(No Model.)

W. MUNROE.

UPRIGHT PIANO ACTION.

No. 551,832. Patented Dec. 24, 1895.

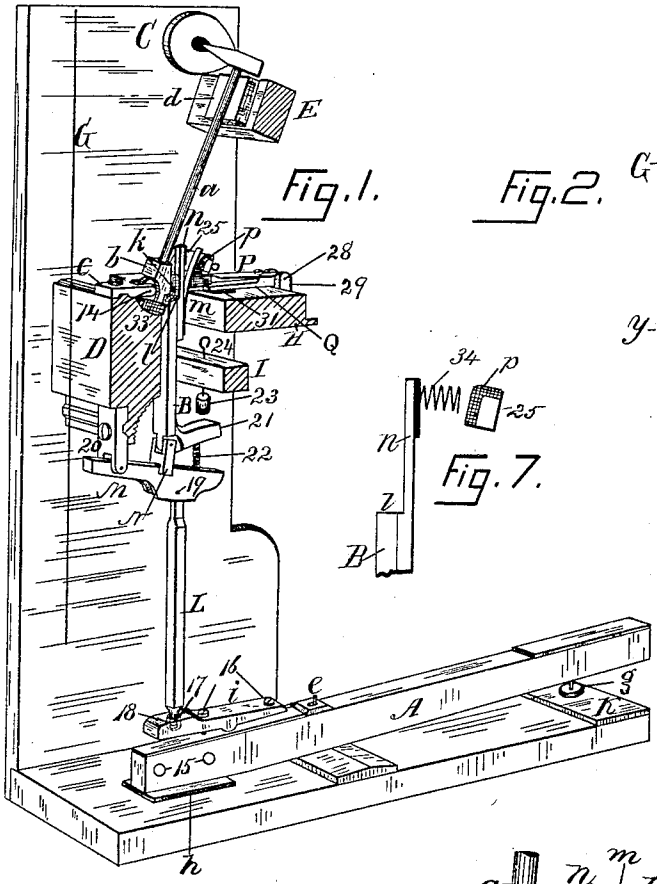

Fig. 1.

Fig. 7.

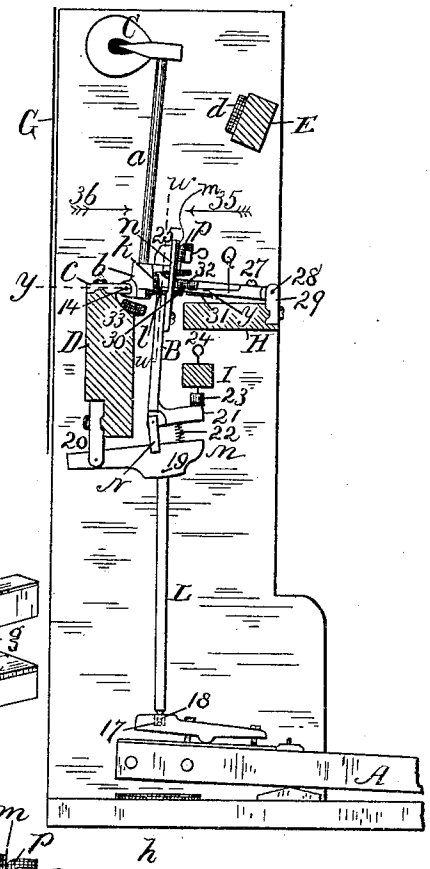

Fig. 2.

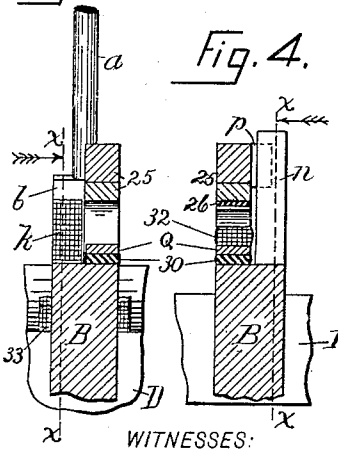

Fig. 3.

Fig. 4.

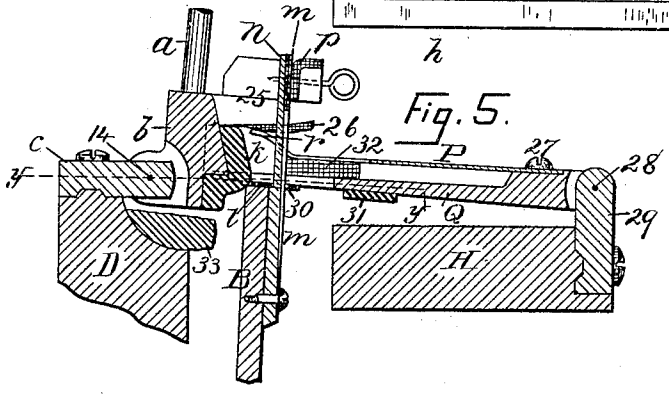

Fig. 5.

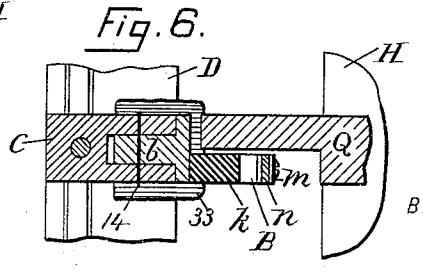

Fig. 6.

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UPRIGHT-PIANO ACTION.

SPECIFICATION forming part of Letters Patent No. 551,832, dated December 24, 1895.

Application filed April 23, 1895. Serial No. 546,890. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MUNROE, of the city, county, and State of New York, have invented an Improved Upright-Piano Action, 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 perspective view of an upright-piano action constructed in accordance with my present invention, the several parts being in their normal position—*i. e.*, with the hammer, jack and key-lever at rest. Fig. 2 is a side elevation representing the key depressed and the hammer-rod in its upright position immediately after the recession of the hammer from the string; Fig. 3, a transverse vertical section (enlarged) on the line *w w* of Fig. 2, looking in the direction of the arrow 35; Fig. 4, a similar section (enlarged) on the line *w w* of Fig. 2, looking in the direction of the arrow 36; Fig. 5, a vertical section taken in the direction of the line *x x* of Figs. 3 and 4; Fig. 6, a horizontal section (enlarged) on the line *y y* of Figs. 2 and 5; Fig. 7, a modification to be referred to.

My present invention relates to upright-piano actions, and has for its objects to obtain elasticity of touch with prompt and rapid responses of tone and power of stroke by the employment of a minimum number of parts of simplest construction which permanently retain their effectiveness under the various conditions of changes of temperature and of transportation from place to place; and this invention consists, in combination with the jack and hammer, of certain springs of peculiar construction, arrangement and operation, by which I accomplish the aforesaid requirements so essential in instrumental practice, said springs and their related parts being hereinafter fully described and specifically claimed.

In the said drawings, A represents the key-lever; B, the lifting-jack; C, the hammer; *a*, the hammer-rod; *b*, the hammer-butt; *c*, a bifurcated cleat screwed to the hammer-butt rail D, and to which cleat the hammer-butt is pivoted at 14.

E is the hammer-rest rail provided with an inclined cushion *d* against which the upper end of the hammer-rod rests when in its normal position—*i. e.*, when the key is not depressed and the parts are in the position seen in Fig. 1. One of the strings is represented by the vertical line G.

H is the repeating-lever rail and I the escapement-rail. The key-lever is pivoted at *e*, and its outer or key end when depressed strikes a cushion *g* secured to the transverse key-rail K thereunder, and the inner end of the key-lever is weighted at 15 and in its normal position rests on a cushion *h* in a well-known manner.

i is a rocker-cleat rigidly secured by adjusting-screws 16 to the top of the inner end of the key-lever and is provided with a socket 17 for the reception of the lower cushioned foot 18 of the upright lifting-rod L pivoted at its upper end at 19 to a guide-lever M pivoted within a bifurcated arm 20 projecting down from and secured to the under side of the hammer-butt rail D. This guide-lever M has a bifurcated standard N rising from its upper side, to which is fulcrumed the bent foot 21 of the jack, between which and the guide-lever M is interposed a spiral spring 22 which is compressed when said lever and foot are raised and the latter brought against the under side of the regulating-button 23 by the ascent of the jack-lifting rod L when pressure is applied to depress the key. This elastic button is made adjustable to limit the upward movement of the jack by a screw 24 passing through the escapement-rail I, and the upward and downward movements of said jack are insured and controlled by the guide-lever M.

A portion of the front of the hammer-butt, its lower front corner, and a portion of its contiguous lower side are provided with a cushion *k* which is in constant contact with a shoulder *l* formed on the lifting-jack, the front upper portion of the cushion abutting against the contiguous surface of the jack when the upper end of the hammer-rod is resting against its cushion *d* and the key-lever is at rest. Projecting from the rear of

the hammer-butt is an offset 25, to the front of which is secured an adjustable pad *p*.

To the front of the jack, below the plane of its shoulder *l*, is secured the lower end of a small, flat, and nearly upright spring *m* of light weight, the upper end of the spring being free and extending up to about the level of the top of the jack, which is provided with a cushion *n*. This spring in its normal position has its upper end inclined forward (away) from the cushion, (see Fig. 1,) and in the position seen in Fig. 2 when the key is depressed it is clamped and firmly held between the cushion *n* and the adjustable pad *p* secured to the offset 25. The tension of the flat spring *m* increases as the pad *p* presses its free end backward in the direction of the arrow 35 when the jack ascends and tips the cushioned butt on the depression of the key.

The under side of the offset of the hammer-butt is provided with an elastic pad 26 which bears on the outer curved end *r* of a flat and nearly horizontally-arranged spring P secured at 27 to a horizontal "repeating-lever" Q fulcrumed at 28 to a bifurcated standard 29 rising from the repeating-lever rail H. The inner end of this lever Q is provided with a cushion 30 on its under side which (like the cushion on the hammer-butt) at all times rests on the shoulder *l* of the jack. Also on the under side of the lever Q is a cushion 31 which rests on the repeating-lever rail, and on the inner end of the lever Q is a cushion 32 interposed between it and the under side of the spring P. There is also a cushion 33 on the top of the hammer-butt rail D, the function of the several cushions or elastic pads being to afford a resilient rest or bearing for the parts contiguous thereto, and, while preventing loss of motion, insures easy gradual movement without tendency to rattle. A spiral spring 34 (see Fig. 7) may be substituted for the spring *m* and good results be obtained thereby.

Operation: I will now describe the operation by which the function and rationale of the action of the springs *m* and P and their related devices will be clearly understood, the parts being represented in their normal position of rest, as seen in Fig. 1. When pressure is applied to depress the key, the jack is raised, causing its shouldered portion *l* to press upward and tip the cushioned hammer-butt away therefrom in the direction of the arrow 35, simultaneous with which the inner end of the repeating-lever Q is also raised by the jack and the inner curved end of the spring P is pressed upward against and tips forward the cushioned offset 25. When the spring P is coming into this position and just before the foot 21 of the jack comes into contact with the regulating-button 23, the upper cushioned end of the jack advances toward the free end of the spring *m*, while at the same time the cushioned offset 25 moves inward to meet said free end, the result of which is that the shoulder *l* of the jack slides slightly upward and laterally under the cushion *k* of the hammer-butt into a position where the latter touches only the corner of the shoulder *l*, the top of the interposed spring *m* being at the same time clamped and held securely between the cushion *n* of the jack and pad *p* of the hammer-butt offset. Just before the clamping of the top of the spring *m* the hammer strikes the string G, and on the completion of the downward movement of the key the hammer recedes to a position near the string, where it is ready to respond promptly to repeat its blow on the next downward stroke of the key. When the pressure on the key is relaxed, the jack descends and its cushioned top recedes from and releases the upper end of the spring *m*, which then asserts itself and assists the jack to return its shoulder *l* laterally and slightly downward into a position under and to receive the cushioned hammer-butt. Otherwise the gravity of the jack would cause it to descend and carry its shouldered seat away from the path of and out of contact with the pivoted hammer-butt, which would result in objectionable noise and loss of motion incompatible with the ability to make quick repetition of harmonious tones when the hammer is to be returned to continue its strokes on the string. When the key-lever is at rest, the hammer-rod is supported on the inclined cushion *d*, and the elastic pad 26 on the under side of the offset 25 rests its entire lower surface on the curved outer end of the spring P, while the cushion *k* of the hammer-butt fits snugly upon the surface of the jack at its shoulder and also against the portions of the jack above and below it.

It will be understood from the foregoing that the spring P acts as an auxiliary aid or assistant to lighten the task of the spring *m* in carrying the shoulder of the jack under the hammer-butt, and by pressing upward on the offset of the butt relieves the jack of part of the weight of the hammer, thus insuring the production of prompt, loud, and rapid responses.

I claim—

1. The combination of the jack B with its cushion *n*, the hammer-butt offset with its elastic pad *p* and an interposed spring, substantially as set forth.

2. The repeating lever Q and hammer butt *b*, the lifting jack B with its shoulder *l* on which they both rest—the hammer-butt offset 25 and the spring P having one end secured to said lever and its other end extending under the offset 25 and supporting a portion of the weight of the hammer, combined and arranged to operate as specified.

3. The jack B with its shoulder *l*, the hammer C with its butt *b* resting thereon and periodically tipped thereby—the hammer-butt

offset 25—the spring interposed and periodically clamped between said jack and offset—the repeating lever Q with its inner end resting upon the shoulder *l* and elevated periodically by the ascent of the jack, and a spring extending under the offset 25 and supporting a portion of the weight of the hammer, the several elements being constructed, combined and arranged to operate substantially as described.

Witness my hand this 8th day of April, 1895.

WILLIAM MUNROE.

In presence of—
ALEXANDER HALLIDAY,
THOMAS R. LEWIS.