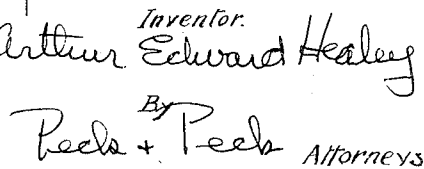


2,247,998

Filed Aug. 14, 1939



UNITED STATES PATENT OFFICE

2,247,998

PIANO ACTION

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Application August 14, 1939, Serial No. 289,996
In Great Britain November 24, 1938

4 Claims. (Cl. 84-240)

This invention relates to piano actions and is particularly, but not exclusively, concerned with actions for upright pianos in which the strike line of the hammers is to be partly or wholly inclined with relation to the horizontal line of the keyboard.

Such actions must embody a hammer rail or beam set wholly or partly at an angle to the horizontal to agree with the inclined strike line or the inclined portion thereof. The hammers and wippens are pivoted on the hammer rail by means of bracket devices called "flanges" and the wippens are actuated from the keys through intermediate members. Often the wippens are actuated by means of secondary levers which are in turn actuated by the keys through the intermediary of tension or thrust members. The said levers are then pivoted on a secondary lever rail spaced from the hammer rail and the tension or thrust members progressively increase in length to correspond to the variation in the distances between the keys and their associated wippens. The centre lines of the wippens must be in line with those of the corresponding secondary levers and, in order to ensure this, it has hitherto been proposed to build up both the hammer rail and the secondary lever rail so that one step is offered at both the upper and lower edge of the rail for each hammer. A hammer and a wippen are pivoted on the upper and lower horizontal faces, respectively, of each step of the hammer rail by means of flanges of the usual construction and a secondary lever is pivoted on each step of the secondary lever rail in the same way. Such a construction is expensive to produce, as will be understood.

It is an object of the present invention to provide improved actions which shall employ hammer rails of standard type irrespective of whether the strike line be partly horizontal and partly inclined or wholly inclined.

As is known, the hammer rail in an action for an upright piano having a horizontal strike line must be arranged with its upper edge nearer to the strings than its lower edge so that the rear face of the rail may be disposed parallel to the jacks and the correct proportions for repetition obtained. Such disposition of the hammer rail is hereinafter termed "arranging the hammer rail at the necessary angle."

The plane of the surface to which the flanges for the wippens are attached is then inclined downwardly towards the strings. When the hammer rail is inclined to agree with an inclination of the strike line the flanges must be maintained

vertical to keep the pivots for the wippens horizontal with the result that the said pivots become directed at an angle to the plane of the strings. It is, however, necessary that said pivots shall remain parallel to the plane of the strings. Similar considerations also apply in the case of the flanges for the hammers when, as is usual, the plane of the surface to which these flanges are attached is inclined upwardly towards the strings in the horizontal position of the hammer rail.

The present invention, therefore, provides a piano action having an inclined strike line in which a hammer rail of standard construction is both arranged at the necessary angle and set to agree with the inclined strike line, and in which the flanges for pivotally mounting the wippens and, if necessary, the flanges for mounting the hammers, on the said rail are so skewed that the pivots are substantially horizontal and parallel with the plane of the strings.

The invention will be clearly understood from the following description of an example of an action constructed in accordance therewith, taken with reference to the accompanying drawing, wherein:

Fig. 1 is a sectional side elevation of the action, with some parts broken away,

Fig. 2 is a front elevation thereof showing the break or inclination in the strike line, some parts being broken away and others being in section,

Fig. 3 is a perspective view, to a larger scale, of one of the flanges employed for mounting the damper levers on the inclined portion of the hammer rail, and

Figs. 4 and 5 are similar views of the flanges for the corresponding hammer and wippen respectively.

The example illustrated is an underdamper action intended for a miniature upright piano in which the bass strings 1 (see Fig. 2) are arranged more nearly horizontal than is usual so that strings approximating in length to those employed in a full-size piano may be used, as is described for example in British patent specification No. 462,497. Due to this arrangement of the bass strings 1 the strike line 2 of the corresponding hammers 3' is inclined downwardly in the direction of the lower end of the bass register. The action is disposed in front of the strings and partly beneath the level of the keyboard, part of the key-frame bottom being shown at 4 and part of a key being shown at 5 in Fig. 1. In the following description the parts of the action corresponding to the inclined portion 2 of

the strike line are given the same reference numerals as the equivalent parts corresponding to the horizontal portion 2a of the strike line but with the addition of an index stroke.

In so far as the action proper, i. e. the whole construction and arrangement of the hammers 3, 3', jacks 6, 6', wippens 7, 7' and so on, is concerned, there is employed any suitable known arrangement in which the wippens 7, 7' are actuated by secondary levers 8. These levers 8 (see Fig. 2) are pivotally mounted at their forward ends in flanges 9 of ordinary construction attached to a vertical face 10 on a secondary lever rail 11 that is spaced forwardly from the hammer rail 12 and located parallel to the plane of the strings 1. The free ends of the secondary levers 8 are located beneath the corresponding wippens 7 and a connection 13 is made from a point 14 intermediate the ends of each lever 8 to the rear end of the corresponding key 5. Over that portion of the length of the action where the strike line 2a is horizontal (shown at the right of Fig. 2), the hammer rail 12 is horizontally disposed while being arranged at the necessary angle (as shown in Fig. 1) to ensure correct proportions for repetition. The corresponding wippens 7 and hammer butts 3a are pivotally mounted on the respective inclined faces 15 and 16 of the hammer rail by means of vertically disposed flanges 17 and 18 of the usual construction, their pivots 19 and 20 being thus located horizontally and parallel with the plane of the strings.

At the inclined portion 2 of the strike line the hammer rail 12' and the secondary lever rail 12' (not shown in Fig. 2) are both inclined downwardly to agree with the inclination of the strike line (as shown at the left of Fig. 2). Since the plane of the face 10 on the secondary lever rail to which the lever flanges 9 are attached is vertical, these flanges (which are vertically disposed) are of the usual construction except that their upper ends may be cut at an angle equal to the angle of inclination of the rail. When the attaching face 10 of the rail is formed by rabbeting the lower edge thereof as shown in Fig. 1, the inclined upper ends of the flanges fit snugly against the transversely disposed face of the rabbet to prevent movement of the flanges about their fixing screws. It will be seen that the pivots for the secondary levers 8 are horizontal and parallel to the plane of the strings.

The hammer rail 12', while being inclined downwardly as mentioned, is also arranged at the necessary angle for ensuring correct proportions for repetition. In consequence the faces 15' and 16' to which the flanges 17' and 18' for the hammer butts 3a' and the wippens 7' are to be attached are each transversely inclined towards the strings 1 while being longitudinally inclined towards the lower end of the bass register. The faces 15' and 16' are oppositely inclined to each other in the transverse direction, in the example chosen, and the respective flanges 17' and 18' are disposed vertically thereon. Each flange is cut on the skew, i. e. the parallel side faces 21 (see Figs. 4 and 5) of the two spaced prongs or lugs thereof meet the front and rear faces of the flange at an angle other than a right angle. The skewed flange 17' for a wippen 7' is secured to the corresponding face 15' of the hammer rail 12' with its front face in surface contact therewith (see Fig. 5), the skewing of the flange being such that the dihedral angle included between a side face 21 of a prong or lug and that portion of the

attachment face 15' of the rail which extends beyond the flange in the downward direction is greater than a right angle. Similarly, the skewed flange 18' for a hammer butt 3a' is secured to the corresponding face 16' on the hammer rail 12' with its rear face in surface contact therewith (see Fig. 4) and so that the dihedral angle included between a side face 21 of a prong or lug of the flange and that portion of the attachment face 16' of the rail which extends beyond the flange in the downward direction is again greater than a right angle. The dihedral angles are not necessarily the same for the two sets of flanges 17' and 18'. The prongs or lugs of each flange are formed with aligned bushed apertures 22 adapted to receive the pivot pin 19' for the wippen 7' or the pivot pin 20' for the hammer butt 3a', as the case may be, and the said apertures are so formed that the axis of the pin (19' or 20') will be disposed perpendicularly to the said faces 21 of the said prongs or lugs. The degree of skewing of the flanges is such that the resultant angular dispositions of the pivot pins 19' and 20' with relation to the respective attachment surfaces 15' and 16' will ensure that these pivot pins will be parallel to the plane of the strings 1. In consequence, the centre lines of the wippens 7' are disposed at right angles to the said plane of the strings and the hammers 3' will move perpendicularly to the said plane, the hammers 3' being set at an angle to their shanks as shown in Fig. 2.

The upper or lower ends of the flanges 17' and 18' respectively, may be cut off at an angle corresponding to that at which the hammer rail 12' is inclined so that the said ends may fit snugly against transversely disposed faces on the rail which are produced by rabbeting the latter to provide the attachment faces 15' and 16' for the flanges.

As can be seen from Fig. 3, the flanges 25' for pivotally mounting the damper levers 26' on the rail 12' are formed so that their upper and lower faces include between them a dihedral angle equal to about half the angle between the inclined strike line 2 and the horizontal strike line 2a. The pivot pin for the damper lever is located with its axis substantially parallel with the upper face of the flange 25' and the damper 27' is set at an angle to the lever so that it lies along the respective string 1.

In order to transmit the movement of the inclined part of the underdamper lifting bar to the horizontal part thereof, the adjacent ends of the two parts are arranged to overlap. The end of the inclined part (shown at 23' in Fig. 1) has its outer half cut away and the overlapping end of the horizontal part (shown at 23 in Fig. 1) has its inner half cut away. Between the superposed flat surfaces of the two parts 23, 23' is arranged a felt pad 24.

The action according to the invention may be employed in pianos having a strike line that is inclined throughout its length, either upwardly or downwardly towards the bass end, or that is inclined at the treble end instead of or in addition to being inclined at the bass end. The improved action may also be adapted for use in grand pianos, for example grand pianos of small type such as are described in British patent specification No. 478,869.

What I claim is:

1. For a piano having at least one series of strings which lie side by side in a single plane and a series of hammers adapted to engage the

said strings along a strike-line which is inclined to the keyboard, an action comprising a rail member longitudinally inclined substantially to follow the inclination of the said strike line and presenting at least one longitudinal seating face which is also transversely inclined towards the plane of the said strings, a plurality of pivotal action parts, and flanges mounted on the said seating face of the rail member, the said flanges each having a prong formation which is constructed for the pivotal mounting of one of the said action parts and has side faces formed to meet opposite side faces of the flange at an angle other than a right-angle, the pivotal axis of said action part being disposed at right-angles to the first-mentioned side faces and said angle being such that the said pivotal axis lies substantially parallel with the plane of the said strings and substantially parallel with the said keyboard.

2. For a piano having at least one series of strings which lie side by side in a single plane and a series of hammers adapted to engage the said strings along a strike-line which is inclined to the keyboard, an action comprising a rail member longitudinally inclined substantially to follow the inclination of the said strike line and presenting longitudinal seating faces which are also transversely inclined towards the plane of the said strings, a plurality of pivotal hammers, a plurality of pivotal wippens and hammer-flanges and wippen-flanges mounted on the respective seating faces of said rail member, each of said flanges having a prong formation which is constructed for the pivotal mounting of a hammer or a wippen on an axis disposed at right-angles

to side faces of said prong formation, the latter also having said side faces formed to meet opposite side faces of the flange at an angle other than a right-angle, said angle being such that said axis lies substantially parallel with said plane of said strings and substantially parallel with said keyboard and such that the first-mentioned side faces of the prong formation include between them and a portion of the corresponding seating face a dihedral angle greater than a right-angle.

3. An upright piano, particularly a miniature upright piano, comprising a series of bass strings arranged side by side in a single plane and at only a slight angle to the horizontal and an action comprising hammers having a correspondingly inclined strike-line, a rail member longitudinally inclined substantially to follow the inclination of said strike-line and presenting longitudinal seating faces which are also transversely inclined towards the said plane, a plurality of pivotal action parts, and flanges mounted on said seating faces, said flanges each having a prong formation which is constructed for the pivotal mounting of one of said action parts and has side faces formed to meet opposite side faces of the flanges at an angle other than a right-angle, said angle being such that the pivotal axis of said action part lies substantially horizontal and substantially parallel with said plane of said strings.

4. A piano action as claimed in claim 2, in which the dihedral angle for the wippen-flanges is different from that for the hammer-flanges.

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