



# UNITED STATES PATENT OFFICE.

EDGAR L. WILLEFORD, OF ATLANTA, GEORGIA, ASSIGNOR OF ONE-HALF TO J. H. WILLIAMS, OF SAME PLACE; JOHN W. WILLEFORD EXECUTOR OF SAID EDGAR L. WILLEFORD, DECEASED.

## PIANOFORTE-ACTION.

SPECIFICATION forming part of Letters Patent No. 617,411, dated January 10, 1899.

Application filed February 12, 1898. Serial No. 670,062. (No model.)

*To all whom it may concern:*

Be it known that I, EDGAR L. WILLEFORD, a citizen of the United States, residing at Atlanta, Fulton county, Georgia, have invented  
5 new and useful Improvements in Pianoforte-Actions, of which the following is a specification.

My invention relates to pianos, its object being to improve the action with a view to  
10 producing a firm, elastic, and perfectly-controlled movement of the hammer under all conditions, enhancing the durability of the parts and connections, insuring a clear, firm, and even tone throughout the register under  
15 all circumstances of use. The improvement also facilitates quick repetition of striking action without possibility of "ciphering" or omission, and generally improves the responsiveness, delicacy, and elasticity of the key-board action, and also facilitates "regulation" and lessens the liability of getting out of regulated adjustment from changes of temperature or other causes.

To these ends my invention consists in the  
25 piano-action embodying the features and elements herein described, combined and arranged as set forth and as illustrated in the accompanying drawings, in which—

Figure 1 is a general side elevation of the  
30 action from the key-lever upward, including the striking-hammer and damper. Fig. 2 is a detail showing the connection between the hammer-shank and the post extension.

Referring now to the drawings, A designates the key-lever, B the jack-bed, pivotally  
35 secured to the rail B', b the jack, C the hammer-butt, c' the hammer-shank, and D the hammer-head, all these parts being arranged according to modern practice in this regard, and, excepting in the particulars hereinafter  
40 pointed out, constructed in the usual manner.

The hammer-butt C is pivotally secured to the rail G, to which also is pivotally secured the damper E' upon a shank e. From the  
45 front of the hammer-butt C projects the back-catch bunter c<sup>2</sup>, engaging the back-catch F, the latter set upon a screw-threaded rod f, projecting from the pivoted jack-bed B. These parts also in their main relations and func-  
50 tions are similar to those in common use.

The essentially new features of my invention reside in the mechanism now to be described and in the modifications thereby made necessary in parts before referred to in combining and adapting all the parts to produce  
55 new and useful results.

Rising from the pivoted jack-bed B in a forward curve near the rear end is rigidly secured a post H', to which is pivoted a slotted extension H<sup>2</sup>, the latter being provided mid-  
60 way with a forward-projecting arm or finger h, slotted to pass and be engaged with the shank f of the back-catch F by means of a nut n upon the screw-threads of the shank f to secure an interadjustment presently to be  
65 described. The post extension H<sup>2</sup> extends in an upward curve in front of the hammer-shank c' in the plane of movement of the latter, passing by the jack b and the shank of the back-catch bunter c<sup>2</sup>, both of which lat-  
70 ter pass through the slots of said extension H<sup>2</sup> without contact or impairment of their several movements and functions.

From near the upper end of the extension H<sup>2</sup> a pivoted tongue j extends rearward  
75 through a slot in the hammer-butt C, with which it has the connection more clearly shown in Fig. 2—that is to say, the tongue j is longitudinally slit, as shown at s, from its rearward to near its front end, and an oblong  
80 recess is formed near its rear end lined with felt or cloth, through which passes a pin p, inserted from side to side through the slot-walls of the hammer-butt C. The jaws of the tongue j are held together by set-screw k.  
85 At the upper extremity of the post extension H<sup>2</sup> is a buffer h', which in the rearward movement of the extension contacts with the rail I as a limiting-stop.

To complete the group of parts just de-  
90 scribed, a spring x, attached to the front projection h and subject to regulation by a set-screw x', passes downward through a slot in the jack b and engages the jack at the rear side by means of a loop h<sup>2</sup>, pivoted to the jack  
95 near the bottom. A small coiled spring y also connects the bottom of the hammer-butt C with the rail G, acting normally to move the hammer away from the string.

The jack b is tripped in the usual manner 100

by a front projection  $b'$ , coming in contact with an adjustable stop  $l$  upon a rail  $m$ , as shown.

The operation is as follows: On pressing  
5 down the forward end of the key-lever the riser  $a$  lifts the pivoted jack-bed  $B$  with the jack  $b$ , which latter in turn operates upon the hammer-butt  $C$  to throw rearward the hammer  $D$  in the usual manner. This action throws  
10 rearward the post  $H'$ , which by means of an adjustable dog  $o$  operates the damper-trip  $E$ , lifting the damper  $E'$ . The movement also brings the jack extension  $b'$  in contact with its arresting-stop  $l$  and jumps back the jack  
15  $b$  against the force of its spring  $x$ . It also throws rearward the upper end of the post extension  $H^2$ , bringing the buffer  $h'$  against the arresting-stop of the rail  $I$ . This arrest occurs before the key-lever has reached its  
20 limit of movement. Consequently as the jack-bed continues rising and the jack  $b$  is jumped out of its seat at the hammer-butt  $C$  the post  $H'$  has a pivotal movement in relation to its extension  $H^2$  against increased tension of  
25 the spring  $x$  and the tongue  $j$  a like pivotal movement in relation to the extension  $H^2$ . Also the rear projection  $h$  parts from its stop  $n$  and the back-catch  $F$  continues on to its proper position to engage the back-catch  
30 bunter  $c^2$  upon the rebound of the hammer. The action of the hammer  $D$  upon the string, it will be seen, is direct and positive, but its rebound is limited by the opening  $s'$  of the slit tongue  $j$  without suddenness or jar. In  
35 releasing the key-lever while the hammer and the extension  $H^2$  are still held to advanced position by the force of the spring  $x$ , as indicated by dotted lines in Fig. 1, the jack-bed  $B$  drops down and allows the jack to reseal  
40 itself under the hammer-butt while the hammer is still held to position by the tongue  $j$  and while the post  $H'$  and its extension  $H^2$  are regaining their normal pivotal relations and the stop  $n$  is coming back to its engagement  
45 with the projection  $h$ . Thus it will be seen that every movement of the action is positive without sacrificing the elasticity and delicacy desired and that the movements are so limited and controlled that it is impossible for the  
50 key-lever to operate on the hammer after a previous action without first allowing the jack to reseal itself. Further, that the limits of key action and hammer movement may be regulated to a point of extreme delicacy without sacrificing the benefits above outlined.

Incidentally it will be observed that the construction is such that the friction is confined to the center-pins and bushings, which permit the greatest possible minimizing and  
60 are least liable to be affected by changes of temperature or other causes. There is no lost motion between the key-lever and striking-hammer, and the repeating action is absolutely untrammelled within defined limits without  
65 possible loss of control. It is also to be noted that while the action is provided with means of regulation at every essential point all these

are accessible from the front without removing the action from its normal relation to the strings.

The "soft-pedal" effect is produced by a suitable lifter (not shown) acting to lift the rail  $R$  into the position shown in dotted lines, thereby diminishing the arc of movement of the key-levers, thus leaving the quality of  
75 tone unimpaired and allowing the performer to vary the loudness by varying the force of the stroke and so producing uniformity of effect varied only in degree from the most delicate pianissimo to the double forte.

I claim as my invention and desire to secure by Letters Patent of the United States—

1. In a piano-action the pivoted jack-bed, provided with a pivotal arm extending upward in front of the hammer-shank, and connected therewith; in combination with the  
85 jack; and a spring connecting the upward extension with the jack, substantially as set forth.

2. In a piano-action, the combination of a  
90 jack-bed and its pivotal extension-arm, the arresting-rail, arranged in the rearward path of the upper terminus of the said arm, and the tongue pivotally attached to said extension and having an elongated slot connection  
95 with said hammer-shank, substantially as set forth.

3. In a piano-action, the combination of a pivoted jack-bed, the pivotal extension-arm; the back-stop, constituting also an adjustable  
100 holding-stop for the extension-arm, and the spring engaging said pivotal extension-arm with the jack, substantially as set forth.

4. In a piano-action, the combination of the jack-bed, the pivotal extension-arm, the back-  
105 stop, the projection of said pivotal extension-arm, and the spring connecting said projection and jack, in compression, drawing the jack rearward and forcing the projection of the extension-arm normally upward against  
110 its holding upon the back-stop, substantially as set forth.

5. The combination of the pivoted jack-bed and its rigid post  $H'$ , the pivotal extension-arm  $H^2$ , the pusher,  $o$ , adjustable in said post, and the damper-trip substantially as set forth.

6. The combination of the pivoted jack-bed, the post having a pivotal extension connected with the hammer-butt, the jack having a rear extension, the spring connecting and operating the jack and the pivoted arm of the  
120 jack-bed, and the arresting-stop engaging the rear extension of the jack, substantially as set forth.

7. The combination of the pivoted jack-bed, the post having a pivotal extension, the forward-projecting arm of the pivotal extension, the back-catch rod and the adjustable nut on said rod engaging the said forward-projecting arm as a holding-stop, substantially as set  
130 forth.

8. The combination of the pivoted jack-bed, the post and its pivotal extension, the hammer-butt, the jack and the tongue,  $j$ , moving

rearward correspondingly with the lifting action of the jack to its arresting-point and the slit-tongue connection of the pivoted tongue extension with the hammer-butt, substantially as set forth.

9. In an action of the character indicated, in combination with the pivoted jack-bed, the post, its pivotal extension and forward projection, and the jack, the spring fulcrumed in the forward projection in a bight or bend, attached to the jack at its outer terminal and having an adjustable bearing against said forward projection at its inner terminal, substantially as set forth.

10. In a piano-action of the character indicated the combination of the post extension of the jack-bed; the pivoted tongue *j* slit as

shown and provided with an oval enlargement; the hammer-butt with which it is engaged as shown; and the limiting-stop, *l*, substantially as described.

11. The piano-action embodying in combination the jack-bed, B, post, H'; extension, H<sup>2</sup>, having a forward projection, *h*; jack, *b*; hammer-butt, C; tongue, *j*; spring, *x*, and back-catch, F *f*, provided with stop, *n*, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EDGAR L. WILLEFORD.

Witnesses:

J. H. WILLIAMS,  
E. F. MARSTON.