

UNITED STATES PATENT OFFICE.

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UPRIGHT-PIANO ACTION.

SPECIFICATION forming part of Letters Patent No. 515,049, dated February 20, 1894.

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To all whom it may concern:

Be it known that I, GEORGE MORSE GUILD, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Upright-Piano Actions, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a front elevation of an upright piano action constructed in accordance with my invention. Fig. 2 is a side elevation of the same. Fig. 3 is a side elevation of the same, with the parts in the positions which they occupy when the key is depressed. Fig. 4 is a detail representing in perspective the jack-butt and hammer heel, the upper portion of the lifter-rod and jack and the parts adjacent thereto. Figs. 5 and 6 are sections through the damper and the upper end of the damper lever. Figs. 7, 8, and 9 are modifications to be referred to.

My invention relates to upright-piano actions, and has for its object to dispense with many of the parts hitherto necessary, and generally to simplify and reduce the cost of construction, and produce at the same time a light, elastic and powerful action free from liability to be injuriously affected by climatic changes, and in which the notes can be repeated rapidly and perfectly without removing the finger from the key; and to this end my invention consists in certain novel features and combinations of parts as hereinafter fully set forth and specifically pointed out in the claims.

In the said drawings, A represents the center rail, to the top of which is secured the flange *a*, to the rear end of which is pivoted the damper lever B, carrying the damper *b*, and to the front end at *c*, the hammer heel C, the lower portion of which is properly shaped and constructed to form the jack-butt D, (sometimes called the "hammer-butt.")

E represents the hammer, *d* the hammer stem, G the hammer rail, and *e* the damper spring, all constructed in the usual manner.

H is a rail having secured to its rear side a flange *f* to the upper end of which is pivoted

a lever I, which rests upon and is supported by an adjusting screw *g* projecting upward from the inner end of the key L fulcrumed at *h*, the head of the screw *g* bearing upon a cushion *k* applied to the under surface of the lever I. To the lever I is pivoted at the lower end of an upright rod or bar M, the free end of which forms the jack, while the opposite end forms the lifter, the entire rod or bar forming what I term a "combined lifter-rod and jack," the upper or free end of which lies directly beneath the jack-butt D and acts upon the same to operate the hammer when raised by the depression of the key L through the lever I previously referred to, an elastic cushion or stop 12 being provided, against which the upper end of the lifter-rod and jack normally rests, as shown in Fig. 2.

The adjusting screw *g* enables the parts to be readily adjusted to compensate for wear, the head of said screw *g* being preferably provided with holes to receive the end of a rod or other implement by which it may be turned to effect the adjustment required.

I is a guide pin and hammer retractor, which projects forwardly from the lower end of the hammer heel, said pin passing through a bushed slot *n*, Fig. 4, formed at the free or upper end of the lifter-rod and jack. The pin *l*, which takes the place of a guide flange, works smoothly and without any friction, in the slot *n*, and forms a simple, cheap, and effective guide for steadying and preventing the lifter-rod and jack from having any lateral movement, whereby it is kept at all times exactly in line with the jack-butt D as required. A further advantage possessed by this guide pin is, that after the hammer has struck its blow upon the string and the key has been released, the weight of the lifter-rod and jack and mechanism connected therewith will be brought upon the guide-pin by the contact of the end of the slot *n* therewith, and thus transmitted to the hammer heel, operating positively in this manner as an assistant device to insure the instant retraction or withdrawal of the hammer in case the joints should be affected by dampness, and rendering it necessary to employ only a very light and inexpensive hammer-spring, thus mate-

rially reducing the cost of the action, and rendering the touch of the instrument very light and elastic.

The hammer spring which I prefer to employ in connection with the aforesaid construction consists of a light spring *p* composed of straight wire, one end being preferably secured at 15 to the jack or bar *M*, while its opposite end bears with suitable tension 10 against a rest or projection 16 located on one side of the jack-butt or hammer-heel and having on its inner or rear side an open slot or notch 8, Fig. 4, to receive the end of the spring *p* and keep it in place, said spring sliding in said slot and by its tension exerting an outward pressure upon the jack-butt or hammer heel above the level of its pivot or fulcrum *c* to withdraw or retract the hammer on the release of the key *L*.

q is an adjustable throw-off button secured to the end of an upwardly inclined regulating screw *r* passing through the lifter-rod and jack *M*, said throw-off button *q* co-operating with an incline *s* formed on the front side of 25 the center rail *A*, whereby as the lifter-rod and jack is raised by the depression of the key *L*, its free end will be thrown off its seat *t* to allow the hammer to recede from the string *w*, and by means of this screw *r*, the operation of these parts may be regulated with the greatest nicety.

It will be seen that the throw-off button *q* is normally situated at a little distance from the face of the incline *s* of the rail *A*, as shown in Fig. 2, and therefore it does not come into contact therewith until the hammer has nearly touched the string, consequently the lifter-rod and jack *M* will remain under the shoulder or seat *t* of the jack-butt until after 40 the blow has been struck, when it is instantly thrown off its seat *t* into the position shown in Fig. 3, against the back-stop *N*, the construction of which will be presently described. By this means the blow of the hammer upon the string is given with its full force before 45 the lifter-rod and jack commences to be thrown off the shoulder or seat *t* of the jack-butt, resulting in the full force of the blow upon the key being always transmitted to the string.

As the key *L* is depressed, an increased tension in a backward direction is put upon the spring *p* by the movement of the parts into the position shown in Fig. 3, the spring being 55 thus ready to act in the proper direction to effect the recession of the hammer at the proper time, and as the lifter-rod and jack commences to fall on the release of the key *L*, the tension of the spring *p* under the arrangement described, acting upon the said lifter-rod and jack in an inward direction, causes its free or upper end to be instantly returned to its original position beneath the seat *t* of the jack-butt against the stop 12, as 60 seen in Fig. 2, ready for a repetition of the blow of the hammer. By this construction I am enabled to reseat the free end of the lifter-

rod and jack beneath the jack-butt the moment the key *L* is relieved of the pressure of the finger, the parts being thus ready for another blow when the hammer has receded but a short distance from the string, which gives me the advantage of being able to repeat rapidly without removing the finger from the key, and at the same time cause the hammer to give a fine and perfect blow each time it strikes the string. 70 75

By arranging the light spring *p* in the manner described to perform the double function of a hammer spring and a spring for reseating the lifter-rod and jack beneath the jack-butt, it can be made of very much lighter wire than any hammer spring hitherto used, thereby giving the instrument a much lighter and more delicate touch, as the full force of the spring is not felt upon the key until just before the blow is struck, the ordinary hammer spring and hammer-spring rail hitherto necessary being by this construction entirely dispensed with, thereby still further reducing the cost of construction. 80 85 90

The back-stop *N* is secured to the hammer-heel *C*, and is preferably provided near its lower end with an adjustable button *a'*, against which the free end of the lifter-rod and jack contacts when thrown off its seat as before described; said button *a'* being secured to the end of a regulating screw *b'* passing through the said back-stop near its lower end, and by thus making the back-stop adjustable as described, the distance that the hammer recedes from the string after the blow may be regulated with the utmost nicety so as to lie as close as possible to the string without any danger of striking it on the rebound, thus enabling the repetition of the notes to be made more rapidly and perfectly than heretofore; furthermore, the location of the regulating-screw *b'* in front of the hammer-heel renders it easily accessible for adjustment, which is 100 an important advantage. 105

If desired, the adjustable back-stop button *a'* may be dispensed with, in which case the back-stop may be made integral with the hammer-heel, as shown in Figs. 7 and 8, and when 115 so made the back stop will, on the release of the key, exert an inward pressure on the free end of the lifter-rod and jack, thus acting to return the same to its original position beneath the seat *t* of the jack-butt, and rendering the employment of a spring for this purpose unnecessary. I prefer however to provide the back-stop with an adjustable button as first described, as it produces better results. 120

P is a back-catch or locking device, consisting of a rod or bar projecting out from the lifter-rod and jack, and having an upward incline or hook 20 at its outer end, which is adapted when the lifter-rod and jack is raised by the key, to hook or catch under an inclined adjustable button *c'*, secured to the end of a regulating screw *d'* passing through the rail *Q*, whereby as the lifter-rod and jack is raised 125 130

by the key L, it is tightly locked in such manner as to prevent it from moving rearwardly or toward the string, and consequently as the back-stop which projects from and forms a part of the hammer heel is pressed firmly into contact with the upper end of the lifter-rod and jack when in the position shown in Fig. 3, it will be obvious that when said lifter-rod and jack is locked as described, the hammer will be securely held from rebounding as soon as it has struck the string and has fallen back as seen in Fig. 3, the position of the lifter-rod and jack when locked being regulated by adjusting the position of the button *c'*. With this construction the hammer is held firmly whether the blow is a light or a powerful one, and any extra pressure on the key to produce a powerful blow of the hammer will cause the outer end of the arm P to be pressed more firmly against the button *c'*, while as soon as the key is released, the descent of the lifter-rod and jack will cause the hook or incline 20 at the end of the arm P to instantly drop out from under the button *c'*, leaving the parts free to operate as before described, it being impossible for the action to become choked as the release of the key will always insure the descent of the arm P.

If preferred the adjustable button *c'* and the regulating screw *b'* may be dispensed with, in which case the hook or incline 20 at the end of the arm P will be brought into direct contact with the correspondingly inclined surface of the rail Q, properly located for this purpose, as shown in Fig. 9, and said rail if desired can be made adjustable by any suitable means to effect the same result as is produced by the employment of the adjustable button *c'*.

To the rear end of the lever I is secured an upwardly projecting arm R, which is preferably provided with an adjustable button *f'* secured to the end of a regulating screw *g'* passing through said arm R; said button *f'*, when the key L is depressed, being brought into direct contact with the lower end of the long damper-lever B to actuate the same at the proper time, thereby enabling me to dispense with the intermediate lever hitherto employed to actuate the damper lever in all actions known as "long actions," which are used almost exclusively, and in which the intermediate lever has been regarded as a necessity by reason of the arrangement of the parts as shown in Letters Patent granted to me April 5, 1892, No. 472,478; and consequently by dispensing with this intermediate lever and the flange to which it was pivoted, I am enabled to materially simplify the construction and reduce the number of parts; two flanges only being employed in my action instead of three or more as formerly, which is an important advantage as the flange-joints are the parts which are liable to stick and require constant attention, hence it is desirable to reduce their number to a minimum.

By means of the adjustable button *f'*, the

movement of the damper may be regulated as desired, but if preferred the button *f'* may be dispensed with and the regulation of the damper accomplished by bending the extension wire which forms the lower portion of the damper-lever.

The damper is adjustably secured to the upper end of the damper-lever B in the following manner: The wooden damper-block *b* is provided with a vertical half-round groove *i'* for the reception of the upper end of the damper lever B, which projects about one-half its thickness beyond the face of the block *b*, which is provided on one side of this groove *i'* with a projecting screw *k'* having a clamping nut *l'* at its outer end, or a head as seen in Fig. 5. Between the nut and the damper lever is placed a washer *m'* preferably provided with a shallow groove *n'* fitting over said damper lever, and thus by turning the nut or the head of the screw the damper-block *b* will be immovably clamped in place as required. Heretofore the damper-lever has passed vertically through the damper-block, which was held in place thereon by a set-screw, and much difficulty has been experienced with this construction on account of the liability of the damper-block to split in line with the vertical aperture therein; with my improved device however the splitting of the damper-block in this manner is entirely prevented, and much annoyance thereby avoided.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an upright piano action, the combination of the hammer, the lifter-rod and jack and the jack-butt co-operating therewith, said jack-butt forming a portion of the hammer heel, a back-stop projecting from the hammer-heel and adapted to contact with the free end of the lifter-rod and jack when the latter is thrown off its seat on the jack-butt, and a back-catch arm or rod projecting from the lifter rod and jack and having an upward incline at its outer end adapted to catch or hook under a rail or a button or projection secured thereto, substantially as set forth.

2. In an upright piano action, the combination of the hammer, the lifter-rod and jack, and the jack-butt co-operating therewith, said jack-butt forming a portion of the hammer-heel, a back-stop projecting from the hammer-heel and adapted to contact with the free end of the lifter-rod and jack when the latter is thrown off its seat on the jack-butt, the rail A having the incline *s*, the adjustable throw-off button *q* projecting from the lifter-rod and jack and co-operating with said incline, and a back-catch arm or rod projecting from the lifter-rod and jack and having an upward incline at its outer end adapted to catch or hook under a rail, or a button or projection secured thereto, substantially as set forth.

3. In an upright-piano action, the combination of the lever I pivoted to the flange of the rail H, the lifter-rod and jack pivoted to the

lever I and provided with the throw-off button *q*, the rail A with its incline *s*, the hammer and hammer-heel, the latter having the jack-butt formed thereon, the back-stop projecting from the hammer-heel, the back-catch arm or rod P projecting from the lifter-rod and jack and having the upward incline 20 at its outer end, and the rail Q provided with a stop under which the outer end of the rod P is adapted to hook or catch on the ascent of the lifter-rod and jack, substantially as and for the purpose described.

4. In an upright-piano action, the combination of the lever I pivoted to the flange of the rail H and actuated by the key L, the lifter-rod and jack pivoted to said lever I and provided with the throw-off button *q* and the slot *n*, the rail A with its incline *s*, the hammer and hammer-heel, the latter having the jack-butt formed thereon, the guide pin *l* projecting through the slot *n*, and the spring *p*, the latter connected at one end with the lifter-rod and jack, and at the opposite end with the hammer heel, all operating substantially as set forth.

5. In an upright-piano action, the combination of the lever I, pivoted to the flange of the rail H and actuated by the key L, the lifter-rod and jack pivoted to said lever I and provided with the throw-off button *q* and slot *n*, the rail A, with its incline *s*, the hammer and hammer-heel, the latter having the jack-butt formed thereon, the guide-pin *l* projecting through the slot *n*, and the spring *p*, the latter connected at one end to the lifter-rod and jack and at the opposite end with the hammer heel, the back-stop N, projecting from the hammer heel, the back-catch arm P having the upward incline 20 at its outer end and the rail Q provided with a stop under which the outer end of said rod P is adapted to hook or catch on the ascent of the lifter-rod, substantially as described.

6. In an upright-piano action, the combination of the damper and damper-lever, the latter pivoted to the flange of the rail A, the hammer and hammer-heel, the latter having the jack-butt formed thereon, the lifter-rod and jack, the lever I pivoted to the rail H and having the lower end of the lifter-rod and jack pivoted thereto, and the arm R projecting upward from the rear end of the lever I and adapted to act directly on the damper lever to actuate the same on the depression of the key, substantially as set forth.

7. In an upright-piano action the combination of the damper and damper-lever, the latter pivoted to the flange of the rail A, the hammer and hammer-heel, the latter having the jack-butt formed thereon, the lifter-rod and jack, the lever I pivoted to the rail H and having the lower end of the lifter-rod and jack pivoted thereto, and the arm R projecting upward from the rear end of the lever I and provided with an adjustable button *f'* adapted to act directly on the damper-lever

to actuate the same on the depression of the key, substantially as set forth.

8. In an upright-piano action, the combination of the damper and damper-lever, the latter pivoted to the flange of the rail A, the hammer and hammer-heel, the latter having the jack-butt formed thereon, the lifter-rod and jack provided with the throw-off button *q*, the rail A with its incline *s*, the lever I pivoted to the flange of the rail H and having the lower end of the lifter-rod and jack pivoted thereto, the back-stop N projecting from the hammer heel, the back-catch rod or bar P projecting from the lifter-rod and jack and having its outer end inclined upward as shown, the rail Q co-operating with said bar P, and the arm R projecting upward from the rear end of the lever I and adapted to act directly on the damper-lever to actuate the same, substantially as set forth.

9. In an upright piano action, the combination of the rail A with its incline *s*, the flange *a*, hammer E, hammer heel C, having the jack-butt D formed thereon, the lifter-rod and jack M provided at its free end with the slot *n* and having the adjustable button *q* co-operating with the incline *s*, the spring *p*, having one end connected with the hammer heel and the other end with the lifter-rod and jack, the guide-pin *l* projecting from the hammer-heel and engaging the slot *n*, the lever I pivoted to the flange of the rail H and having the lifter-rod and jack pivoted thereto, said lever I being provided with the upwardly-projecting arm R adapted to act directly on the damper-lever to actuate the same, the key L provided with the adjusting screw *g*, the back-stop N projecting from the hammer-heel, the back-catch rod or bar P projecting out from the lifter-rod and jack, and having its outer end inclined upward as shown, and the rail Q provided with a stop under which said bar P is adapted to catch on the ascent of the lifter-rod, all constructed and arranged to operate substantially as set forth.

10. An action for upright-pianos substantially as described, the same consisting of the rail A with its incline *s*, the flange *a*, hammer E, hammer-heel C, having the jack-butt D formed thereon, the lifter-rod and jack M provided at its free end with the slot *n* and having the adjustable throw-off button *q* co-operating with the incline *s*, the spring *p* having one end connected with the hammer-heel and the other end with the lifter-rod and jack, the guide-pin *l* projecting from the hammer-heel and engaging the slot *n*, the lever I pivoted to the flange of the rail H and having the lifter-rod and jack pivoted thereto, said lever I being provided with the upwardly projecting arm R having the adjustable button *f'*, the key L provided with the adjusting screw *g*, the back-stop N projecting from the hammer-heel and having the adjustable button *a'*, the back-catch rod or bar P projecting out from the lifter-rod and jack and having

its outer end inclined upward as shown, the co-operating rail Q provided with a stop under which the bar P is adapted to catch on the ascent of the lifter-rod and jack, the damper *b*, damper-lever B pivoted to the flange *a* and adapted to be actuated by the arm R of the lever I, and the damper-spring *e*, all constructed and arranged to operate substantially as described.

- 10 11. In an upright-piano action, the damper-block having a projecting screw provided with a clamping nut or head, in combination with the damper-lever adapted to be clamped by said nut or head against the face of the damper-block, substantially as set forth.

15 12. In an upright-piano action, the combination, with the damper-lever, of the damper-block *b* provided on one side with a vertical groove *i'*, for the reception of the upper end

of said damper-lever, the screw *k'* projecting 2- from the damper block and provided with a nut or head adapted to clamp the damper in place upon the damper-lever, substantially as set forth.

13. In an upright-piano action, the combination of the damper-lever B, the damper-block *b*, with its vertical groove *i'*, the screw *k'*, with its clamping nut or head, and the washer *m'* having the groove *n'*, all constructed and operating substantially in the 30 manner and for the purpose set forth.

Witness my hand this 22d day of October, A. D. 1892.

GEORGE MORSE GUILD.

In presence of—

P. E. TESCHEMACHER,
HARRY W. AIKEN.