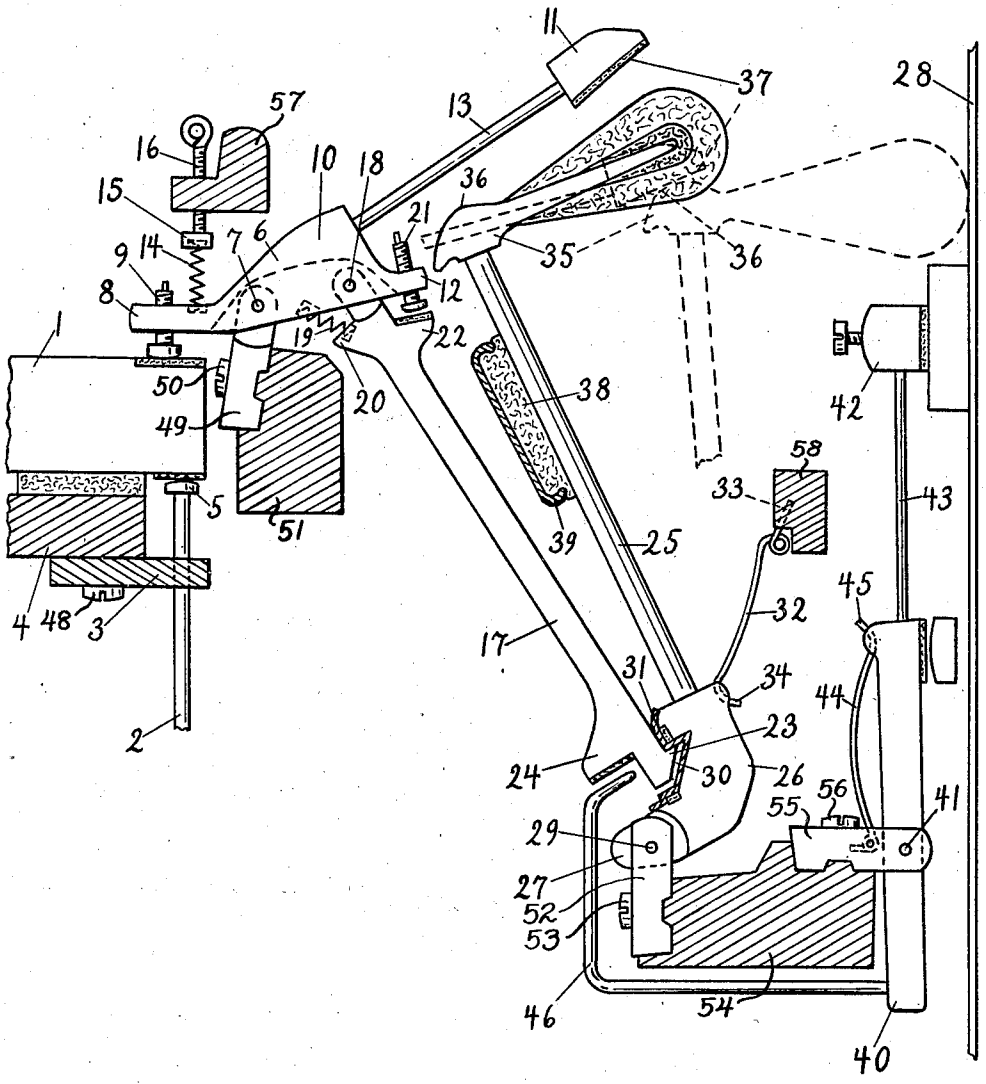
July 15, 1947. A. P. BROWN 2,424,018

PIANO-ACTION

Filed Dec. 22, 1945



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Patented July 15, 1947

2,424,018

UNITED STATES PATENT OFFICE

2,424,018

PIANO ACTION

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Application December 22, 1945, Serial No. 636,657

7 Claims. (Cl. 84—240)

1

My invention relates to piano actions and, more particularly, to actions for spinets of restricted dimensions. An object of my invention is to provide an action which can be inserted in a piano of a height not much exceeding the height of the keys.

In the prior art, this object has been attained by providing mechanisms connecting the key with an actuating element positioned at a lower level whereby the height of an action of otherwise more or less conventional structure is reduced. Such devices are known as "underslung actions." They have several severe disadvantages. The mechanism interposed between the key and the proper action increases the number of parts required, requires higher expenses, makes the structure more complicated, makes the proper adjustment more difficult and less reliable and results in a mushy touch and tones of poor quality.

Further objects of my invention are to avoid these drawbacks, to actuate the proper action by direct blow or stroke of the key, and, thereby, to obtain tones of perfect quality.

Other objects are to provide a jack with a lower end positioned considerably below the level of the key; to provide a hammer with a pivoted butt positioned at its lower end; to provide for a co-operation between the jack and the hammer whereby the jack releasably engages the hammer butt and swings the hammer from the position of rest toward the sound string, and can be disengaged from the hammer when the latter rebounds; to provide means driving the hammer back into the position of rest; to provide a wippen having an arm struck upward by the key and having another part moving down at the same time and carrying a back check; to provide a jack hinged to this latter part and moving down when the key is struck; and to arrange these parts in a narrow space located at the back side of the key.

Further objects are to provide a pivoted damper with an extension which is engaged by the jack at the end of a stroke.

Still other objects are to arrange the hammer and the jack at a short horizontal distance from each other; to facilitate, thereby, the proper engagement between these parts; to provide, thereby, for a small horizontal measure of the action and of the piano; and to provide a structure of the hammer rest which can be positioned in the narrow space between the hammer and the jack.

Still further objects are to provide the wippen and the jack with extensions contacting each other at the end of a key stroke and, thereby,

2

tripping the jack out of engagement with the hammer butt; and to provide means urging the jack into the engaging position.

Still other objects are to provide the front side of the hammer butt with a recess, and to provide the lower end of the jack with a back projection engaging this recess.

Still further objects are to reduce the number of parts, and to simplify the structure of a piano action of this type.

Still other objects and advantages will appear from the following description of an exemplifying embodiment of my invention, from the appended claims and from the accompanying drawing in which the figure shows a vertical, partially sectional side view of this embodiment.

It should be noted that, throughout this specification and claims, the "front side" is understood to be the side facing the performer or the left side in the drawing, and the "back side" to be the side facing the sound string or the right side in the drawing.

Referring to the drawing, numeral 1 indicates a key of conventional structure shown broken off, the front part of this key being omitted.

The key 1 can be operated either by the hand of a performer or by a pneumatic action which may move a wire 2 in vertical direction. The wire 2 may pass slidably through an opening of a block 3 affixed, by a screw 48, to the key bed 4 and may have an upper end provided with a head 5 contacting a padded lower surface of the key 1. In both kinds of operation, the back end of the key 1 moves upward when the key is struck.

A wippen 6 has a fixed pivot 7. The pivot 7 connects the wippen 6 rotatably to a part 49 which is affixed, by a screw 50, to a bar 51 forming a part of the piano's stationary structure. An arm 8 of the wippen 6 extends about horizontally over the back end of the key 1 and carries an adjustable screw 9 contacting a padded upper surface of the key whereby the wippen 6 is turned clockwise around the pivot 7 when the key is struck. Another part 10 of the wippen is positioned at the back side of the pivot 7, carries a back check 11 and has an extension 12. The back check may comprise a wire 13 which is bendable for adjustment of the position of the back check.

A spring 14 has a stationary end which may be inserted in a disk 15 affixed to an adjustable screw 16, and has a movable end which contacts the wippen arm 8 and may be inserted in a recess of the upper surface of this arm. The screw 16 may pass through a bar 57 forming a part of the piano's stationary structure. The spring 14 urges the

wippen 6 in counter-clockwise direction toward the position of rest.

A jack 17 is hinged to the wippen 6 at a pivot point 18 of the part 10. The fixed pivot 7 is positioned between the pivot 18 and the screw 9. A spring 19 is positioned between the wippen 6 and a projection 20 of the jack 17 and urges the jack in counter-clockwise direction around the pivot 18.

A jack trip screw 21 is adjustably inserted in the extension 12 of the wippen and, at the end of a key stroke, contacts a padded surface of another projection 22 of the jack whereby the latter is slightly turned around the pivot 15 in clockwise direction.

The jack 17 extends from the pivot 18 down in an oblique direction and has a lower end positioned considerably below the level of the key or of the key board. This lower end is provided with a back projection 23 for releasable engagement with a hammer as will be described later. The jack 17 has another projection or nose 24 at its front side. This nose serves for the operation of the damper as will be described later.

The hammer has a shank 25 which, in the position of rest, is situated at a short distance from the jack 17 and at the back side thereof. A butt 26 is affixed to the lower end of the shank 25 and has a part 27 passing below the jack 17 and having a fixed pivot 29 positioned farther to the front side than the lower end of the jack 17. The pivot 29 connects the butt 26 rotatably to a part 52 which is affixed, by a screw 53, to a bar 54 forming a part of the piano's stationary structure. The butt 26 has a recess 30 at the front side, facing the projection 23. This recess is releasably engaged by the projection 23 which pushes the butt 26 down when the key is struck and the jack moves downward, and pushes the butt 26 up when the key is released and the jack moves upward. The surfaces of the recess 30 which are contacted by the projection 23 may be padded with felt layers, and a thin layer 31 of suitable protective material, for example, buckskin, may be placed over these felt layers and adjoining parts of the butt's surface.

Additional means urging the hammer into the position of rest may be provided. For example, a spring 32 may have a stationary end 33 affixed to a part 58 of the piano's stationary structure, and may have a movable end 34 contacting the butt 26 and urging the hammer in counter-clockwise direction. While not indispensable for the operation of the action, the spring 32 makes it possible to use a relatively small or weak spring 14 and to obtain, nevertheless, a quick, reliable and forceful return of the action into the position of rest.

A head 35 is affixed to the upper end of the shank 25 and is positioned below the back check in the position of rest. When the hammer swings around the pivot 29 in clockwise direction, the head 35 hits a sounding string 28 in the position shown in dotted lines. When the hammer rebounds from the latter position, a rounded surface 36 of the head 35 engages wedgingly a padded surface 37 of the back check which, at the same time, is positioned as shown in dotted lines.

A hammer rest 38 forms a stop for counter-clockwise movement of the hammer. In the position of rest, the shank 25 contacts a padded surface of the hammer rest 38. The latter is positioned in the narrow space between the shank 25 and the jack 17, and suitable clearance is left between the hammer rest and the jack. In order to make this arrangement possible, the structure of the hammer rest comprises, in contradistinction from the usual wooden bar or rail, a steel rail 39 which has a U-shaped cross-section having short legs bent into tight engagement with the pad of the hammer rest 38. This structure can be made sufficiently strong without requiring much space in the direction perpendicular to the shank 25 and makes it possible to arrange the jack 17 and the shank 25 about parallel and at a short distance from each other.

A damper comprises a preferably vertically positioned lever 40 turnable around a fixed pivot 41, a head 42 and a wire 43 connecting the head 42 with the upper end of the lever 40. The pivot 41 connects the lever 40 rotatably to a part 55 which is affixed, by a screw 56, to a part of the piano's stationary structure, for example, to the bar 54. A spring 44 has a fixed end and a movable end 45 urging the damper into contact with the string 28.

A wire or extension 46 is affixed to the lower end of the lever 40 and reaches into the path of the nose 24. This nose is positioned over the free end of the wire 46 and may have a padded lower surface. The wire 46 is so adjusted that the nose 24 hits the free end of the wire at the end of a key stroke.

The described piano action operates as follows:

When the key 1 is struck, its back end drives the wippen 6 in clockwise direction, raising the wippen arm 8 and lowering the part 10 and the back check 11. The part 10 pushes the jack down whereby the projection 23, engaging the recess 30 and pushing the lower surface thereof, turns the hammer around the pivot 29 into the position where the hammer head 35 strikes the string 28 as shown in dotted lines.

The jack trip screw 21, is so adjusted that, a short time before the key stroke is completed, the jack is turned in clockwise direction around the hinge 18 sufficiently to withdraw the projection 23 and the lower end of the jack 17 from the butt recess 30. Simultaneously, the nose 24 contacts the wire 46 and turns the damper a little in counter-clockwise direction around the pivot 41 whereby the damper head 42 is withdrawn from the string 28. Then, the hammer, being disengaged from the projection 23 of the jack, rebounds and is caught by the back check 11 as described before.

When the key 1 is released, it returns into the shown position of rest. At the same time, the spring 14 urges the wippen 6 back into the shown position, the projection 23 entering again the recess 30 and pushing the upper surface thereof up whereby the hammer is returned into the position shown in full lines.

I desire it understood that my invention is not confined to the particular embodiment shown and described, the same being merely illustrative, and that my invention may be carried out in other ways without departing from the spirit of my invention as it is obvious that the particular embodiment shown and described is only one of the many that may be employed to attain the objects of my invention.

Having described the nature of my invention, what I claim and desire to protect by Letters Patent is:

1. In a piano action, a combination comprising a key having a back end moving up when the key is struck, a wippen having a fixed pivot and an arm with a lower surface drivingly contacted by said key end, a jack hinged to said wippen, said wippen pivot being positioned between said arm

and said jack hinge whereby said jack moves down when the key is struck, said jack having a lower end positioned considerably lower than said key and having a back projection, and a hammer having a shank positioned at the back side of said jack, and having a butt affixed to the lower end of said shank, said butt having a front recess engageable by said jack projection and having a fixed pivot positioned farther to the front side than said recess.

2. In a piano action, a combination comprising a key having a back end moving up when the key is struck, a wippen having a fixed pivot and an arm with a lower surface drivingly contacted by said key end, a back check affixed to said wippen and extending to the back side, a jack hinged to said wippen, said wippen pivot being positioned between said am and said jack hinge whereby said jack moves down when the key is struck, said jack having a lower end positioned considerably lower than said key and having a back projection, and a hammer having a shank positioned at the back side of said jack, having a head affixed to the upper end of said shank and engageable by said back check, and having a butt affixed to the lower end of said shank, said butt having a front recess engageable by said jack projection and having a fixed pivot positioned farther to the front side than said recess.

3. In a piano action, a combination comprising a key having a back end moving up when the key is struck, a wippen having a fixed pivot and an arm with a lower surface drivingly contacted by said key end, a jack hinged to said wippen, said wippen pivot being positioned between said arm and said jack hinge whereby said jack moves down when the key is struck, said jack having a lower end positioned considerably lower than said key and having a back projection, a hammer having a shank positioned at the back side of said jack, and having a butt affixed to the lower end of said shank, said butt having a front recess engageable by said jack projection and having a fixed pivot positioned farther to the front side than said recess, and a spring positioned between said wippen and said jack and urging the latter around its hinge in that direction in which the lower end of said jack engages said hammer butt, said wippen and said jack having projections contacting each other at the end of a key stroke whereby said jack is turned against the pressure of said spring.

4. In a piano action, a combination comprising a key having a back end moving up when the key is struck, a wippen having a fixed pivot and an arm with a lower surface drivingly contacted by said key end, a jack hinged to said wippen, said wippen pivot being positioned between said arm and said jack hinge whereby said jack moves down when the key is struck, said jack having a lower end positioned considerably lower than said key and having a back projection, a hammer having a shank positioned at the back side of said jack, and having a butt affixed to the lower end of said shank, said butt having a front recess engageable by said jack projection and having a fixed pivot positioned farther to the front side than said recess, said jack having a nose at its front side, and a damper having a fixed pivot and an extension reaching into the path of said nose.

5. In a piano action, a combination comprising a key having a back end moving up when the key is struck, a wippen having a fixed pivot and an arm with a lower surface drivingly contacted by said key and, a jack hanged to said wippen, said wippen pivot being positioned between said arm and said jack hinge whereby said jack moves down when the key is struck, said jack having a lower end positioned considerably lower than said key and having a back projection, a hammer having a shank positioned at the back side of said jack, and having a butt affixed to the lower end of said shank, said butt having a front recess engageable by said jack projection and having a fixed pivot positioned farther to the front side than said recess, and a hammer rest positioned between said shank and said jack and comprising a steel rail of U-shaped cross-section.

6. In a piano action, a combination comprising a key having a back end moving up when the key is struck, a wippen having a fixed pivot and an arm with a lower surface drivingly contacted by said key end, a spring urging said wippen arm toward said key end, a jack hinged to said wippen, said wippen pivot being positioned between said arm and said jack hinge whereby said jack moves down when the key is struck, said jack having a lower end positioned considerably lower than said key and having a back projection, and a hammer having a shank positioned at the back side of said jack, and having a butt affixed to the lower end of said shank, said butt having a front recess engageable by said jack projection and having a fixed pivot positioned farther to the front side than said recess.

7. In a piano action, a combination comprising a key having a back end moving up when the key is struck, a wippen having a fixed pivot and an arm with a lower surface drivingly contacted by said key end, a jack hinged to said wippen, said wippen pivot being positioned between said arm and said jack hinge whereby said jack moves down when the key is struck, said jack having a lower end positioned considerably lower than said key and having a back projection, a hammer having a shank positioned at the back side of said jack, and having a butt affixed to the lower end of said shank, said butt having a front recess engageable by said jack projection and having a fixed pivot positioned farther to the front side than said recess, and a spring urging said hammer in the direction to the front side.

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