S. R. PERRY.

PIANO ACTION.

APPLICATION FILED OCT. 24, 1905.

**900,307.** Patented Oct. 6, 1908.

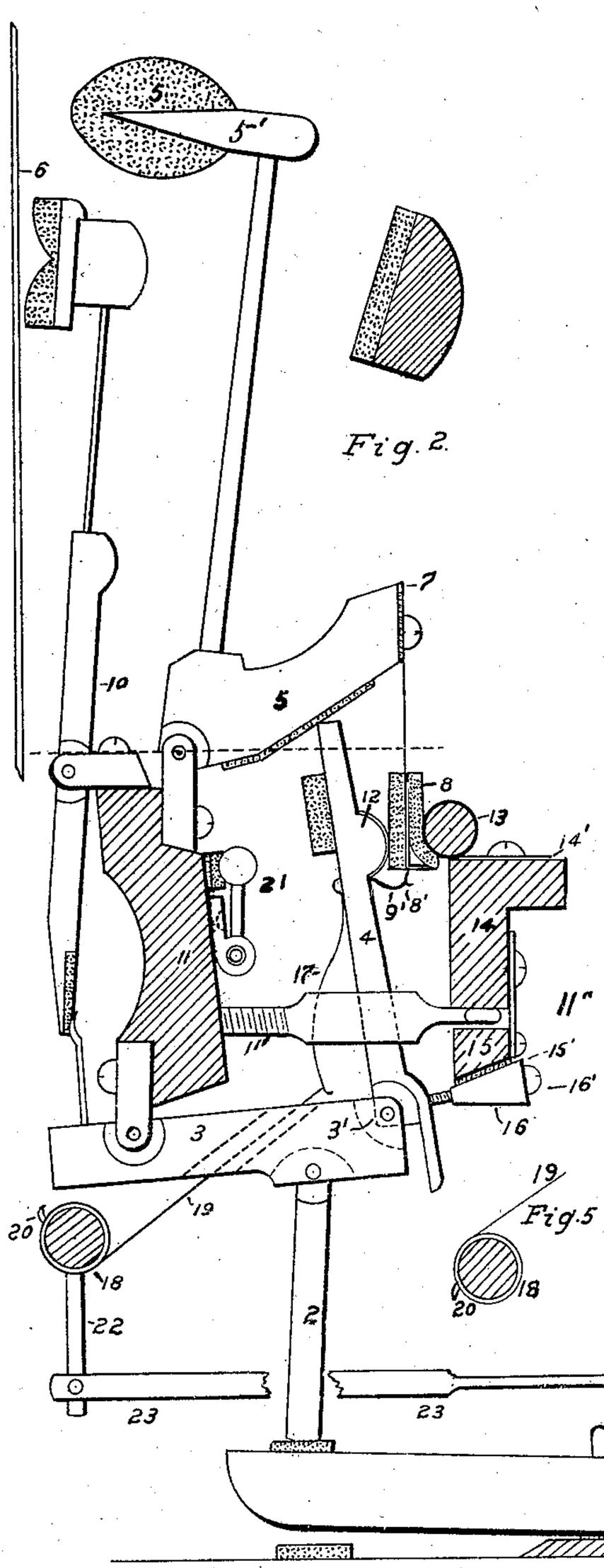


Fig. 2.

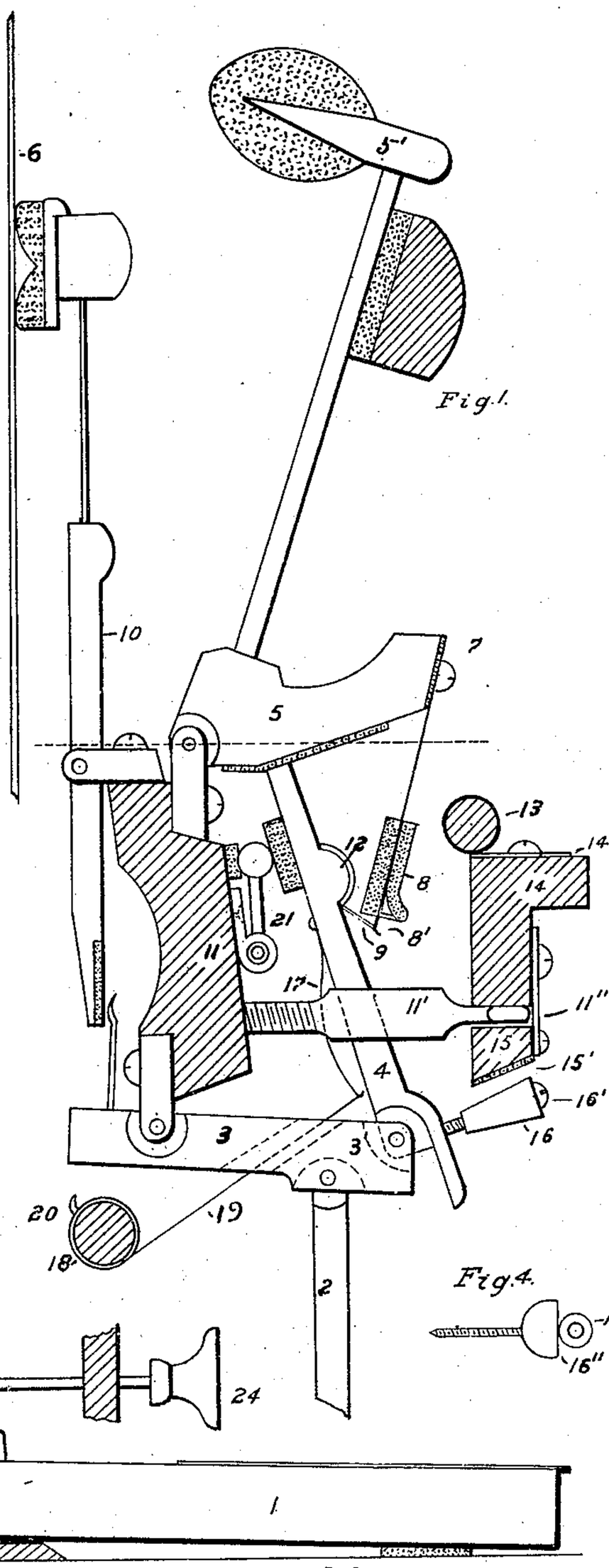


Fig. 1.

Fig. 5




Fig. 4.




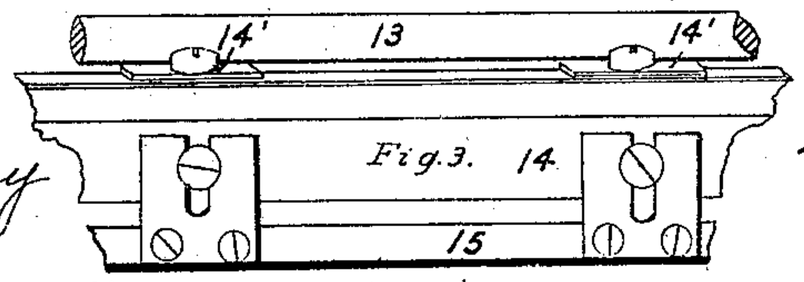


Fig. 3.

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## PIANO-ACTION.

No. 900,307. Specification of Letters Patent. Patented Oct. 6, 1908.

Application filed October 24, 1905. Serial No. 284,137.

*To all whom it may concern:*

Be it known that I, SAMUEL R. PERRY, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented Improvements in Piano-Actions, of which the following is a specification.

My invention relates to improvements in piano actions in which the forward end of each of the hammer-butts is provided with an elastic back check, said back check connected to its corresponding jack, the jacks each carrying a retracting spring and said springs connected to a rail turning on its axis, back check rails and regulating rails adjustably held in a horizontal position at right angles to and facing the back checks and jacks, and has for its objects a varied and delicate touch, and a quick repetition of the parts in operation, all of which is more fully explained hereinafter and pointed out in the claims.

Similar characters refer to similar parts throughout the drawings.

In the accompanying drawings Figure 1 represents a section of my improved action as applied to an upright piano, showing the various parts in their normal position or at rest. Fig. 2 represents the relative positions of the several parts to each other after a blow has been struck on the strings and the keys held down. Fig. 3 shows a horizontal view of the back check rail and regulating rail in their positions on the bar or support. Figs. 4 and 5 will be referred to later on.

1 is the key which rests on the key frame *k*, *f*, of which the upper lines only are shown. The key and the key frame are not shown attached to Fig. 1, but their position is indicated by the extension piece 2 which serves to connect the jack lever 3 to the key 1; the jack 4 is jointed to the jack lever at 3′, its upper end operating upon the under side of the hammer-butt 5. The hammer-butt sustains the hammer 5′ in its movement towards the string 6. The jack lever 3, the hammer-butt 5 and the damper lever 10 are jointed to the action rail 11 in the usual manner. The forward end of the hammer-butt is beveled at 7, in order to sustain the elastic back check 8 at the proper angle. The back check is made of some material sufficiently elastic or springy to exert a slight retracting action on the hammer in its movement to or from the strings, and of sufficient stability to act as a ckeck to the hammer in its rebound from the strings. For this purpose I use a thin, high-tempered brass or other suitable metal or material about one-quarter of an inch wide. The lower end of the back check 8 is covered with suitable material to act as a cushion, and may have a small portion 8′ extending below the cushion in the shape of a hook, by which it is connected to a cord or tape 9 and the cord or tape attached to the jack; the cord or tape must be pliable, so as to adjust itself to the varying positions of the back check and the jack in operation. The jack 4 is provided near its upper end with a projection 12, which in conjunction with the rail 13 combines to hold the cushion of the back check 8 and thus hold the hammer 5′ in check after its return from the string.

The back check rail 13 may be made in one piece or in sections, as found convenient, of any suitable material, such as metal tubing, or of wood, and is adjustably attached to the bar 14 by means of cleats 14′. These cleats are adjustably held to the bar with screws and are easily and quickly adjusted. The bar 14 may be secured to the action brackets (not shown) or to the action rail 11 by means of a number of arms, one of which, 11′, is shown projecting from the action rail and attached to the bar 14 at 11″. The bar 14 also serves to hold the regulating rail 15 in position in the same manner (with cleats) as the rail 13 is secured, and it may consist of one or more lengths, as desired. The regulating rail 15 is peculiar in that its under side is beveled, 15′, so as to present a beveled surface to the foot or tripper 16 as it moves upward. The foot or tripper 16 is composed of a screw 16′ passing through a button 16, which may be conical in shape or hemispherical, as shown by 16″, Fig. 4. The screw, after passing through the button, is turned into the jack, and as the screw is turned in or out the distance between the beveled rail 15 and the button 16 or 16″ will be made narrow or wide as desired, and the tripper can be so adjusted as to strike the regulating rail at the proper time to force the jack 4 with its projection 12, in contact with the cushion on the back check 8 and against the back check rail 13 to form a check to the hammer 5′ after a blow on the strings.

Sustained in a horizontal position back of and at right angles to the jack lever is a rail 18 which may be journaled to the action

brackets (not shown), or to the action rail, (attachment not shown), and is made to revolve a number of degrees by means of an arm like 22 extending from the rail 18; said arm jointed to the stop rod 23 and stop 24, or it may be revolved by means of a foot pedal (not shown).

To the inner side of the jack 4 toward its upper end is attached a spring 17, its free end reaching toward the jack lever 3; the spring 17 is connected to the rail 18 by means of any suitable material, such as thread or cord 19. The thread or cord which passes through the jack lever 3, as shown by dotted lines, may be attached to the rail 18 in any manner suitable, but I prefer hooks 20 fastened to the rail 18, one for each spring, and the connecting cord 19 passing under the rail 18 or over it, as shown by Fig. 5, and looped over the hooks. The thread or cord hooked to the rail 18 and attached to the spring is of such length as to cause a certain amount of tension to the spring, which forces the jack inwardly toward the action rail 11 and against the soft pedal bar 21 while the action is in its normal position, as shown by Fig. 1.

The object to be attained by the use of the rail 18 connected to the spring 17 by the cord 19 is to change the tension of the spring 17 attached to the jack 4, at will. By turning the revolving rail 18 the cords 19 attached to the rail and to the springs will become shorter or longer and consequently the power of the springs 17 to force the jacks 4 into position under the hammer-butts will be made greater or less as the revolving rail is turned one way or in the opposite direction and as the hammer-butts 5, the back checks 8, the jacks 4, the jack lever 3, the extension 2 and the key 1 are successively connected together the spring 17 attached to the jack 4 and under control of the revolving rail 18 will exert a greater or less retractive power upon the various parts of the action. Thus the rail 18 may be made to change the weight of the keys, assist in the rapid movement of the various parts of the action, and especially assist the hammer in its return from the string.

As shown by Fig. 1, the material 9 connecting the spring back check 8 and the jack 4 is held in a straight line or taut, owing to the elastic pull of the spring back check, and it continues in this condition until the foot or tripper 16 comes in contact with the regulating rail 15, at which time the jack immediately moves toward the back check rail 13 and the cord becomes slack 9′, and continues so while the rail 13, the back check 8 and the projection 12 on jack 4 are in contact, as shown by Fig. 2. As the cushion of the spring back check 8 never rises above a line drawn through the hammer-butt center (see dotted lines) and as the upper end of the elastic back check is attached to the forward end of the hammer-butt arm the back check if free to act would revolve in a circle around the hammer-butt center, but as it is connected to the jack by pliable material 9, and the jack as shown by Fig. 1 is held in position by the spring 17 and the force of the blow when in operation, the back check thus held exerts continuously a slight influence against the forward movement of the hammer, and this slight influence is still exerted when the back check cushion, having been allowed to move forward by the forward movement of the jack, comes in contact with the rail 13. The spring 17 which forces the jack 4 toward the soft pedal bar 21 loses its power somewhat by the counteracting pull of the back check spring 8, so that when the jack foot 16 strikes the beveled rail 15, less power is required to move the jack.

In actions heretofore made in which a back check is attached to an extension of the hammer-butt and comes in contact with a regulating button, some difficulty has been experienced because of the limited capacity of the button to check the heavier hammers. For this reason I use a continuous back check rail 13, which gives ample back-checking surface to control the hammers and is easily adjusted in position to meet the back checks. The back check rail is practically the same as illustrated and claimed in my application for Letters Patent #223,874, filed Nov. 22, 1904, piano actions. The soft pedal bar 21 heretofore referred to is practically the same as the bar 22 in patent granted to me Feb. 3, 1903, #719,690, piano actions; this bar is used to move the jacks under the hammer-butts to various positions, and will not be referred to further except in the claims.

The operation of the action is as follows: When the key is pressed, its rear portion is raised, carrying with it the extension 2, the jack lever 3, and the jack 4. The upper end of the jack bearing upon the under side of the hammer-butt forces the hammer toward the strings. The back check 8 connected at its upper end to the hammer-butt arm and at its lower end to the jack is compelled to move in a circle around the hammer-butt center, and continually exerts a force upon the jack in the direction of the back check rail 13. Thus the spring back check slightly retards the hammer in its movement toward the strings and in some degree counteracts the power of the jack spring 17 to hold the jack 4 in position under the hammer-butt 5. For this reason the jack may follow the hammer-butt until the hammer is closer to the strings than is usual, without danger of the hammer jarring against the strings. For this reason also a most delicate touch termed "pressure touch" may be made, which in no way however detracts from the ability of the action to convey an extremely heavy blow. When the jack foot or tripper 16 comes in contact

with the beveled underside 15′ of the regulating rail 15 as the key 1 and other parts continue to move upward, the jack 4, because of the counteracting effect of the two springs 17 and 8 upon each other, moves easily forward toward the back check rail 13, and the hammer 5′ having struck the strings 6, rebounds, the spring back check is caught between the projection 12 on the jack 4 and the back check rail 13, and the hammer is held in place ready for a succeeding blow. Upon the pressure being taken from the key the action of the spring 17 connected to the rail 18, together with the dead weight of the movable parts of the action, connected together as they are, quickly tend to draw the hammer into position for another blow, the result being a very quick movement of the several parts with either a soft "pressure touch" or a heavy blow.

Having fully described my invention, I make the following claims.

1. In a piano action a series of hammers and hammer-butts, a series of jacks and jack levers and a series of back checks, each back check attached to one of the hammer-butts and connected to its corresponding jack, substantially as set forth.

2. In a piano action a series of hammers and hammer-butts, a series of jacks and jack levers and a series of back checks, each back check depending from one of the hammer-butts and connected to its corresponding jack, and a back check rail held in a horizontal position facing the jacks and back checks, substantially as set forth.

3. In a piano action a series of hammers and hammer-butts, a series of jacks and jack levers, a series of elastic back checks, each back check depending from one of the hammer-butts and connected to its corresponding jack, a back check rail and a regulating rail both held in a horizontal position facing the jacks and back checks, substantially as set forth.

4. In a piano action a series of hammers and hammer-butts, a series of jacks and jack levers, a series of elastic back checks, each back check depending from one of the hammer-butts and connected to its corresponding jack, a bar held in a horizontal position facing the jacks and back checks, a back check rail or rails carried by the bar and a regulating rail or rails carried by the bar, substantially as set forth.

5. In a piano action a series of hammers and hammer-butts, a series of jacks and jack levers, a back-checking rail held in a horizontal position facing the jacks, and a regulating rail held in a horizontal position facing the jacks, the jacks each provided with a foot or tripper, a series of back-checks each depending from one of the hammer-butts and connected to its corresponding jack, a set of keys, each key connected to and operating one of the jack levers, whereby the hammer in its retraction from the strings is held in check by pressure on the key, substantially as set forth.

6. In a piano action a series of hammer butts, a series of jacks and jack levers, each jack adapted to operate under its corresponding hammer butt and provided with a screw turned into its lower end substantially at right angles to the main body of the jack the screw carrying a button on its head end and said button adapted to be adjusted to or from the outer surface of the jack, substantially as set forth.

7. In a piano action a series of hammer butts, a series of jacks operating under the hammer-butts and a series of jack levers supporting the jacks, each jack provided with a screw turned into its lower end substantially at right angles to the main body of the jack, the screw carrying a button on its head end, said button adapted to be adjusted to or from the outer surface of the jack in combination with a rail having its lower end beveled and adapted to contact with the button on the lower end of the jack whereby the upper end of the jack is tripped from under the hammer-butt substantially as set forth.

8. In a piano action a series of hammers and hammer-butts, a series of jacks and jack levers, the jacks operating under the hammer-butts, the jacks each provided with a spring, a rail 18 capable of being turned on its axis and extending lengthwise of the action and held in a horizontal position at right angles to the jack levers, and means to connect the rail 18 with the springs attached to the jacks, substantially as set forth.

9. In a piano action a series of hammers and hammer-butts, a series of jacks and jack levers, the jacks operating the hammer-butts, the jacks each provided with a spring, a rail 18 capable of being turned on its axis and extending lengthwise of the action and held in a horizontal position at right angles to the jack levers, means to connect the rail 18 with the springs attached to the jacks, a series of back checks each depending from one of the hammer-butts and connected to its corresponding jack, whereby the movable parts of the action are forced to their normal positions, substantially as set forth.

10. In a piano action a series of hammers and hammer-butts, a series of jacks and jack levers, the jacks operating the hammer-butts and each provided with a spring, a rail 18 capable of being turned on its axis and extending lengthwise of the action, held and operated in a horizontal position at right angles to and facing the jack levers, means to connect the rail 18 to the springs on the jacks, a series of back checks each depending from one of the hammer-butts and connected to its corresponding jack, a set of piano keys and means to connect each key with its corresponding section of the action, means to

turn the rail 18 at will, whereby the strength of the jack springs is changed and the touch of the keys is varied, substantially as set forth.

11. In a piano action a series of jacks and jack levers, each jack provided with a retracting spring, a rail 18 capable of being turned on its axis and extending lengthwise of the action and held in a horizontal position at right angles to the jack levers, means to turn the rail 18 at will and means to connect each of the springs on the jacks with the rail 18, a series of hammers and hammer-butts, and a soft pedal bar operating the jacks under the hammer-butts, substantially as set forth.

12. In a piano action a series of jacks and jack levers, each jack provided with a retracting spring, a rail 18 capable of being turned on its axis and extending lengthwise of the action and held in a horizontal position at right angles to the jack levers, means to turn the rail 18 at will and means to connect the springs on the jacks with the rail 18, a series of hammers and hammer-butts, a series of elastic back checks, each back check attached to one of the hammer-butts and means to connect each back check with its corresponding jack, a back check rail held in a horizontal position at right angles to the jacks and back checks, a regulating rail held in a horizontal position at right angles to the jacks, the jacks provided with a tripping foot, and a soft pedal bar operating the jacks, substantially as set forth.

13. In a piano action a series of hammers and hammer-butts, a series of jacks and jack levers and a series of elastic back-checks, each back check attached to a hammer-butt and connected to its corresponding jack, substantially as set forth.

14. In a piano action a series of hammers and hammer-butts, a series of jacks and jack levers, and a series of elastic back checks, each back check depending from one of the hammer-butts and connected to its corresponding jack, and a back check rail held in a horizontal position facing the jacks and back checks, substantially as set forth.

15. In a piano action a series of hammers and hammer-butts, a series of jacks and jack levers, the jacks each provided with a spring operating to retract the jack, a series of back checks depending from the hammer-butts and each back check connected to its corresponding jack, a back-check rail or rails suitably held in position facing and at right angles to the back checks, a regulating rail or rails suitably held in position facing and at right angles to the jacks, and the jacks each provided with a tripper, substantially as set forth.

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Witnesses:
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