Aug. 31, 1926. 1,598,203

B. F. LAUKANDT

PIANO ACTION

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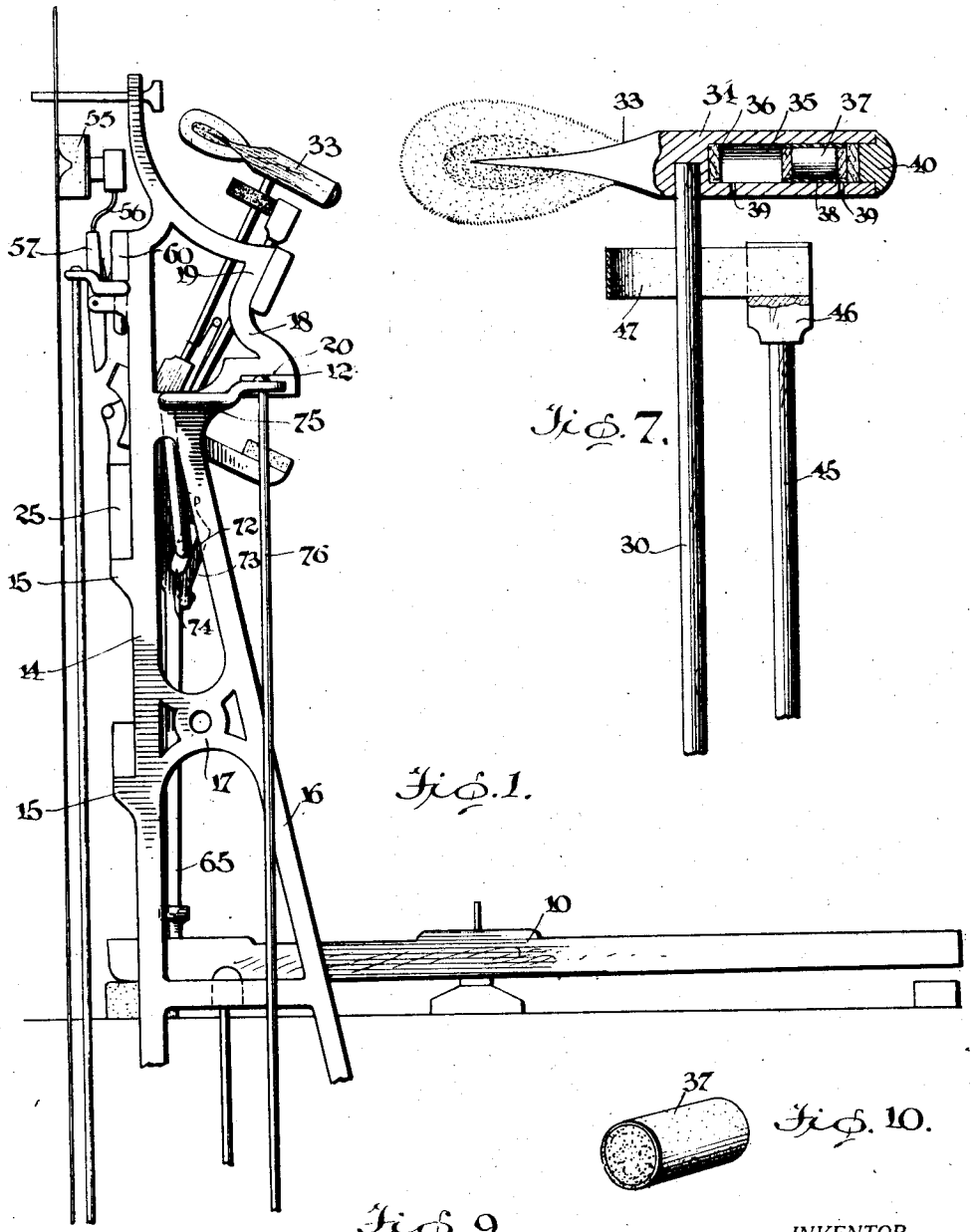



Fig. 1.




Fig. 7.




Fig. 10.

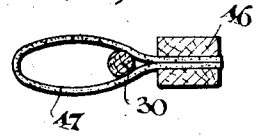



Fig. 9.

WITNESSES

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PIANO ACTION

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Fig. 2

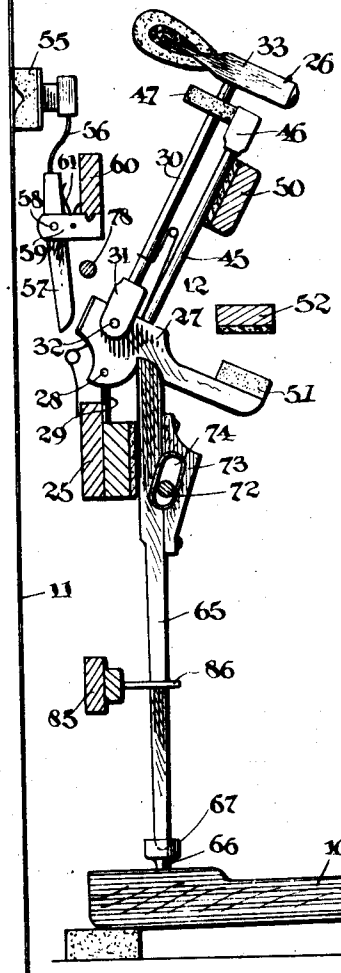
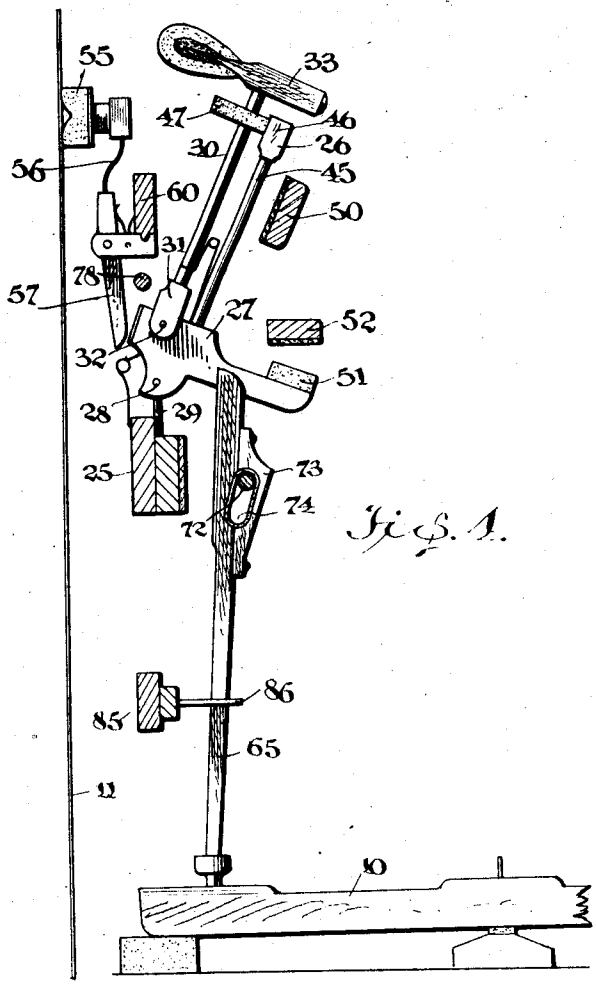



Fig. 1.




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Filed July 10, 1923 3 Sheets-Sheet 3

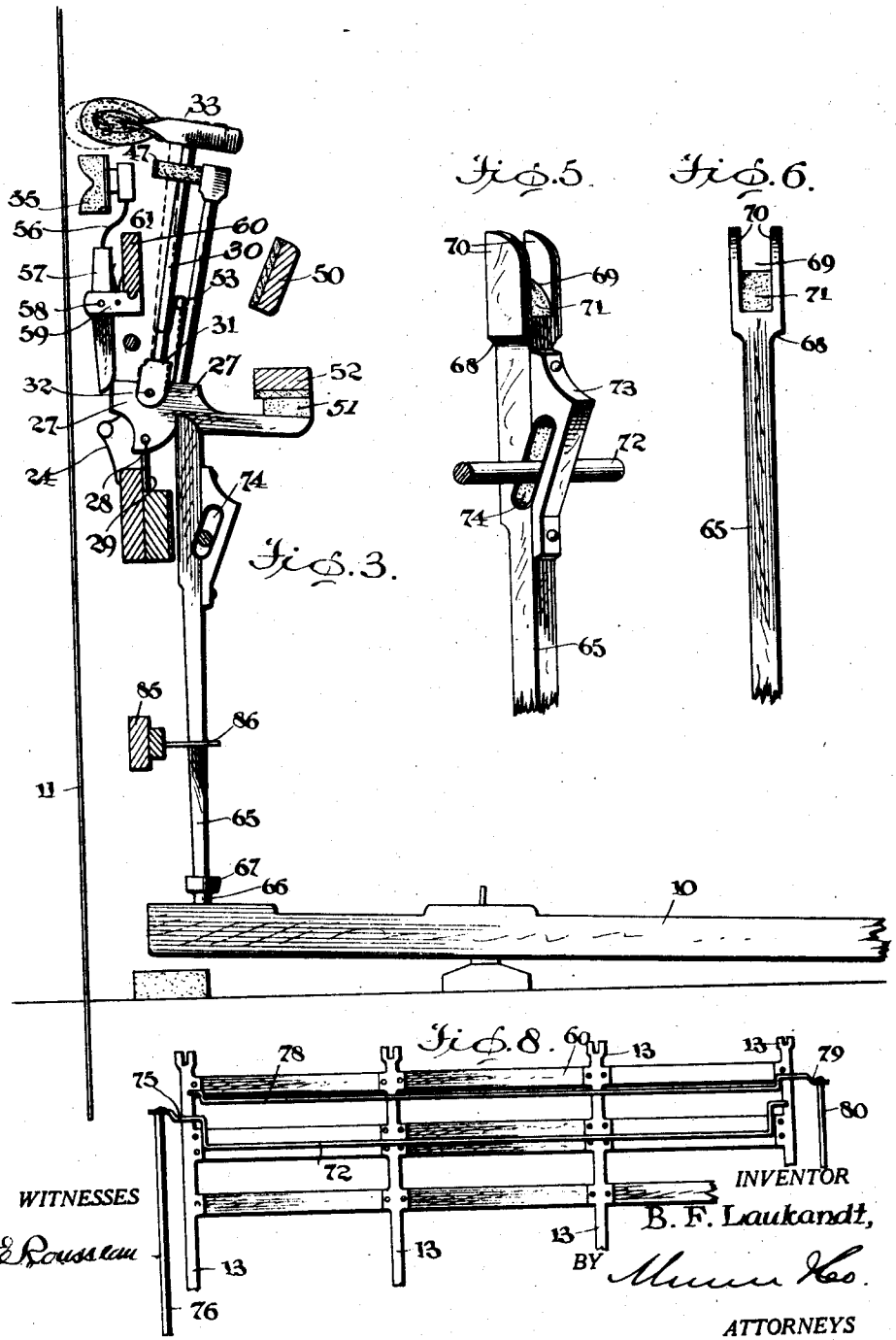



Fig. 3.

Fig. 5.

Fig. 6.

Fig. 8.

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Patented Aug. 31, 1926. 1,598,203

# UNITED STATES PATENT OFFICE.

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## PIANO ACTION.

Application filed July 10, 1923. Serial No. 650,704.

This invention relates to an improvement in piano actions, and has for its object, first, to insure a greater rythmic precision by eliminating all lost motion in the action, second, to obtain a quick repetition of the hammer strokes with less finger motion than is required by the ordinary standard action, and third, to reduce the number of parts in action to a minimum without sacrificing any of the advantages attached to the old standard actions.

Other objects and advantages of the invention reside in certain novel features of the construction, combination and arrangement of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming part of this specification, and in which:

Figure 1 is a fragmentary view in elevation, showing the piano action embodying the present invention together with the frame thereof;

Figure 2 is a fragmentary view, partly in section and partly in elevation, showing the piano action at rest;

Figure 3 is a similar view, showing the hammer action in striking position;

Figure 4 is a view similar to Figures 2 and 3 but showing the action adjusted for softer playing;

Figure 5 is a fragmentary view in perspective, showing the construction of the upper end of an extension rod;

Figure 6 is a view similar to Figure 5, showing the extension rod in elevation;

Figure 7 is a fragmentary detail view, partly in section and partly in elevation and showing the hammer construction;

Figure 8 is a view in elevation, showing the manner in which the pedal controls are mounted on the frame; and

Figures 9 and 10 are detail views.

Referring to the drawings wherein for the sake of illustration is shown the preferred embodiment of the invention, numeral 10 designates a conventional key which is mounted in the conventional manner and the numeral 11 designates the strings of the piano. The piano action is designated generally at 12 and is mounted on frame members 13 constructed as shown in Figures 1 and 8 and each including a vertical bar 14 having rail supporting shoulders 15 integral therewith and also having an inclined bar 16 connected by cross pieces 17 with the vertical bar and serving with the vertical bar to support an extension 18 providing rail supports 19 and 20.

The piano action 12 includes a main or supporting rail 25 mounted on horizontally alined shoulders 15 of the frame members. A hammer designated generally at 26 is provided and includes a butt or central lever 27 pivotally supported, as at 28, upon a flange 29 carried by the supporting rail 25. A shank 30 is embodied in the hammer and bifurcated at its lower end, as at 31, the arms of the bifurcation embracing the butt 27 and being pivotally secured thereto, as at 32. The upper end of the shank 30 has fixedly secured thereto a hammer head 33 constructed, as shown in Figure 7, and having its body 34 provided with an axially extending cylindrical cavity 35, the ends of which are equipped with pads of felt, designated at 36. A weight 37 encased in leather or other suitable material, designated at 38, is arranged in the cavity so as to be freely shiftable therein. At each end of the cavity vents 39 are provided which permit of free escape and admission of air whereby the movement of the weight 37 is not interfered with. A removable plug 40 pinned or otherwise suitably secured to the body 34 is provided at one end of the body so as to permit of assembly of the weight in the cavity. A post 45 has its lower end secured to the butt 27 and extends upwardly therefrom, the post 45 being inclined slightly with respect to the vertical. At its upper end the post 45 is headed, as at 46, and to this head 46 a leather strap or loop 47 is fastened, the loop 47 embracing the shank 30 of the hammer. The post 46 serves to drive the hammer or to transmit the impulses thereto from the butt, and also serves as a back-check therefor. When the action is at rest the post 45 lays against a rest rail 50 which is faced with felt in the usual manner. Also when the action is in the striking position the tail of the butt has its block of felt 51 engaged with the felt surfacing of a check rail 52 mounted on the rail support 20 of the frame member so as to check the movement of the butt or central lever. The hammer 26 is so mounted and balanced that under the action of gravity it tends to seek the position

shown in Figures 1 and 2, the post 45 lying against the rest rail 50 and the shank 30 laying back against the portion of the strap which is connected to the head 46 of the post 45, as shown in detail in Figure 9. In order to supplement the action of gravity in this respect the light spring 53 is employed and is connected to the butt 27 and to the shank 30 for the purpose of tending to swing the shank 30 toward the post 45 and against the strap 47 thereof as shown in Figures 1, 4 and 9. Also a light spring 24 may be employed and may be connected to the main rail 25 and butt 27 to swing the central lever to the position shown in Figures 1, 2 and 4, these light springs being constructed and arranged as shown in the drawings.

A damper designated generally at 55 is provided and is rigidly supported by means of a heavy wire 56, upon a damper lever 57 pivotally mounted, as at 58, on the flange 59 carried by the damper rail 60 mounted on the uppermost rail support of the frame members. The damper lever 57 is directly engaged by the butt 27, as shown in Figure 3. A light spring 61 is mounted on the flange 59 and engages the rail 60 and damper lever 57 and tends to return the damper into engagement with its string.

The impulse is directly transmitted from the key 10 to the butt or central lever 27 by means of an extension rod 65, the lower end of which is connected to the key by a capstan screw 66 having a hollow cap 67 to receive the lower end of the rod. It is to be understood that the lower end of the extension rod 65 fits or stands loosely in the cavity provided therefor in the head of the capstan screw so as to permit the entire action to be readily removed. The rod 65 tapers toward its lower end and at its upper end it is headed or enlarged, as at 68, and is bifurcated, as at 69, to provide guide flanges 70 which engage on the opposite sides of the central lever or butt 27. The portion of the head 68 lying in between the flanges 70 is surfaced by felt or the like, as at 71, and is adapted for slidable and adjustable engagement with the under side of the butt 27. The point at which the extension rod engages the butt is controlled from the soft pedal of the piano and for this purpose a crank shaft 72 is mounted on the frame members and is connected with the extension rod by means of a strap bearing or bracket 73 which with the rod 65 provides a slot 74 in which the crank 72 operates. At one end the crank 72 is provided with an arm 75 connected by a pedal rod 76 with the pedals (not shown).

A similar crank 78 is provided for the damper and coacts with the lower arm of the damper levers 57, as indicated in Figures 1, 2 and 3. Also one end of the crank 78 is provided with an arm 79 connected by a pedal rod 80 with the loud pedal (see Fig. 8).

A guide rail 85 is mounted on the lowest rail support of the frame members and carries extension guide pins 86.

In operation the impulse is transmitted directly from the key to the butt or central lever through the extension rod 65. The swinging of the butt about its pivot 28 carries with it the post 45 which in turn drives or actuates the shank 30 of the hammer so as to throw the hammer head into striking engagement with the strings. The forward throw of the shank 30 and hammer head 33 is limited only by the string of the piano against which the hammer head strikes and which, after the striking, acts to automatically throw the hammer head 33 away from it and the shank 30 into engagement with the rear ends of the loop 47 next to the post head 46. However, as shown in Fig. 3, the arrangement is such that the hammer head 33 and its shank 30, that is the hammer proper, has a very short forward movement after the movement of the butt 27 has been checked by contact with the check rail 52, the dotted lines in Figure 3 indicating the small but almost instantaneous movement of the hammer proper between the post 46, the piano string and back to the post again. This operation has many advantages and is believed to constitute an important feature of this invention. The loop or strap 47 serves to make the hammer follow the backward movement of the post 45 when a new stroke is desired or when the post is to return to the rest rail 50. It also serves as a back-check on the return movement of the hammer. The shiftable weight 37 in the hammer head serves to absorb the recoil of the hammer and thus to prevent it from restriking the string on its own accord. The conjoint action of the shiftable weight 37 and the leather strap 47 to the end of overcoming and aborbing the recoil from the string after a forcible blow constitutes an important feature of the present invention. In this connection it is to be noted that the shifting weight brings the hammer head to a state of rest when, on its recoil, it returns into engagement with the rear ends of the straps 47 adjacent the post head 46 and that the strap 47 being soft and yieldable does not react to tend to cause the hammer head to rebound therefrom. The damper is released by the direct and positive action of the butt and the movement of the butt is limited in a positive and effective manner by its engagement with the check rail.

At the same time the mechanism is readily adjustable for soft playing, the stroke of the hammer being varied for this purpose by a simple adjustment of the extension rod

with respect to the butt. For soft playing the soft pedal is pressed and the crank 72 is thereby rotated to swing the extension rod in a clockwise direction as viewed in Figures 1, 2 and 3 and to the position shown in Figure 4 whereby the stroke of the hammer is shortened, thereby softening the impact of the hammer as will be apparent from a consideration of Figure 4.

I claim:

1. In a piano action, a supporting rail, a hammer having a butt swingably connected to the supporting rail and having a head actuated from the butt and mounted for limited swinging movement relative to said butt, an extension rod engaged with the under side of the butt of the hammer, a check rail engageable with the upper side of the butt, a damper having a lever adapted to be engaged by the butt of the hammer.

2. In a piano action, a supporting rail, a hammer having a butt swingably connected to the supporting rail and having a head actuated from the butt and mounted for limited swinging movement relative to said butt, an extension rod engaged with the under side of the butt of the hammer, and a check rail engageable with the upper side of the butt.

3. In a piano action, a supporting rail, a hammer including a butt swingably connected to the supporting rail, a shank pivotally connected to the butt, a head carried by the shank, a post fixedly secured to the butt at the rear end of the shank and co-operable with the shank for imparting an impulse thereto, and a loop carried by the post and embracing the shank, and an extension rod engaged with the underside of the butt of the hammer.

4. In a piano action, a hammer including a butt, a shank pivotally connected to the butt, a head carried by the shank, and a post fixedly secured to the butt to the rear of the shank, and cooperable with the shank for imparting an impulse thereto.

5. In a piano action, a hammer including a butt, a shank pivotally connected to the butt, a head carried by the shank, a post fixedly secured to the butt to the rear of the shank, and a loop carried by the post and embracing the shank.

6. In a piano action, a hammer having a head provided with an axial cavity, and a freely shiftable weight arranged in said cavity.

7. In a piano action, a hammer having a head provided with an axial cavity, a freely shiftable weight arranged in said cavity, and means for cushioning the impact of the weight with the walls of the cavity and for preventing air compression within said cavity.

8. In a piano action, a hammer having a butt, an extension rod slidably engaged with the butt, and manually shiftable means for controlling the point of engagement of the extension rod and butt whereby the stroke of the hammer may be varied.

9. In a piano action, a hammer having a butt, an extension rod having its upper end slidably and adjustably engaged with said butt, and manually shiftable means having a loose connection with the extension rod for controlling the point of engagement of the extension rod with the butt whereby the stroke of the hammer may be varied.

10. In a piano action, a hammer having a butt, an extension rod having its upper end bifurcated and slidably and adjustably engaged with said butt, and means coacting with the extension rod for controlling the point of engagement of the extension rod with the butt whereby the stroke of the hammer may be varied, said means including a crank and a bearing strap secured to the extension rod and embracing the crank.

11. In a piano action, a hammer including a butt, a shank pivotally connected thereto, a head carried by the shank and having a freely shiftable weight therein, a post fixedly secured to the butt to the rear of the shank, and means carried by the post and providing a yieldable seat for the shank.

12. In a piano action, a hammer including a butt, a shank pivotally connected thereto, a head carried by the shank and having a freely shiftable weight therein, a post fixedly secured to the butt to the rear of the shank, and a loop of flexible and yieldable material embracing the shank and having its ends disposed in and secured to the post to effect return movement of the hammer and to provide a yieldable seat for the shank thereof.

13. In a piano action, a hammer including a butt, a shank pivotally connected thereto, a head carried by the shank, a post fixedly secured to the butt to the rear of the shank, and means carried by the post and providing a yieldable seat for the shank.

14. In a piano action, a hammer including a butt, a shank pivotally connected thereto, a head carried by the shank, a post fixedly secured to the butt to the rear of the shank, and a loop of flexible and yieldable material embracing the shank and having its ends disposed in and secured to the post to effect return movement of the hammer and to provide a yieldable seat for the shank thereof.

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