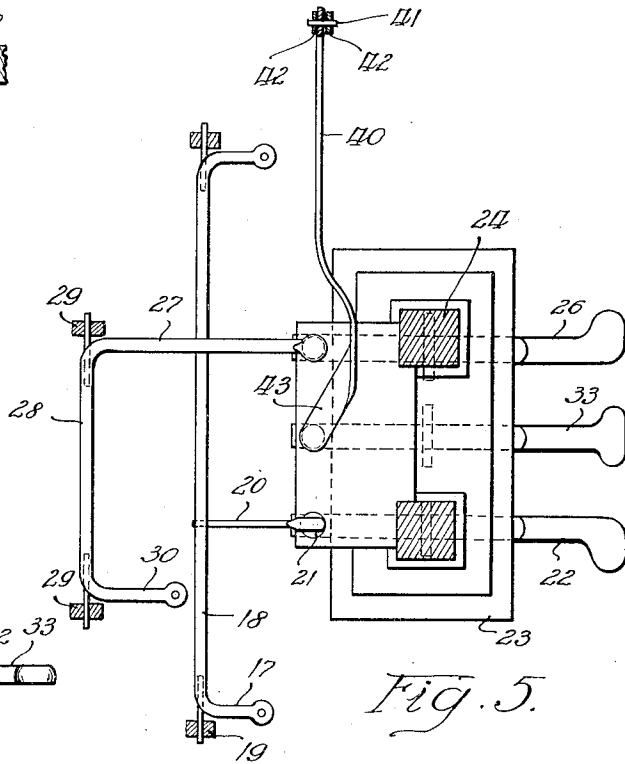


Fig. 5.

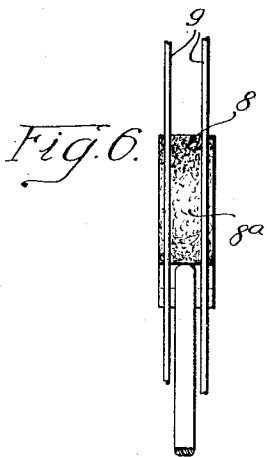


Fig. 6.

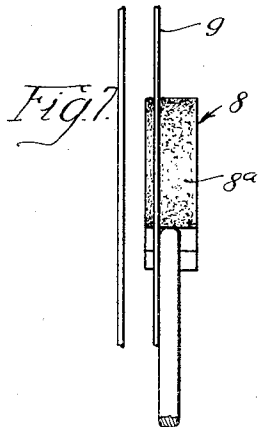


Fig. 7.

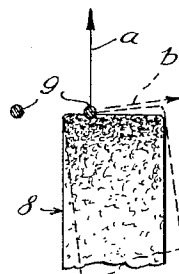


Fig. 8.

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UNITED STATES PATENT OFFICE

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PIANO

Application filed July 10, 1929. Serial No. 377,190.

This invention relates to pianos, and more particularly to means for producing a harpsichord effect in the playing of the piano.

It has been proposed to provide special mechanism in pianos for plucking the strings when desired to produce special effects. Such mechanisms are supplemental to the actions and associated parts for playing the piano and are rather complicated, adding materially to the cost of the instrument. One of the main objects of my invention is to provide simple and efficient means for producing a wiping effect upon the strings of a piano so as to produce what is known as the harpsichord effect. A further object is to provide means whereby this wiping effect is produced by the hammers ordinarily used in playing the instrument and without the use of complicated supplemental mechanisms.

A further object is to provide simple and efficient means for shifting the key bed in such a manner as to dispose the hammers so as to cause the latter to strike but one string of the respective unisons in such manner as to exert a wiping effect thereon. Further objects and advantages of my invention will appear from the detailed description.

In the drawings:

Figure 1 is a plan view of a key bed and associative parts of a grand piano, illustrating my invention as applied thereto, the casing of the piano being shown fragmentarily.

Figure 2 is a fragmentary sectional view through the key bed and the supporting base therefor, on an enlarged scale, taken substantially on line 2—2 of Figure 1,

Figure 3 is a section through the key bed and associative parts, on an enlarged scale, taken substantially on line 3—3 of Figure 1, parts being shown in elevation,

Figure 4 is a fragmentary sectional view through the key bed base taken adjacent the shift lever, parts being shown in elevation,

Figure 5 is a section taken substantially on line 5—5 of Figure 4,

Figure 6 is a plan view of the strings of one unison of the piano and the hammer, the latter being shown in its normal position,

Figure 7 is a view similar to Figure 6 show-

ing the hammer shifted into position to produce the harpsichord effect,

Figure 8 is a vertical sectional view, on an enlarged scale, through the strings of a unison, the hammer being shown fragmentarily in elevation and as striking one of the strings, the final position of the hammer at the termination of its up stroke being indicated by dotted lines.

I have illustrated my invention, by way of example, as applied to a grand piano which is, in general, of known construction. This piano comprises a casing 1, a key bed base 2, a key bed 3 slidably mounted upon the base for longitudinal movement, and a leaf spring 4 confined between one end of the key bed 3 and one side of the casing 1, this spring normally holding the other end of the key bed against the left hand side of the casing.

A resonator 5 is mounted in the casing 1, in a suitable manner, in rear of the key bed. This resonator may be in the form of a sounding board, though I preferably use a sound box constructed in accordance with that disclosed in my copending application for a piano, Serial No. 328,238, filed December 24, 1928. A string frame or plate, as it is commonly termed, is disposed in the casing 1 above the resonator 5 and has the strings disposed thereon in a suitable manner. This plate, and the manner of disposing the strings thereon, is well known in the art and has been omitted for the sake of clearness of illustration.

It is common practice in grand pianos of ordinary construction to employ three strings to each unison. I, preferably, employ but two strings to each unison, as disclosed in my copending application above identified. I contemplate, however, using my invention with pianos employing three string unisons, when desired.

Keys 6 are mounted upon the key bed 3, in a known manner, and each key has associated therewith an action 7 which is of known construction and is mounted upon the key bed in a known manner, this action comprising a hammer 8. In the normal position of the key bed each of the hammers 8 is disposed below, and in vertical alignment with, strings 9 of

the respective unisons, the strings being disposed equidistant from the transverse center of the hammer as in Figure 6. Upon depression of key 6 the action 7 is actuated so as to cause hammer 8 to strike the strings producing the loud pedal effect. Simultaneously with this upward movement of the hammer, the inner end of the key 6 contacts damper lever 10 thus raising damper head 11, through wire 12 and damper block 13, in a known manner. Upon release of key 16 the parts are returned to their normal positions of Figure 3.

When it is desired to produce the soft pedal effect, all of the hammers 8 are raised simultaneously toward the strings of the unison by means of a bar 14 which extends beneath the reduced inner ends 6^a of the keys.

This bar is hingedly mounted on the key bed base 2 and is normally in its lower position illustrated in Figure 3. Blocks 15 are secured to the bar and rods 16 are confined between these blocks and the forward ends of arm 17 of a U-shaped lever 18 rockably mounted in brackets 19 secured to the under face of key bed base 2. An arm 20 is secured to lever 18 and bears at its forward end upon a head 21 at the upper end of a rod connecting this arm and the rearward end of a soft pedal 22 mounted in a pedestal 23, in a suitable manner, this pedestal being supported by posts 24 suitably secured thereto and to the piano casing. The rail 14 and the parts associated therewith for producing the soft pedal effect by raising the hammers toward the strings forms the subject matter of my copending application for piano, Serial No. 377,189, filed July 10, 1929, and need not be further illustrated or described here, it being sufficient to note that by raising the rail 14 the inner ends of the keys 16 are all raised simultaneously and act through the actions 7 and associated capstan screws 25 to raise the hammers 8 toward the strings of the instrument.

A sustaining pedal 26 is mounted in the pedestal 23 and is operatively connected to one arm 27 of a U-shaped lever 28 rockably mounted in brackets 29 suitably secured to the under face of key bed base 2.

The other arm 30, of this lever is suitably connected, in a known manner, to damper rail 31. This rail is provided with capstan screws 32 disposed beneath damper levers 10 so that, when pedal 26 is depressed, these levers are raised thus raising the damper heads 11 into inoperative position. The construction and operation of the damper rail and the sustaining pedal and associated parts are well understood in the art and need not be further illustrated, nor described in more detail.

A shift pedal 33 is mounted in the pedestal 23 for rocking movement, being disposed between the pedals 22 and 26. This pedal is

forked at its rearward end for reception of an eye 34 at the lower end of a rod 35. This rod is pivotally secured to the pedal, on a horizontal axis by a pin 36 passing through the arms of the fork of pedal 33 and the eye 34. The head 37 screws upon the upper end of the rod and is secured in adjustment thereon by a jam nut 38. Pedals 22 and 26 are connected to rods similar to rods 35 and provided at the upper ends thereof with heads similar to head 37, all of these rods operating through a guide member or block 39 suitably secured to posts 24.

An angle shift lever 40 is rockably mounted adjacent the angle thereof, at 41, between a pair of brackets 42 suitably secured to the under face of key bed base 2.

The longer arm of this lever extends toward the left hand end of casing 1 and has its end portion turned through an angle of 90 degrees to provide a flat terminal element 43 which rests upon a felt disc 44 suitably secured to the upper end of head 37.

The shorter arm 45 of this lever is disposed vertically and extends through a slot 46 in key bed base 2. The upper end portion of this arm is turned through an angle of 90 degrees to provide a flat terminal element 47 which extends into a slot 48 in key bed 3 and aligned vertically with slot 46. The width of slot 48 corresponds approximately to the thickness of element 47 so that there is no objectionable looseness or play between this element and the key bed. An expansion coil spring 49 is disposed in slot 46 and is confined between arm 45 and the more distant end wall of the slot. This spring exerts pressure in such direction as to hold element 43 snugly against the felt disc 44 and prevents any undesirable looseness or play in the lever 40 such as might produce an objectionable metallic rattle.

The key bed is reduced in thickness at its inner side to provide a flange 50 which extends beneath guide clips 51 suitably secured to the key bed base 2. The outer or front side of the key bed is shown as contacting front rail 52 of the casing. The key bed is thus held against transverse movement, that is against movement toward the front or back of the piano, while being slidable toward the sides thereof.

Normally the key bed is held in contact with the casing 1 at the left hand side thereof, as in Figure 1. When shift pedal 33 is depressed the key bed is shifted toward the right into approximately the position indicated by dotted lines in Figure 1, by the action of shift lever 40 and associated parts. When the key bed is in its normal position the hammers 8 are disposed below both strings of the respective unisons and in vertical alignment therewith, the transverse center line of the hammer being midway between the two strings, as in Figure 6. With the key bed

in the dotted line position of Figure 1 each hammer is disposed with its transverse center line to the right of the last string of the respective unisons, as in Figure 7. The hammers 8 are of known construction and each of these hammers is provided with a relatively thick layer or covering 8^a of felt. The hammers are also loosely mounted to facilitate actuation thereof, as is the common practice.

10 With the hammer disposed as in Figure 7, when the key 6 is depressed the hammer is caused to strike the right hand string 9 of the associated unison, the point of contact of the hammer with the string being disposed an appreciable distance to the left of the transverse center line of the hammer. This, in conjunction with the loose mounting of the hammer, results in the hammer tilting or canting slightly toward the right as indicated by the dotted line position of the hammer in Figure 8.

In this figure the stroke of the hammer, that is the force actuating the hammer, is vertical as indicated by the arrow *a*. Due to the tilting of the hammer, referred to, this vertical force is, in part, converted into a component substantially at right angles thereto as indicated by the dotted line arrow *b*. The direction of movement of the hammer, as it contacts the string, is thus converted from a vertical movement to a lateral movement at an inclination upwardly of several degrees. This lateral shifting of the hammer produces a wiping effect on the strings which is emphasized by the ability of the felt 8^a to give or be compressed slightly under the impact of the blow. In this manner I produce the harpsichord effect, which results from the wiping action of the hammers across the strings, by utilizing the hammers employed in the ordinary playing of the instrument and without any necessity for providing supplemental mechanism for playing of the strings. A particular advantage of my invention is that it necessitates no material changes in the construction of the piano and does not in any way alter the usual pedal arrangement thereof. In this connection it is pointed out that I employ the center pedal for shifting the key bed, this pedal corresponding to the usual sostenuto pedal of a piano which, in practice, is seldom if ever used. I thus provide simple and efficient means for producing, in a piano of what may be considered as standard construction, the harpsichord effect.

While I have illustrated and described my invention as applied to a grand piano adapted to be played by hand, it can be applied to advantage to instruments of various other types and I do not intend therefore, to in any way limit my invention to this one use.

What I claim is:

1. In combination in a piano comprising the strings arranged in unisons each having a

plurality of strings, actions comprising hammers normally disposed to strike all of the strings of the respective unisons, said hammers being loosely mounted for limited lateral twisting movement, and means for disposing the hammers to strike one string only of the respective unisons and to one side of the transverse center of the hammer whereby upon contact of the hammer with said string said hammer will be shifted across said string to produce a wiping effect thereon.

2. In combination in a piano comprising the strings arranged in unisons each having a plurality of strings, a shiftable key bed, and actions mounted thereon and comprising hammers for the respective unisons, said hammers being loosely mounted for limited lateral twisting movement, the key bed being normally disposed to position the hammers to strike all of the strings of the respective unisons, and means for shifting the key bed into position to dispose the hammers to strike one string only of the respective unisons and to one side of the transverse center of the hammer whereby upon contact of the hammer with said string said hammer will be shifted across said string to produce a wiping effect thereon.

3. In combination in a piano comprising the strings arranged in unisons each having a plurality of strings, a key bed base, a key bed slidable on the base for end wise movement, actions mounted on the bed and comprising hammers for the respective unisons, said hammers being loosely mounted for limited lateral twisting movement, yielding means urging the key bed in one direction and normally holding it in position to dispose the hammers to strike all of the strings of the respective unisons, and means for shifting the key bed in the other direction a proper distance to dispose the hammers to strike one string only of the respective unisons and to one side of the transverse center of the hammer whereby upon contact of the hammer with the string the movement of said hammer will be changed to provide a wiping effect upon said string.

In witness whereof, I hereunto subscribe my name this 13th day of June, 1929.

LLOYD LOAR.