

Jan. 16, 1968

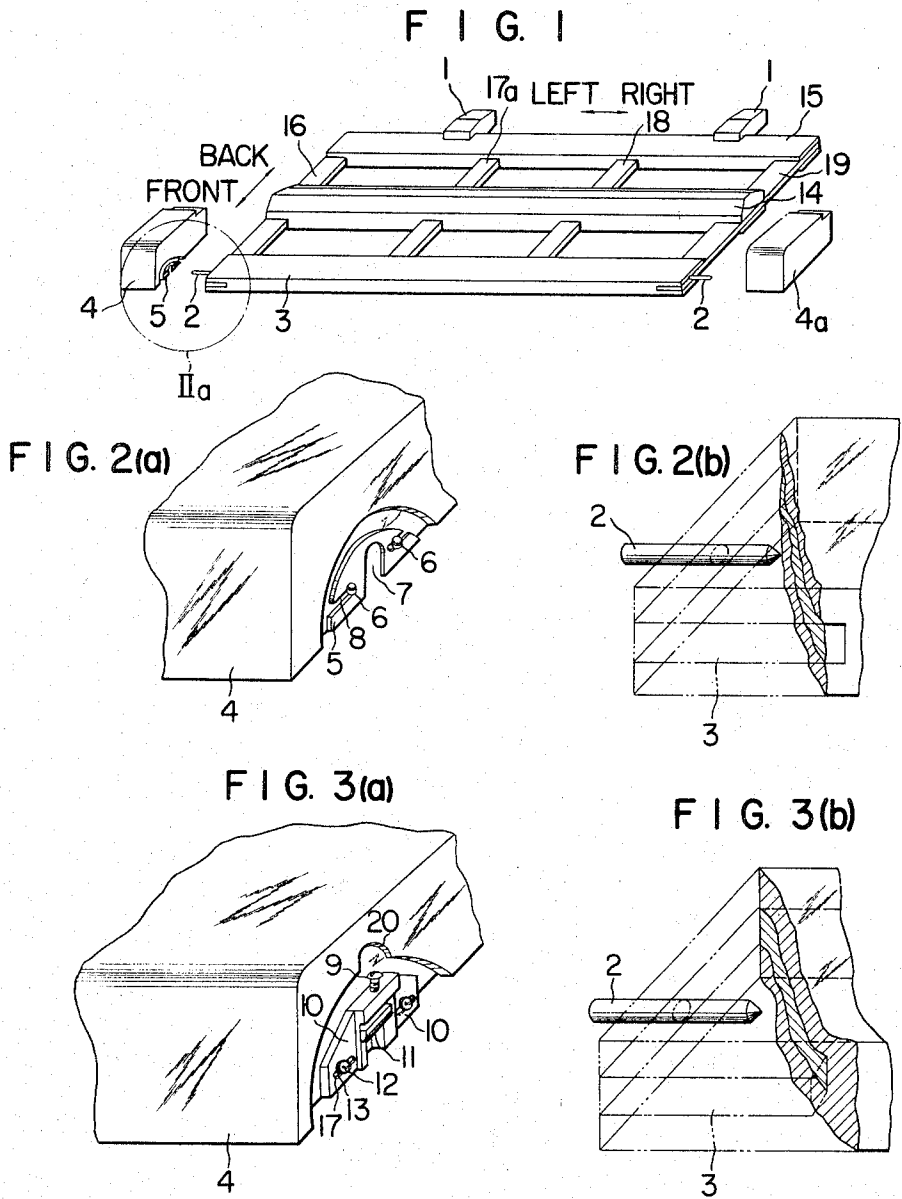
YOSHIYUKI MATSUMOTO

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KEYFRAME SIDE PIN GUIDES OF MUSICAL INSTRUMENT

Filed Dec. 8, 1966

2 Sheets-Sheet 1



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FIG. 4

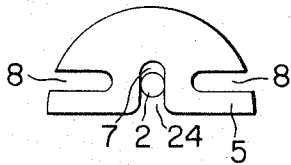


FIG. 5

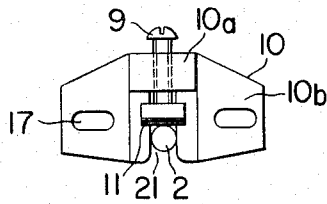


FIG. 6

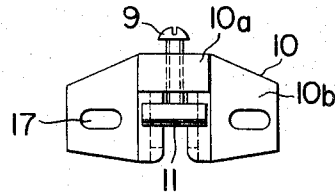


FIG. 7(a)

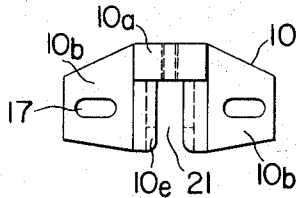


FIG. 7(b)

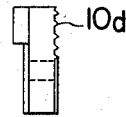


FIG. 7(c)

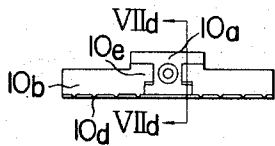


FIG. 7(d)

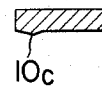
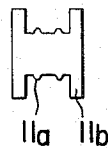


FIG. 8(a)



FIG. 8(b)



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KEYFRAME SIDE PIN GUIDES OF MUSICAL INSTRUMENT

Yoshiyuki Matsumoto, Hamamatsu-shi, Japan, assignor to Nippon Gakki Seizo Kabushiki Kaisha, Hamamatsu-shi, Japan

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4 Claims. (Cl. 84-432)

This invention relates to pianos and like musical instruments and more particularly to new and improved keyframe side pin guides whereby warp curving of the front part of a keyframe can be prevented.

Keyframe side pin guides known heretofore have been incapable of preventing upward warp curving of the front member of the keyframe as described more fully hereinafter.

It is an object of the present invention to provide keyframe side pin guides of relatively simple construction and arrangement whereby upward warp curving of the front member of the keyframe can be prevented.

Briefly stated, the present invention provides keyframe side pin guides for keyframes of pianos and like musical instruments, each of the side pin guides comprising a combination of a side pin guide body having horizontal slot holes for mounting of the guide body onto a key block, a vertical cutout slot for receiving of the keyframe side pins, and a tapped hole coaxially aligned with and disposed above the cutout slot, a guide piece adapted to fit in and slide along the cutout slot above and in contact with a pin fitted in the cutout slot, and an adjusting screw screwed in the tapped hole to press the guide piece firmly against the side pin and thereby to prevent upward curving of the front member of the keyframe.

The nature, principle, and details of the invention will be more clearly apparent from the following detailed description when read in conjunction with the accompanying drawings, in which like parts are designated by like reference numerals.

In the drawings:

FIG. 1 is a perspective view showing one example of the keyframe and key blocks of a grand piano;

FIGS. 2(a) and 2(b) are fragmentary perspective views showing in enlargement the part IIa of FIG. 1 of one part of a keyframe and a keyframe side pin guide of known type;

FIGS. 3(a) and 3(b) are fragmentary perspective views similar to FIGS. 2(a) and 2(b) showing one example of application of the keyframe side pin guide according to the invention;

FIG. 4 is an elevational view indicating the relationship between a keyframe side pin guide and side pin of known type;

FIG. 5 is an elevational view indicating the relationship between a preferred embodiment of the keyframe side pin guide and pin according to the invention;

FIG. 6 is an elevational view showing the assembled state of the side pin guide shown in FIG. 5;

FIGS. 7(a), 7(b), and 7(c) are respectively an elevational frontal view, a side elevational view, and a bottom view of the side pin guide body constituting the stationary structure of the side pin guide shown in FIGS. 5 and 6.

FIG. 7(d) is a fragmentary sectional view taken along the plane indicated by line VIId-VII d of FIG. 7(c) in the direction indicated; and

FIGS. 8(a) and 8(b) are respectively side elevational and plan views showing the guide piece of the side pin guide shown in FIGS. 5 and 6.

Throughout the following disclosure, directions referred to as "front," "back," "left," "right," "above," "be-

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low," etc., are those of the musical instrument, i.e., a grand piano in the example herein set forth.

In general, the keyframe of a grand piano, as shown in FIGS. 1, 2(a), and 2(b), is formed by the assemblage of a front rail 3, a balance (or intermediate) rail 14, a back (or rear) rail 15, and transverse slats 16, 17a, 18, and 19 and is free to move horizontally left and right over a key bed (not shown) under the guidance of back rail guides 1, keyframe side pin guides 5 and side pins 2 engaged with the side pin guides 5. The side pin guides 5 are respectively mounted by wood screws 6 onto a key block 4 at the bass end and a key block 4a at the treble end and are so constructed and arranged as to slow the horizontal movement of the keyframe. The side pin guides 5 function to engage with and guide pins 2 partly imbedded fixedly in the left and right ends of the front part of the keyframe and extending outwardly toward the left and right.

For these side pin guides, pin guides each as illustrated in FIG. 4 have heretofore been used to engage with pins 2 as indicated. Each of these known pin guides 5 is provided with horizontal slots 8 for insertion therethrough of wood screws 6 for fine adjustments front-and-back and up-and-down of the mounted position of the pin guide structure 5. A central vertical slot 24 is also provided for receiving and engaging with a side pin 2.

When these known side pin guides 5 are mounted on the key blocks 4 and 4a respectively at the bass and treble ends and the side pins 2 are engaged with the slots 24, the engagement relationship between a side pin 2 and its respective slot 24 is frequently such that a gap 7 remains above the pin 2, although the engagement is tight with respect to the front-and-back direction, because of deviations in the imbedded positions of pins 2 in the ends of the front rail 3 of the keyframe.

For this reason, when the front rail 3 of the keyframes assumes a curvature due to warping after a long period of use, it is not possible to prevent this warping. Moreover, in many cases it is not possible to eliminate this space 7 to cause the pin 2 to contact the upper end of the slot 24 even by adjustment of the aforementioned fine-adjustment wood screws 6.

The reason for this is that there are certain limits to the adjustment of the position of the side pin guide 5 in the up-and-down direction by means of the adjusting wood screws 6, these upward and downward limits being at the extremities of a range of movement which is $\frac{1}{2}$ of the difference between the diameter of the wood screws 6 and the width of the slots 8 into which the screws are inserted, and, moreover, there is the possibility of the side pin guide 5 shifting its position, when the screws 6 are loosened to replace the guide 5 in the correct position and then retightened. The width of the slots 8 cannot, of course, be enlarged beyond a certain limit imposed by the necessity of the heads of the screws 6 to be engaged with the guide structure 5 and by the limit to the strength of the guide structure itself.

The present invention contemplates overcoming the above described difficulties by providing a side pin guide of new and improved construction and arrangement as described hereinbelow with respect to a preferred embodiment of the invention.

Referring to FIGS. 3(a), 3(b) and 5, the example of the side pin guide according to the invention comprises a pin guide body 10 of symmetrical saddle shape and integral structure having two flange parts 10b joined by an upper cross piece or bridge 10a, an adjusting screw in screw thread engagement with a vertical tapped through hole in the bridge 10a, and a guide piece 11 slidably engaged in a vertical cutout slot 21 in the guide body 10 below the bridge 10a and between the inner sides of the flange parts 10b. The flange parts 10b are provided re-

spectively with horizontal slot holes 17 for mounting the guide body onto a key block.

The adjusting screw 9 is inserted from the upper side of the bridge 10a, and the lower tip of the screw 9 rests against the upper surface of the guide piece 11. The guide piece 11 has a curved lower surface for contacting a side pin 2 of the keyframe, which side pin 2, in assembled state, is engaged in the cutout slot 21 below and against the guide piece 11.

FIGS. 6, 7(a), 7(b), 7(c), 7(d), 8(a), and 8(b) show the details of the side pin guide assembly and disassembled guide body 10 and guide piece 11. The guide body 10 is provided on its rear surface to contact the key block with numerous projections 10d for secure fastening against the key block without slippage therebetween. The flange parts 10b at their parts on the sides of the slot 21 have inwardly projecting flanges 10e between which the guide piece 11 is slidable in vertical direction. Each flange 10e has near its lower end a stop 10c for preventing the guide piece from slipping out after assembly.

The guide piece 11 in plan view has an H-shaped cross section with guide flanges 11b for slidable contact with the inside faces of the flanges 10e of the guide body 10 and is provided with ridges 11a for providing sliding friction on its surfaces to contact the opposed surfaces of the flanges 10e. As mentioned briefly hereinabove, the guide piece 11 has a curved lower surface. The curvature is a single convex curvature whose generatrix direction is perpendicular to the axis of the side pin 2 to contact the surface.

The guide body 10 and the guide piece 11 are made of self-lubricative material such as a polyacetal resin which is well known, for example, under the trade name of "Delrin" (produced by Du Pont) or "Duracon" (produced by Dainihon Celluloid K.K., Japan), each being the synthetic resin of 100% polyacetal containing small amount of impurities sometimes.

The key blocks 4 and 4a at the bass and treble ends are secured to the key bed (not shown). Each side pin guide assembly is mounted on its respective key block by means of wood screws 12 with washers 13, the screws being passed through the slot holes 17 of the guide body 10 and screwed into the key block as shown in FIG. 3(a).

The surface of each key block for mounting of the side pin guide is recessed so that, when the side pin guide is mounted, its outermost part does not project outward beyond the surface of the key block facing the key (not shown). Furthermore, a groove or cutout 20 is provided in the key block above the adjusting screw 9 so that a screwdriver can be inserted from above to turn the adjusting screw 9.

In assembled state, each side pin 2 imbedded at its root end in the keyframe front rail 3 is fitted at its other end into the slot 21 of the side pin guide as indicated in FIG. 5. There are some deviations in the imbedded positions of the side pins 2. A front-and-back deviation of the imbedded position of each side pin 2 is compensated for by the initial mounting position of the corresponding side pin guide. A deviation of the imbedded position in the vertical direction can be readily compensated for, and the guide piece 11 caused to closely contact the upper side

of the pin 2, by causing the guide piece 11 to slide along the slot 21 by means of the adjusting screw 9 without the necessity of making adjustments by means of the mounting screws 12 as in the prior art.

By the above described construction and arrangement of the side pin guide, the side pin 2 can be closely held by the guide piece 11 without excessive force. Accordingly, the keyframe front rail 3 is prevented from curving upward. For this reason, there is no spoilage of the touch, and the keyframe can be constantly maintained in its normal state.

Since the pin guide body 10 and the guide piece 11 are made of a self-lubricative material such as, for example, a polyacetal resin, sliding movements of the side pin 2 in contact with the guide body 10 and guide piece 11 do not produce noise.

It should be understood, of course, that the foregoing disclosure relates to only a preferred embodiment of the invention and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention as set forth in the appended claims.

What I claim is:

1. In a piano or like musical instrument, keyframe side pin guides each comprising: a side pin guide body having slot holes for mounting of said body onto a key block, a cutout slot, and a tapped hole; a guide piece adapted to fit in and slide along said cutout slot; and an adjusting screw thread-engaged in said tapped hole to press said guide piece against a side pin imbeddedly fixed to a keyframe front member.

2. In a piano or like musical instrument having a keyframe with side pins imbedded in the keyframe front member, keyframe side pin guides each comprising, in combination: a side pin guide body having horizontal slot holes for mounting of said body onto a key block, a vertical cutout slot for receiving one of said side pins, and a tapped hole coaxially aligned with and disposed above said cutout slot; a guide piece adapted to fit in and slide along said cutout slot above and in contact with said side pin; an adjusting screw thread-engaged in said tapped hole to press said guide piece against said side pin; and fastening means passed through said slot holes for mounting said side pin guide body onto the key block adjustably in a horizontal direction.

3. The keyframe side pin guides as claimed in claim 2 in which the side pin guide body and the guide piece are made of a self-lubricative material.

4. The keyframe side pin guides as claimed in claim 3 in which polyacetal is used as the self-lubricative material.

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RICHARD B. WILKINSON, *Primary Examiner*.

CHARLES OVERBEY, *Assistant Examiner*.