(No Model.) 3 Sheets—Sheet 1.

R. M. HUTCHINSON.

PIANO ACTION.

No. 419,678. Patented Jan. 21, 1890.

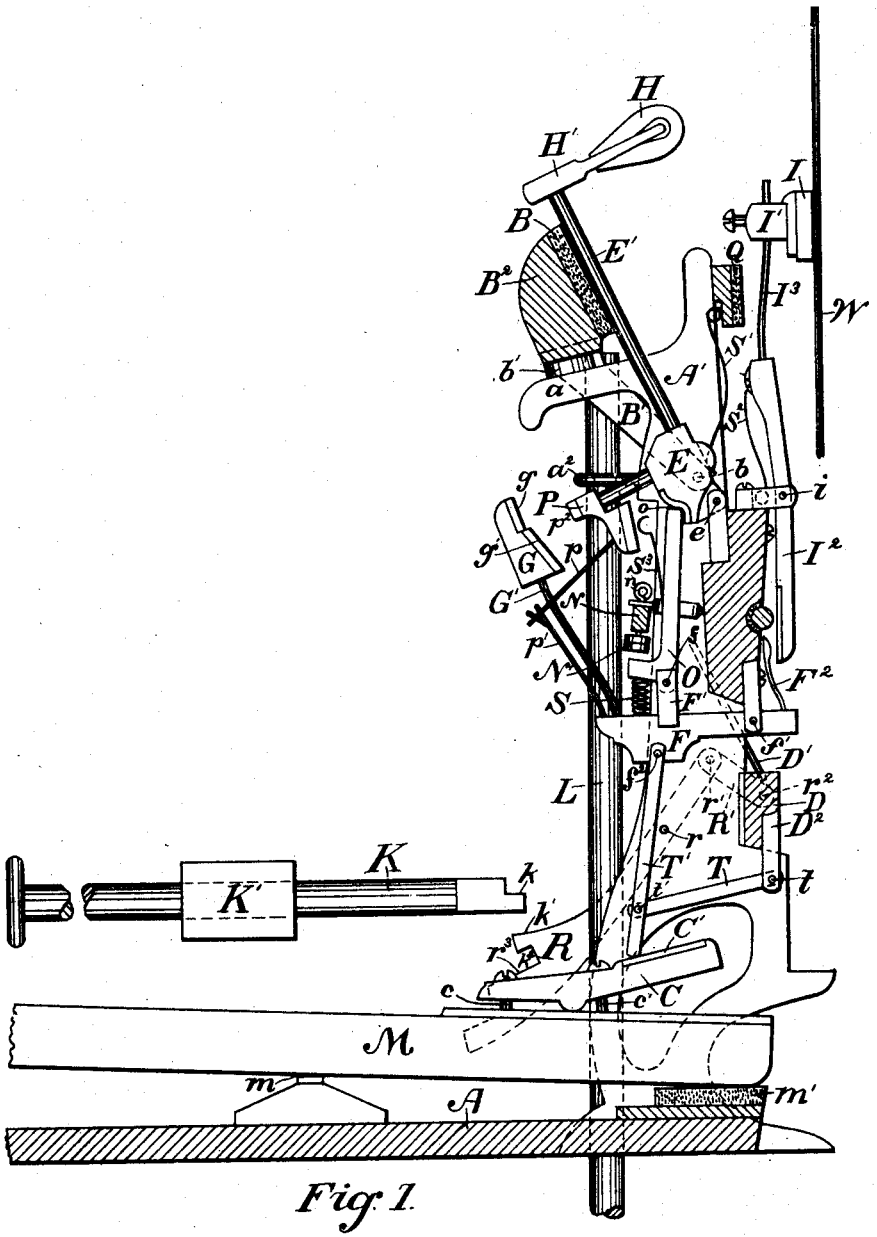

Fig. 1.

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PIANO ACTION.

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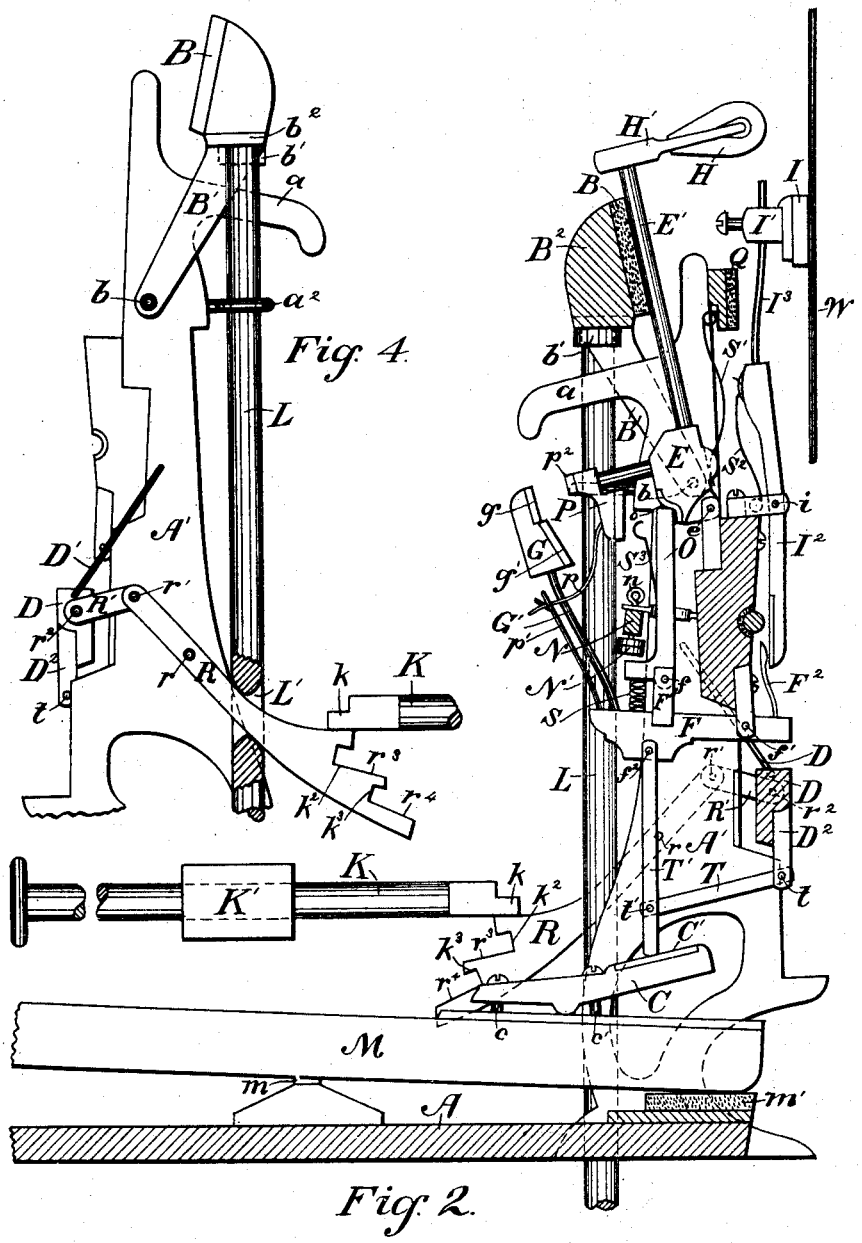

Fig. 4.

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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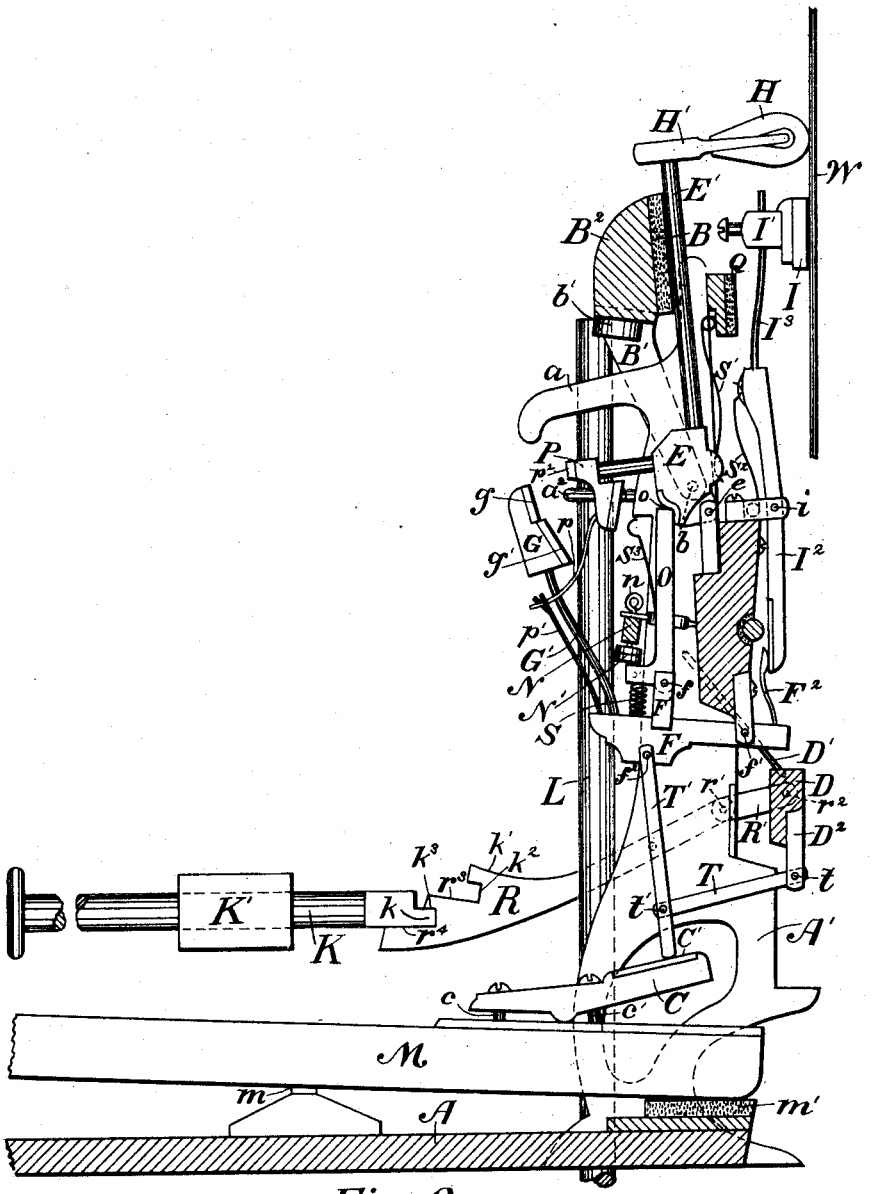

Fig. 3.

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UNITED STATES PATENT OFFICE.

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PIANO-ACTION.

SPECIFICATION forming part of Letters Patent No. 419,678, dated January 21, 1890.

Application filed January 14, 1889. Serial No. 296,265. (No model.)

To all whom it may concern:

Be it known that I, ROBERT M. HUTCHINSON, a subject of the Queen of Great Britain, residing at Boston, in the county of Suffolk and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Upright-Piano-Forte Actions, of which the following is a full specification.

In the accompanying drawings, Figure 1 shows in elevation, partly in section, my improved action in its normal position for ordinary playing. Fig. 2 is a similar view with parts in position for playing softly. Fig. 3 shows the position of parts when it is desired to practice fingering the keys without producing any sound, and Fig. 4 is an end elevation of certain parts directly concerned in carrying out the principle of my invention, the interior working parts of the action being removed.

My invention consists of certain improvements in upright-piano actions, as hereinafter fully described in detail, whereby the dip and touch on the keys in playing the piano when the soft-pedal is applied is exactly the same as when playing at its normal tone, and whereby, moreover, a player may practice fingering the keys without producing any sound at all, or, if desired, he may so arrange it as to carry on the fingering practice and produce only a very slight sound, scarcely audible to any one but himself, and sufficient only to assure him that the correct notes are struck. Furthermore, the construction is such that, whether the piano is arranged to produce no sound at all during the fingering of the keys or whether only to produce a slight sound, the dip and touch of the keys is the same as when playing at its normal tone.

A is the base of the action-frame, and A′ represents one of the end standards.

M represents a piano-key fulcrumed at *m*, and having secured to its upper face, near the rear, by means of the screws *c c′*, the key-rocker C.

T′ is the lifter, the lower end of which rests upon the upper inclined surface *c′* of the rocker, while it is pivoted at its upper end at f^2 to the jack-rocker F.

T is the swing, pivoted at *t* to the swing-flange D^2, rigidly secured to the lower rail D, the said swing being pivoted also, at *t′*, to the lifter.

The jack-rocker F, pivoted at *f′* to a connection of the frame, the jack O, pivoted at *f* to the jack-flange F, secured to the jack-rocker, and the hammer-heel E, pivoted at *e* to the frame and bearing the hammer-shank E′ and the hammer H, do not materially differ from the same parts as commonly found in many upright-piano actions. So, also, the regulating-rail N, with the regulating-button N′, operated by the screw *n*, the damper-spoon F^2, secured to the jack-rocker F, and the damper-lever I^2, pivoted at *i* to a connection of the frame and bearing the wire I^3 and the damper I, are all substantially similar to the corresponding parts as ordinarily found in pianos of this class.

Fig. 1 shows all the parts at rest in the position they would occupy when the piano is to be played with its normal tone. In this position the hammer H has its longest throw—that is, the hammer-rail B^2, bearing the rail-cloth B, against which rests the hammer-shank E′, lies back against the shoulder *a* of the standard, the side B′ of the said hammer-rail being pivoted at *b* to the standard. An interposing cushion *b′* is preferably secured to the under side of the hammer-rail where it comes in contact with the shoulder *a*. On the outer side of the hammer-rail B^2 is the shoulder b^2, which rests on the top of the pedal-rod L, suitably guided, as at a^2, to move up and down, so that when this rod is at its lowest point the said hammer-rail rests on the shoulder *a* in the position shown in Fig. 1. This rod L is connected with one of the pedals in such a manner that when the pedal is pressed down by the foot the rod L rises, and, vice versa, so that when the foot is not on the pedal the rod is in its lowest position, as shown in Fig. 1.

When the forward end of the key M is pressed downward, the rear end rises, bearing with it the key-rocker C, and an impulse is given to the hammer H, causing it to quickly strike the wire W and produce the sound, in the usual manner, through the office of the

lifter T′, jack-rocker F, and jack O, bearing against the notch *o* on the hammer-heel E. The return of the hammer to rest under the influence of the spring S′, the general action of the back-stop P, borne on the hammer-heel E, and that of the back-check G are sufficiently familiar to those skilled in the art, so that a detailed description of their action is unnecessary. Simultaneously with the striking of the wire by the hammer H the damper I is lifted therefrom through the action of the damper-spoon F^2 against the lower end of the lever I^2, and is again pressed against the wire by the action of the spring S^2 in the usual manner after the sound has been sufficiently continued.

The flange or lower rail D, instead of being rigidly secured to the frame, as commonly, is pivoted at each end thereof in my improved action to the lower end of an arm D′, the upper end of which is pivoted in turn to the standard A′ in such a manner that the said lower rail may swing outwardly from the frame.

R is a lever, pivoted at *r* to the standard A′ and connected in any desired manner with the pedal-rod L, so as to rise and fall therewith, as by passing through the slot L′ in the rod L. The upper end of the lever R is pivoted at *r*′ (see Fig. 4) to the link R′, the other end of which is in turn pivoted to the end of the lower rail D, the arrangements of the parts being such that when the rod L is at its lowest position the lower rail D is resting against the frame, as shown in Fig. 1; but as the rod rises, which occurs when the pedal is pressed down, the said lower rail is swung outward from the frame, as shown in Figs. 3 and 4.

K is a stop suitably guided to slide easily in the piano-frame and operated from the outside, preferably at one end of the keyboard. The stop is in such a position that its inner end *k* determines the height of the rod L, and therefore the extent to which the pedal connected therewith is pressed down. When it is desired to play the piano softly, the soft-pedal is pressed down and the rod L rises until the surface *k*′ on the lever R comes in contact with the end *k* of the stop K. At the same time the rod L lifts the hammer-rail B^2 by its upward bearing against the shoulder b^2, and with it the hammer is moved to the position shown in Fig. 2. From this position it has a much shorter throw than before, with the consequent lessening of the sound.

When the lower rail D is stationary, as is ordinarily the case, the result is that when the hammer is raised by the action of the rod L, as just described, the back-stop P, also rising, draws up the jack-rocker F through the influence of the bridle-strap *p*, and thus raises the lifter T′ from the key-rocker C. At the same time a space is also left between the upper end of the jack O and the notch *o* in the hammer-heel E. The consequence is that when the key is pressed down in this position it either has not the same dip and touch or there is much lost motion and looseness of action due to the considerable space the key must be moved through before any effect whatever is produced on the hammer H, this being one of the most serious defects of upright actions of this class. This defect is wholly remedied in my improved action by means of the movable lower rail D and the inclined key-rocker C, which slopes upward from the key away from the fulcrum thereof or toward the inner end of the key. The incline C′ on the said key-rocker is such that when the rod L is moved up into the position shown in Fig. 2 and the lower rail D is swung outwardly by the action of the lever R and the link R′, as already explained, the lifter T′ is swung laterally on its pivot f^2, its lower or bearing end being moved up along the incline C′ by means of the swing T, the lower end of the said lifter being always in contact therewith, the result being that the jack O is pressed upward sufficiently to be in contact with the notch *o* of the hammer-heel E, thus effectually taking up all the lost motion. At the same time the decreased work due to moving the hammer through a shorter throw is compensated by the increased leverage gained on the key M, the point of contact of the end of the lifter T′ and the inclined key-rocker being farther removed from the fulcrum *m* of the key. By this means exactly the same touch and dip is preserved on the keys whether the piano is being played loudly or softly.

When it is desired to practice fingering the keys without producing any sound at all, the stop K is withdrawn to the point indicated in Fig. 3 and the pedal is pressed down, thereby raising the rod L until the step r^4 on the lever R comes in contact with the end *k* of said stop. In this position the rod L is lifted as high as it will go, and with it the hammer-rail B^2, until the hammer H is pressed against the wire. At the same time by the action of the lever R and the link R′ the lower rail D is pressed outwardly to its farthest limit and the lifter T′ moved up along the incline C′ of the key-rocker still farther than before, with the same result of keeping the parts that would otherwise be separated still in contact. In this position the hammer is not moved at all by pressing the key, but remains perfectly stationary. When the key is pressed, however, the damper I is operated as usual; but the jack O, under the influence of the shoulder *o*′ coming in contact with the regulating-button N′, is swung out of the notch *o* and passes up behind the hammer-heel E, returning to its former position under the influence of the spring S when the pressure on the key is removed. Although apparently little work is being done by pressing the key with the parts in this position, yet by reason of the fact that the lower rail D is swung out by the lever R and link R′ as far as it will go, thereby moving the lower

end of the lifter T′ to its extreme limit on the incline C′, the result is still that the increased leverage gained thereby on the key M entirely compensates the decreased work otherwise done, so that, although no sound is produced, the touch-and dip of the key remains the same. I preferably provide the step r^4 of the lever R with the notch k^3, into which the end k of the stop K may be pressed, so as to hold the parts in this position without constantly keeping the foot on the pedal.

In the drawings I have shown the parts in position corresponding to three positions of the hammer H. It is obvious that by graduating the end of the lever R with one or more additional steps—as, for instance, r^3—suitably located, and preferably also notching the same, as at k^2, to receive the end of the stop K, the hammer may also be held at any desired intermediate position between that shown in Fig. 2 and that shown in Fig. 3. By this means the fingering practice of the keys may be carried on and a very slight sound produced, audible only to the player, if desired, and sufficient only to enable him to know that he is striking the right keys, the loudness of the sound of course depending on the length of throw of the hammer H, and this in turn on the position of the intermediate step or steps r^3 on the lever R. By this means the player can readily control the loudness of the sound by the conjoint action of the stop K and the pedal-rod L and play for any length of time with the parts in any of the various positions, the pressure required and the dip of the keys being always the same whatever the position of the parts.

The shape of the back-stop P and the back-check G differ from those ordinarily in use. The face of the back-check, instead of being made straight or evenly curved, as ordinarily, is preferably made with the two plane faces $g\ g'$ inclined to each other and arranged as shown. This form has been found desirable in order that the projecting face p^2 of the back-stop P may always strike squarely against the back-check whatever be the position of the parts.

I do not confine myself to the exact mechanism for operating the movable lower rail herein shown, nor to the method of connecting the lever R with the rod L by passing the lever through the slot L′ in the rod. Various arrangements of lever mechanism might obviously be employed, and many means of operating the lever by the pedal-rod—as, for instance, by passing the lever outside the rod and moving it by pins in the rod on either side of the lever, or by having a pin in the rod play in a slot in the lever.

It will be seen that by withdrawing the stop K sufficiently to allow the moving of the pedal-rod through its entire motion without obstruction a player may with my improved action and with always the same touch on the keys grade the sound completely from the normal tone of the piano to a mere nothing, according to the position of the pedal-rod, which he may readily vary with his foot independent of the stop, if desired, thus producing extremely varied modulations.

I claim—

1. An upright-piano action having a movable hammer-rail, a pedal-rod, a pivoted lever connected with said rod, and a stop engaging with said lever, substantially as and for the purposes described.

2. In an upright-piano action, the combination of a movable hammer-rail, a pedal-rod, a pivoted graduated lever connected with said rod, and a sliding stop engaging with said lever, substantially as and for the purposes described.

3. An upright-piano action having a key provided near its inner end with a key-rocker having an inclined bearing-surface sloping upward from the key away from the fulcrum thereof, substantially as and for the purposes described.

4. In an upright-piano action, the combination of a movable lower rail, a swing pivotally connected therewith, a lifter pivoted to said swing, and a key provided near its inner end with an inclined key-rocker sloping upward from the key away from the fulcrum thereof, arranged and operating substantially as and for the purposes described.

5. In an upright piano, the combination, with the hammer, hammer-heel, jack, and jack-rocker, of a movable hammer-rail, a key provided near its inner end with an inclined key-rocker sloping upward from the key away from the fulcrum thereof, a movable lower rail, a swing pivotally connected with said lower rail, and a lifter connected with said jack-rocker and swing and bearing against said inclined key-rocker, all arranged and operated, whereby in playing the sound may be rendered wholly or partially inaudible and the dip and touch remain the same, substantially as described.

6. An upright-piano action provided with a movable lower rail, in combination with a lever, a link connecting said lever and lower rail, and a pedal-rod connected with said lever, substantially as described.

7. In an upright-piano action, the back-check G, having the inclined faces $g\ g'$, in combination with the back-stop P, having the face p^2, whereby the said face p^2, whatever the position of the parts, strikes squarely against one or the other of the said faces $g\ g'$, substantially as and for the purposes described.

8. A piano-action having a key provided near its inner end with an inclined key-rocker sloping upward from the key away from the fulcrum thereof, in combination with a swinging lifter, whereby both the dip and the touch of the key is the same whatever be the position of the lifter on the key-rocker, substantially as described.

9. The combination, with the working parts of an upright-piano action, of a movable hammer-rail, a pedal-rod, a pivoted lever connected with said rod, a movable lower rail, a link connecting said lever and lower rail, and an inclined key-rocker, all arranged and operated substantially as and for the purposes described.

In witness whereof I have hereunto set my hand.

ROBERT M. HUTCHINSON.

Witnesses:
WM. B. H. DOWSE,
ALBERT E. LEACH.