April 17, 1951 A. F. KNOBLAUGH 2,548,890

UPRIGHT PIANO ACTION

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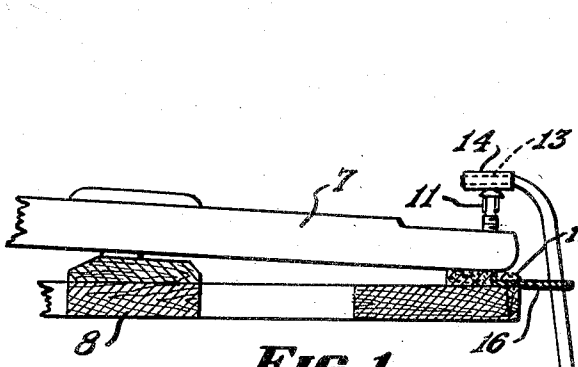
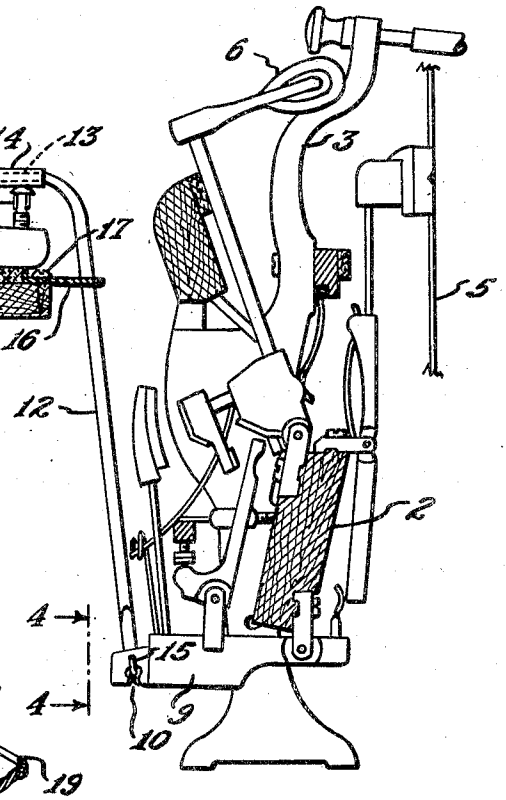


FIG. 1.



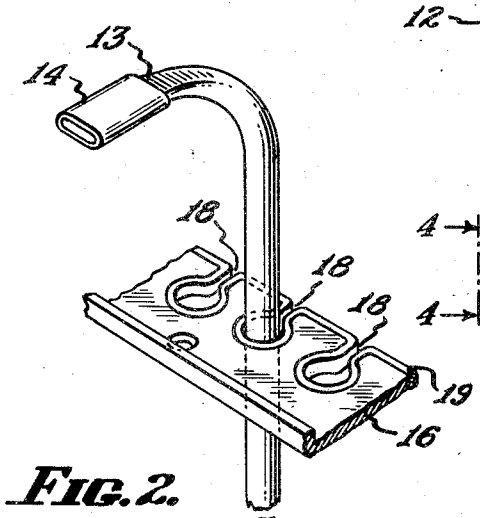


FIG. 2.

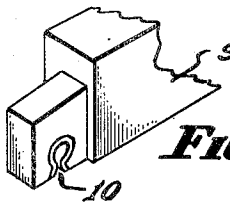
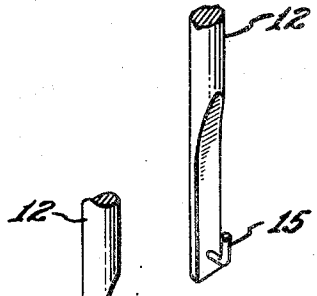


FIG. 3.



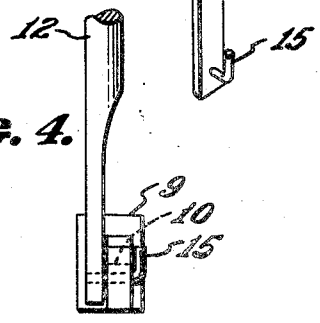


FIG. 4.

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UPRIGHT PIANO ACTION

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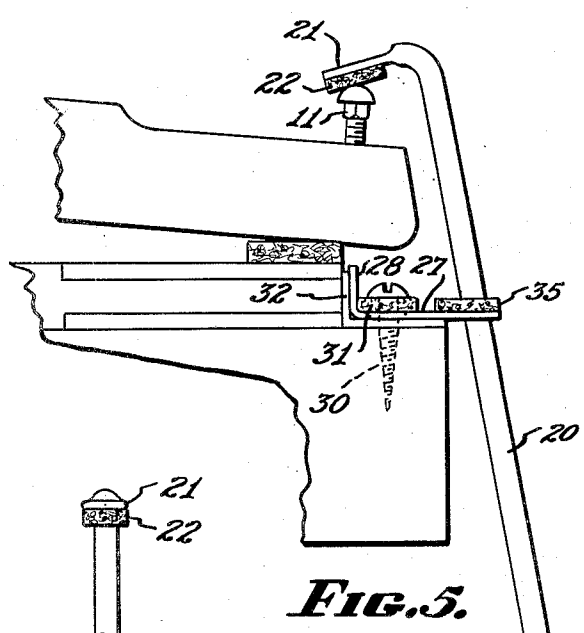


FIG. 5.

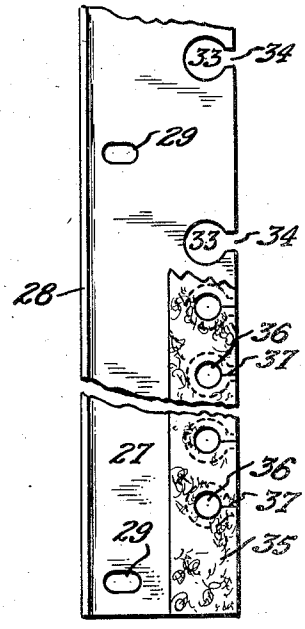


FIG. 8.

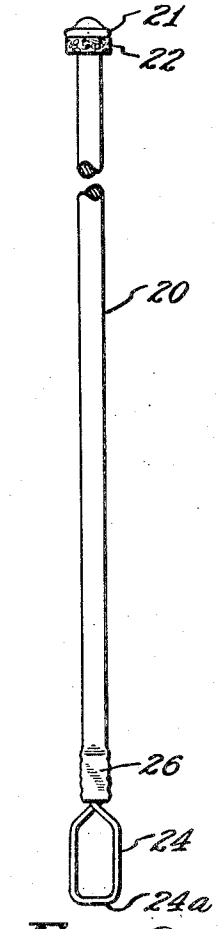


FIG. 6.

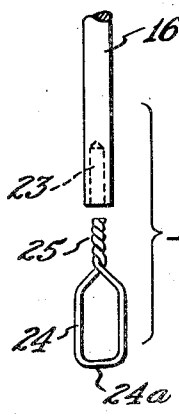
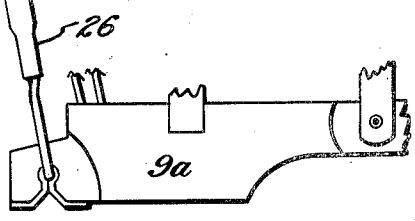


FIG. 7.



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UNITED STATES PATENT OFFICE

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UPRIGHT PIANO ACTION

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Application January 5, 1950, Serial No. 136,965

16 Claims. (Cl. 84—240)

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This application is a continuation-in-part of my copending application Serial No. 68,847, filed January 3, 1949, and bearing the same title, now abandoned.

My invention relates to pianos and particularly to small upright pianos in which the action mechanism for operating the hammers is located at least partially below the level of the playing keys.

One object of the invention is to provide a key and action connecting mechanism in an upright piano of small height, which is not costly to construct and assemble into the piano.

Another object is to provide a connecting mechanism which permits keys and/or the action to be readily removed from and reinserted in a piano.

Still another object is to provide a connecting mechanism, the members of which corresponding to the respective keys and hammers are individually removable and may be reinserted in a ready manner.

Another object is to provide a connecting mechanism occupying small height above the keys, so that key cover boards, known as fallboards, of simple design and operation can be included in a piano.

Another object of the invention is the provision of improvements in motion transmitting abstracts for piano actions and combinations of abstracts and guiding means.

Another object of the invention is the provision of a piano action of inexpensive and improved construction wherein the abstract assembly including guiding means may readily be removed from the instrument with the action assembly but without disconnection of the individual elements.

The manner in which the above objects are attained, and the attainment of other objects which will be pointed out later herein or will become apparent to those skilled in the art on reading this specification will now be described in detail, with reference to the accompanying drawings, wherein:

Figure 1 is a side elevational view of a piano action, key, and connecting mechanism.

Figure 2 is a perspective view of a connecting rod and adjacent portion of a guide rail.

Figure 3 is a perspective view of the front part of a wippen.

Figure 4 is a front elevational view of the front part of a wippen and the lower part of a connecting rod, as seen at 4—4 in Figure 1.

Figure 5 is a partial elevational view showing an improved abstract device, its guiding means, the mode of its connection to the wippen and its engagement with the capstan screw of a key.

Figure 6 is a vertical elevational view of the abstract itself.

Figure 7 is an exploded view illustrative of a mode of making the abstract.

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Figure 8 is a partial plan view of a modified guiding means.

Referring first to Figure 1, an upright action 1 having the usual elements (which thus do not require detailed description), is integrated on a main rail 2 with brackets 3 attached for supporting the action in a piano in a known manner. At the rear of the action are the piano strings 5 struck by respective hammers 6.

As is illustrated, the action 1 is partially below the level of a keyboard of playing keys 7 supported on a keyframe 8. The primary motivating lever of the action is the wippen 9, located at a lower level than the key frame and rearwardly pivoted so as to be swingable in a vertical plane. There are, of course, as many such wippens in the instrument as corresponding keys.

The front end of the wippen is reduced in width, as shown in Figures 3 and 4, and into the lower side of which reduced portion is cut a keyhole-shaped slot 10 which is bushed with cloth. The rear end of the key 7 carries a capstan screw 11.

Connecting each key of the piano and the corresponding wippen is an abstract rod or sticker 12, preferably of the light metal aluminum or an aluminum alloy. This generally vertical extending rod 12 throughout most of its length is of substantially constant circular cross-section. As is illustrated, the top portion of the rod above the key has been bent forward and flattened to form a horizontal shelf portion 13 resting upon the capstan screw 11 of the key. For padding, the shelf 13 may be enclosed in a tubular sleeve 14 of textile material, rubber, or the like, stretched over the shelf and preferably cemented thereto.

The bottom portion of the rod 12 is pivoted to the wippen 9 in a feature now to be described. As shown, this lower portion of the rod has been milled to reduced thickness and a horizontal hole drilled in the milled section, into which a metal pin 15 has been tightly driven. In the configuration as illustrated, this pin 15 extends axially with the keyhole slot 10 in the wippen and the outer portion of the pin is bent up. The pin 15 and the slot 10 are accommodated to each other so that the pin can be "snapped" into the slot, passing very snugly through the reduced outer portion of the slot, and becoming pivoted freely in the inner portion. The bent-up end of the pin and the milled section of the rod 12 function as end guides in this pivotal connection, as particularly shown in Figure 4.

To complete a guide for the rod 12 so as to locate its position definitely and to confine it to desired vertical motion, I have provided a metal guide rail 16 attached by screws 17 to the rear part of the key frame 8 below the keys 7 so as to extend rearwardly therefrom in its width. The rail 16 extends in length along the

entire compass of the keyboard and as illustrated in Figure 2 has a series of keyhole shaped slots 18 open to its rear edge. These slots 18 are bushed in a continuous manner by a fabric or rubber strip 19 cemented suitably to the rail. There are, of course, as many slots 18 as there are corresponding rods 12 and keys 7 in the piano. The inner portion of each slot 18 is circular as shown, of such size that the rod 12 guided therein slides freely in this inner portion.

To remove an individual rod 12 from the structure the rod is first disengaged from its wippen 9 and then raised and turned axially through substantially a right angle. When the rod or abstract is so turned, the pin 15 will slide through the accommodating outer restricted portion of the slot 18 in the guide rail 16, to permit the withdrawal of the rod. Rods are installed in a correspondingly reversed manner.

The removal of the entire action 1 is readily accomplished in my invention. The guide rail 16 is unscrewed from the key frame 8 and moved rearwardly, moving all the rods 12 correspondingly. The rail is attached temporarily to the action and the action then removed in a known manner. Installation may be accomplished in a correspondingly reversed manner. It will be apparent that the removal and installation of keys is quite easily performed in my structure.

Referring to Figures 5 to 8 inclusive, I have illustrated a modified structure which I have found somewhat less expensive to construct and somewhat more positive in its action. The abstract or sticker 20 is, as before, a rod preferably of light metal. Its upper end is bent over and is preferably flattened in a die as at 21. A pad of sound-deadening material 22 may be attached to the flat under surface of the bent-over portion.

At the lower end of the rod I first form a bore 23. This can be done rapidly by drilling the end of the rod. A non-corrosive wire of suitable stiffness is formed by bending into a rectangular loop 24 and a shank 25, directed away from the loop, positioned substantially midway between the sides of the loop, and formed by twisting the ends of the wire together. The shank element 25 is then inserted in the bore 23, and the end of the rod 20 is deformed or flattened as shown at 26 in Figures 5 and 6, so that the wire loop element is securely and permanently held to the rod. The flattening or deformation may be accomplished in a die or by other means such as hammering. In assembly the parts are so located that the plane of the loop 24 lies at a right angle to the direction of extension of the bent-over portion 21 of the rod. It will be understood that the mode of affixing the wire element to the rod as described above produces a non-rotative connection between these elements so that the relationship just described will be maintained.

The loop 24 may be made as wide as desired so that it is not neecssary to reduce the end portion of the wippen 9*a* as much as as the wippen 9 of Figure 3, unless this be desired for some other purpose. The wippen is provided with the conventional bushed key slot described above. The bail portion 24*a* of the loop can be engaged in the key slot in the manner described above, whereupon the sides of the loop will act to prevent axial displacement of the bail portion. The abstract or sticker 20 is thus pivoted to the wippen in a secure fashion.

An improved guide means is shown at 27 in

Figure 8. It may be made of relatively thin sheet metal. One edge of it is turned up to stiffen the structure as at 28. Elongated slots 29 are provided whereby the guide may be adjustably attached to the key bed or key base, as by screws 30 (in Figure 5). Felt or other resilient washers 31 are preferably used in connection with these screws, and an angular bushing 32 of suitable substance may be used beneath the guide if desired.

The edge of the guide opposite the turned-up flange 28 is provided with a series of suitably spaced holes 33, larger than the diameter of the abstract or sticker and opening as before to the edge of the guide by means of slots 34. These slots are of less width than the holes 33 and the diameter of the abstract or sticker 20.

Instead of bushing these holes and slots on their interior surfaces as hereinabove described in connection with Figure 2, I have found that a very satisfactory and much cheaper construction may be provided by cementing a strip 35 of felt or other suitable guiding and sound-deadening material to the upper surface of the metallic guide element 27. The strip is provided with holes 36 of approximately the diameter of the abstracts or stickers 20 so as to guide them without undue play; and the holes 36 are connected with the outer edge of the strip 35 by slits 37. The holes 36 formed in the strip 35 will respond in location to the holes 33 in the guide member so as to be substantially concentric therewith and the slits 37 will be so formed as to lie substantially centrally of the slots 34.

This gives a noiseless construction in which the abstracts are slidably retained by the guide but are not disengageable therefrom in directions transverse the length of the abstract. When it becomes desirable to remove a single abstract or sticker, its loop portion is first disengaged from the wippen. The abstract is then drawn upwardly in its hole 36 until the loop portion is reached. Then as before the abstract is rotated through an angle of about 90° to position its wire loop substantially transverse the length of the guide member 27, whereupon the wire loop may be withdrawn from the guide through a slot 34 and the corresponding slit 37. Reengagement of the abstract with the guide can be effected by a reversal of these operations, the arrangement being a particular advantage in assembling pianos.

By my invention I have proveded not only a novel, strong and inexpensive abstract, but also a new combination of abstract and guiding means which has a number of important advantages in addition to its low cost. The various abstracts cannot become disengaged from the guiding means so long as they remain in engagement with the various wippens. The turned-over upper portions of the abstracts are maintained accurately in alignment with the capstan screws 11 since the abstract is non-rotative with respect to the wippen so long as it remains in engagement therewith. When occasion arises to remove the action from the piano, the abstracts and guide means can be removed as a unit therewith by merely unfastening the guide means from the key bed or key base, moving it still in engagement with the various abstracts toward the action proper, and tying or otherwise fastening it in place. The light metal construction of the abstracts, preferably also the guide means, makes accidental disengagement of the abstracts from the wippens unlikely. Nor, as explained above,

can the abstracts become disengaged from the guide means so long as they remain in engagement with the wippens.

It will be understood that modifications may be made in my invention without departing from its spirit.

Having thus described the invention, those features which I claim as new and novel and which I desire to protect by Letters Patent, comprise:

1. In a piano an action rail, a wippen pivoted to said rail, a key frame located above said wippen, a key mounted for actuation on said frame and an abstract for connecting said wippen and said key, said abstract being a rigid, rod-like member of elongated form having an angularly disposed end contacting said key and a pivotal element connecting said abstract and said wippen substantially in line with the axis of said abstract, said element having means to prevent axial rotation of said abstract, and guide means for said abstract located below its key contacting end at a point remote from its pivotal connection with the wippen, said guide means having an opening accepting said abstract slidably in a rod-like portion thereof and an additional contiguous opening for permitting passage of said pivotal element.

2. The structure claimed in claim 1 wherein said abstract is a rod of light metal.

3. The structure claimed in claim 1 wherein said abstract is a rod of light material in which the angularly disposed end is a bent-over portion of said rod, said bent-over portion being flattened and provided with a sound-deadening element for contacting a capstan screw on said key.

4. The structure claimed in claim 1 wherein said abstract is a rod of light material in which the angularly disposed end is a bent-over portion of said rod, said bent-over portion being flattened and provided with a sound-deadening element for contacting a capstan screw on said key, the end of said abstract opposite said bent-over end having a portion of reduced thickness, said pivotal element comprising a pin-like portion extending rigidly from said reduced portion substantially at a right angle to said reduced portion.

5. The structure claimed in claim 4 wherein said pin-like portion has an end turned substantially at a right angle, and wherein said additional contiguous opening has a reduced cross-section whereby said abstract may be withdrawn upwardly from said guide upon positioning to permit said pin-like portion to pass through said reduced connecting opening.

6. The structure claimed in claim 4 wherein said pin-like portion has an end turned substantially at a right angle, and wherein said wippen has a reduced end with an opening therein to receive said pin-like portion, said last mentioned opening having a connection with the lower edge of said reduced end, said last mentioned opening and said connection being bushed with a resilient substance whereby said pin-like portion can be snapped into and out of pivotal connection with said wippen.

7. In an action for pianos having wippens below the keys, an abstract for connecting a wippen to a key, said abstract comprising a stiff rod of light metal having a substantially rectilinear body and an angularly related upper end, said upper end being flattened, the lower end of said abstract being reduced in thickness and provided with a rigid pin extending substantially normal to the axis of said abstract.

8. In an action for pianos having wippens below the keys, an abstract for connecting a wippen to a key, said abstract comprising a stiff rod of light metal having a substantially rectilinear body and an angularly related upper end, said upper end being flattened, and a lower end reduced in thickness and provided with a rigid pin-like portion extending substantially normal to the axis of said abstract, in combination with guide means for said abstract comprising a plate-like member having an opening therein to receive the body of the abstract slidably, there being a connection between said opening and the outer edge of said plate-like member, said connection being of reduced cross-section, but permitting the withdrawal of said abstract from said guide upwardly upon rotation thereof to permit said pin-like portion to pass through said connection.

9. The structure claimed in claim 3 wherein the pivotal element comprises a wire loop having a bail portion engaging said wippen, side elements and a shank, said shank being in substantial axial engagement with said abstract, and said side elements adapted to lie on either side of the abstract pivoting portion of said wippen.

10. An abstract for connecting a wippen to a key in pianos, said abstract comprising a stiff rod of light material having a substantially straight body portion, an angularly related upper end for contacting the capstan screw of a key, and a wire element at the lower end providing a pivoting element for connection to a wippen, said pivoting element being directed substantially normal to the axis of said body, said wire element including parts at both ends of said pivoting element to prevent axial displacement of said pivoting element when in engagement with the wippen.

11. The structure claimed in claim 10 wherein said pivoting element is formed as the bail portion of a wire loop having a shank in axial engagement with said body, and wherein said parts for preventing axial displacement of said pivoting element comprise the side portions of said wire loop.

12. The structure claimed in claim 10 wherein said pivoting element is formed as the bail portion of a wire loop having side portions and a central shank in which the ends of the wire are twisted together, said shank being located substantially axially in a bore in said body, said body being crimped about said shank.

13. In a piano an action rail, a wippen pivoted to said rail, a key frame located above said wippen, a key mounted for actuation on said frame, and an abstract for connecting said wippen and said key, said abstract having a rigid rod-like body of elongated form with an angularly disposed end contacting said key and a pivotal connection between said abstract and said wippen, said connection having means to prevent axial rotation of said abstract, and guide means for said abstract located below its key contacting end at a point remote from its pivotal connection with the wippen, said guide means comprising a guide rail having a superposed layer of sound-deadening material secured thereto, said sound-deadening material having an opening therein approximating the cross-sectional dimensions of said abstract and accepting said abstract slidably in a rod-like portion thereof, and an opening in said guide rail of larger dimensions than the cross-sectional dimensions of said abstract responding in location to the opening in said sound-deadening material.

14. In a piano action including an action rail, a wippen pivoted to said rail, a key frame, a key

mounted for actuation on said frame and an abstract for connecting said wippen and said key, guide means for said abstract comprising a guide rail, a layer of sound-deadening material secured to one surface of said guide rail, said sound-deadening material having an opening therein approximating the cross-sectional dimensions of the abstract connecting the wippen and the key and adapted to accept the abstract slidably but without undue play, and an opening in said guide rail larger in dimensions than the cross-sectional dimensions of the abstract, said last mentioned opening responding in location to the opening in said sound-deadening material.

15. The structure of claim 14 wherein said guide rail comprises a thin metallic member of elongated form angular in cross-section.

16. The structure of claim 14 wherein said opening in said guide rail has an additional contiguous opening for permitting passage of a pin-like portion of the abstract when in alignment with said additional contiguous opening, said sound-deadening material being severed in the area of said additional contiguous opening.

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No references cited.