No. 719,690. PATENTED FEB. 3, 1903.

S. R. PERRY.

PIANO ACTION.

APPLICATION FILED MAY 14, 1901.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

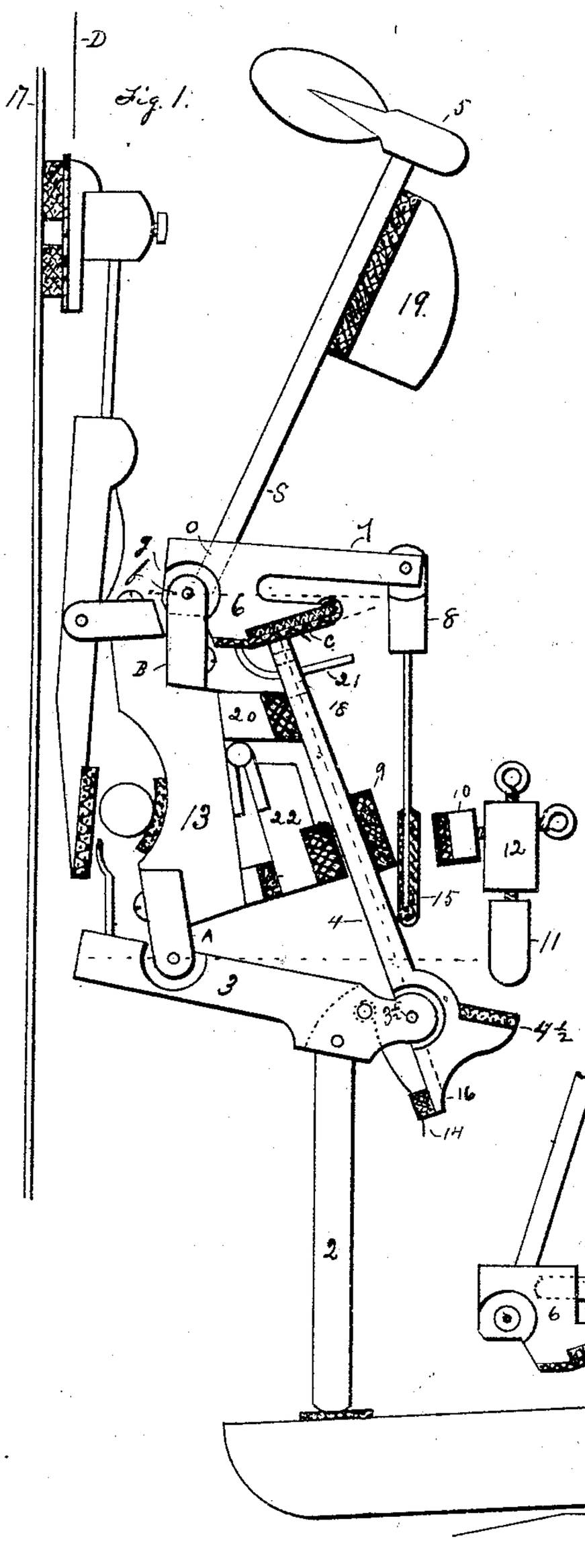

Fig. 2.

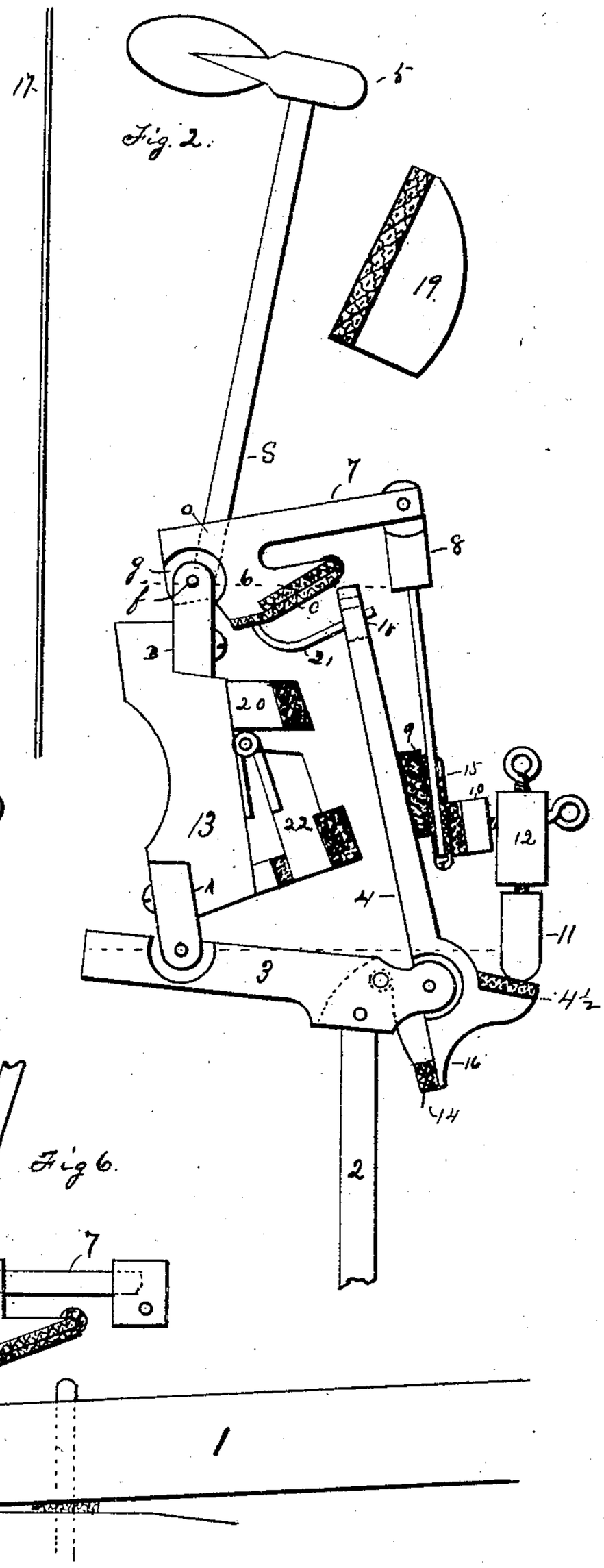

Fig 6.

WITNESSES:

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

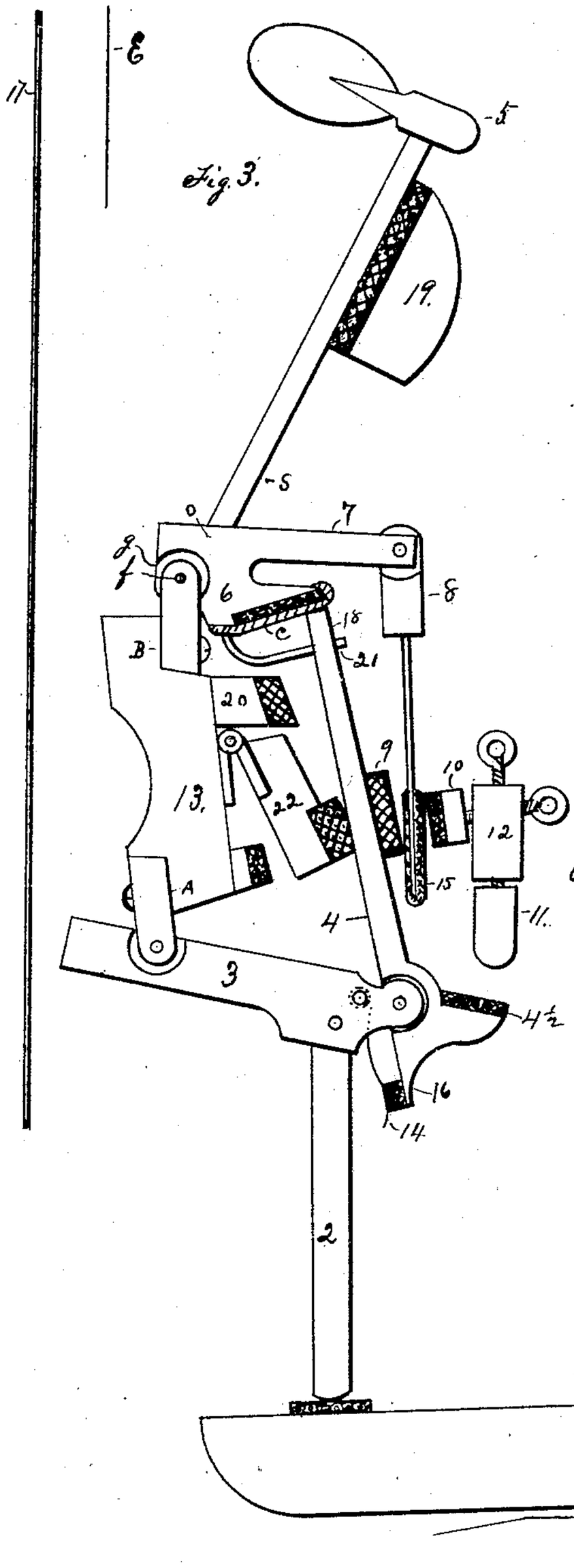


Fig. 7.

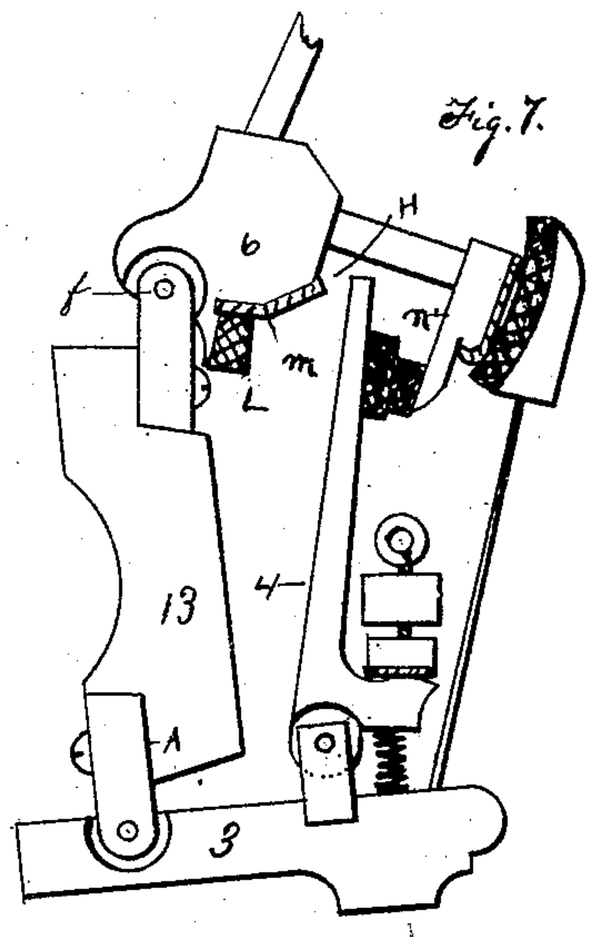


Fig. 5.

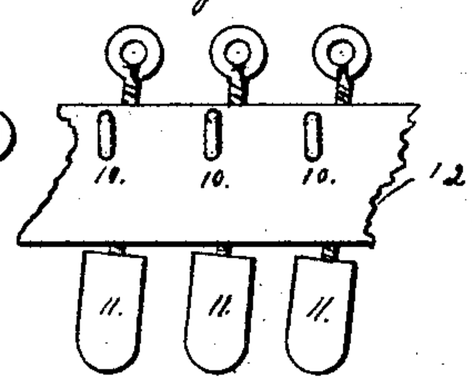
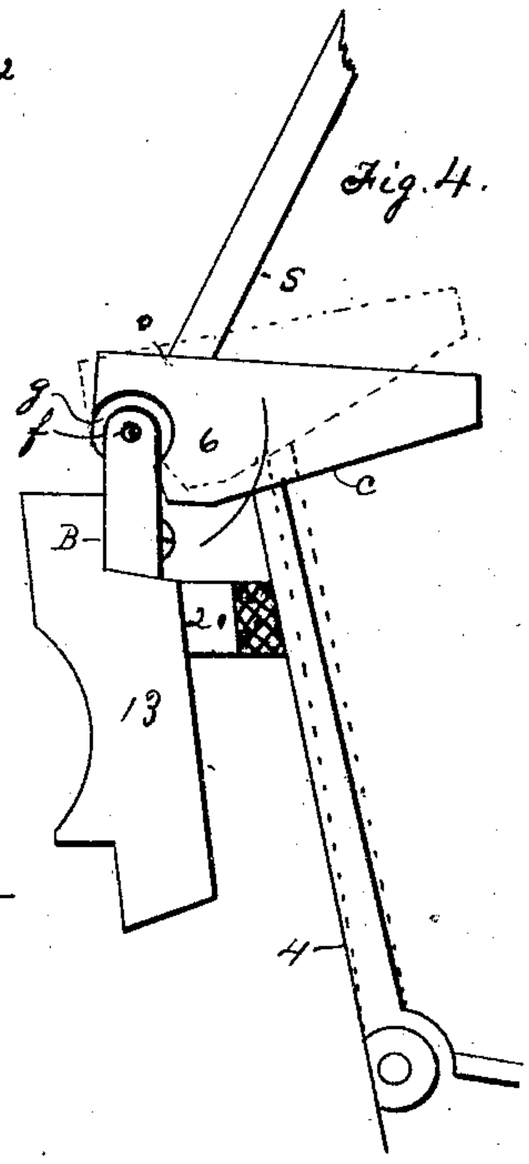


Fig. 4.



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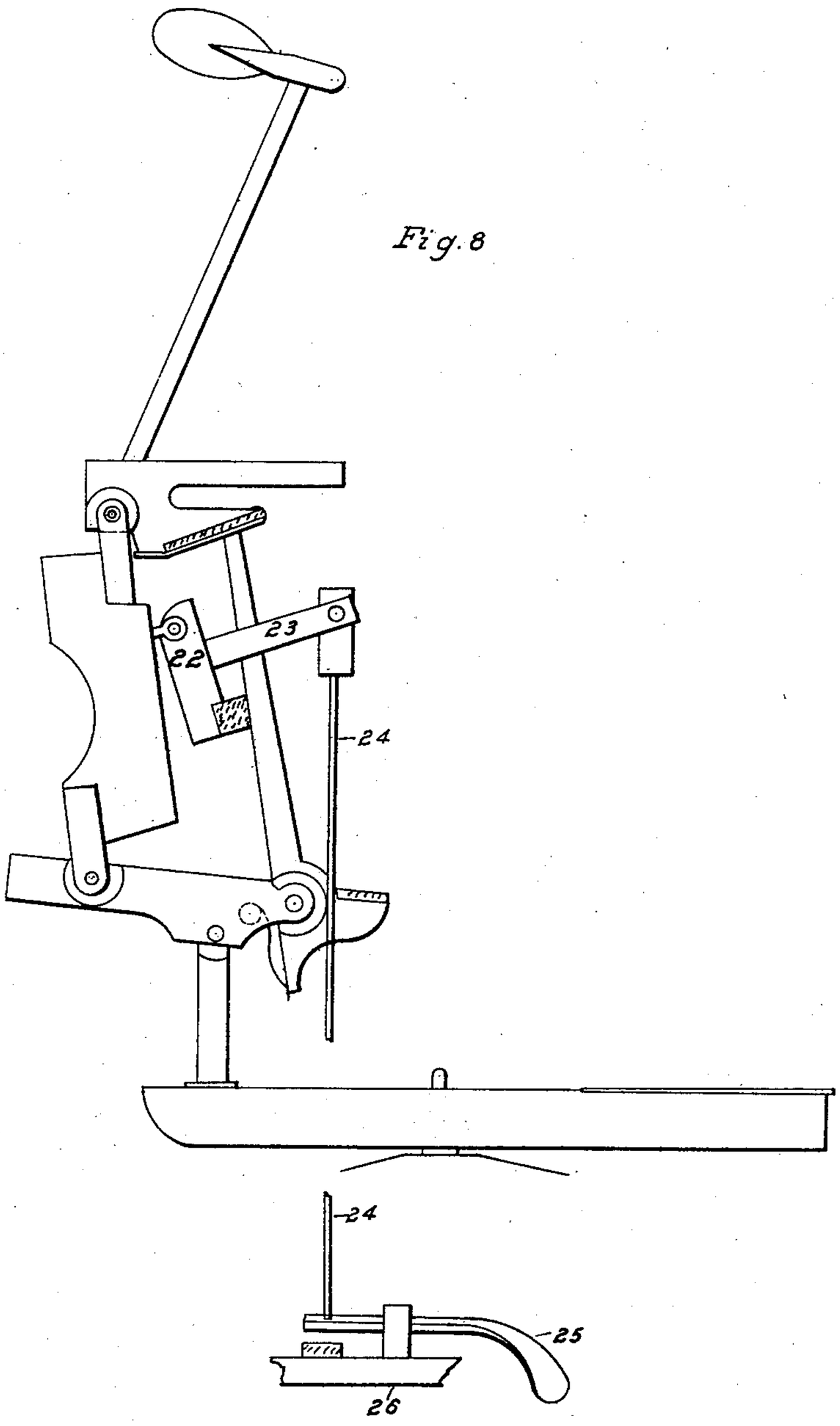
NO MODEL. 3 SHEETS—SHEET 3.

Fig. 8



WITNESSES:

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UNITED STATES PATENT OFFICE.

SAMUEL R. PERRY, OF SCRANTON, PENNSYLVANIA.

PIANO-ACTION.

SPECIFICATION forming part of Letters Patent No. 719,690, dated February 3, 1903.

Application filed May 14, 1901. Serial No. 60,240. (No model.)

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 an Improvement in Piano-Actions, of which the following is a specification.

The object of my invention is to produce a piano-action by which the most delicate manipulation of the keys will be recorded on the strings of the piano, to simplify its mechanism and adjustment and reduce its cost, also to control the movement of the jacks so as to produce variation in the strength of tone without altering the dip of the keys or moving the hammers with the hammer-rail toward the strings, to place the hammer-butts and jacks in such relation to each other as to produce the most perfect contact and consequent repetition of the hammers against the strings, and also to effect a perfect check or hold of the hammers after a stroke is made.

My invention consists of a hammer-butt provided with an arm or extended part which is adapted to connect with a pendent back-check, said back-check extending downward between the jack and a regulating-rail carrying regulating devices by means of which the jack is forced forward to a contact with the pendent back-check, forming a check to the hammer in its rebound from the string and holding the jack under the surface of the hammer-butt ready for a succeeding stroke.

It also consists of forming that portion of the hammer-butt which faces the upper end of the jack in a straight line approximately at a right angle to the jack, so that the jack may come in contact along the entire under side of the hammer-butt, if desirable.

It also consists of a spring situated in the body of the jack-lever and extending downward to a contact with the extended heel of the jack and also of a bar extending between the action-rail and the jacks for the purpose of moving the jacks forward or backward under the hammer-butts.

It also consists in combining with the above other devices not claimed as new in themselves, but auxiliary to the perfect working of the action, such as a wire attached to and adjustable to or from the straight under surface of the hammer-butt, a bar on the action-rail upon which the jacks rest in their positions of rest, the upper end of the jack formed with a slot through which the wire on the hammer-butt operates, the jack jointed to the jack-lever below a line drawn through the center of its flange, all of which will be more fully explained farther on.

In the accompanying drawings, Figure 1 represents an upright action embodying the improvements herein set forth; Fig. 2, the same, showing the parts at rest after the key has been struck. Fig. 3 shows the jacks in position for a soft stroke, moved forward under the hammer-butts by the cushioned bar 22. Fig. 4 shows the circular movement of the hammer-butt carrying the jack in its upward movement away from the cushioned bar 20. Fig. 5 shows the regulating-rail carrying the regulating screws and buttons. Fig. 6 shows another method of making the hammer-butt with an extended arm, and Fig. 7 shows the hammer-butt which is now in general use. Fig. 8 shows an arm 23 extending from the bar 22 and connected to a pitman 24, extending downward to and operated by a pedal-lever 25, hinged to the bottom board 26 of a piano.

Similar characters refer to similar parts throughout the drawings.

In Fig. 1, 1 represents the key of a piano operating the action; 2, the extension from the key to jack-lever 3; 4, the jack, jointed to the jack-lever 3 at $3\frac{1}{2}$. Its upper end operating under the beveled side *c* of the hammer-butt 6 propels the hammer 5 toward the strings 17. 7 is the arm of the hammer-butt 6, which extends to its connection with the pendent back-check 8–15. 11 is a regulating screw and button attached to the rail 12, used for the purpose of forcing the jack 4 forward along the beveled under side *c* of the hammer-butt 6 and also to force a contact of the cushion 9 on jack 4 with the pendent back-check cushion 15 and the regulating screw and button 10, for the purpose of holding the hammer in its rebound from the strings, as shown in Fig. 2. 14 is a spring attached within the body of the jack-lever 3. Its lower free end pressing against the lower extremity 16 of the jack 4 forces the jack into its position against the bar 20 under the hammer-butt.

The hammer-butt 6, which is attached to the rail 13 by means of the flange B, is peculiar in construction in that its under side *c*, which comes in contact with the jack 4, is formed in a straight line approximately at right angles to a line drawn through the length of the jack, as shown by the dotted lines. (See Fig. 1.) In the old style of action, as shown in Fig. 7, its under surface H is always made in the shape of an obtuse angle or the segment of a circle. (Not shown.) In either case the jack 4 must slip beyond its rest on the cushion L up and away from the hammer-butt to allow the hammer sufficient space to rebound from the string and is not again effective until it has come under the point *m* of the angle. For this reason repeated light strokes of the key may allow the hammer to recede from the strings until it rests against the hammer-rail, (not shown,) and the jack will not move out of the space between the cushioned surface H and the back-catch *n* until the key is allowed to come up to its normal position. Consequently the repetitions of the hammer against the strings are very difficult and uneven; but in this action the instant the jack is released from its contact with the back-check cushion 15 and the button 11 it must come in contact with some portion of the under side *c* of the hammer-butt 6 ready for another stroke, because it is regulated to be always under the hammer-butt under all circumstances. Again, in the old style of actions the cushion L, upon which the jack rests, will in time be compressed or so worn toward the hammer-butt center *f* by the constant upward movement of the jack that there will be formed a socket in which the jacks rest, and the even and delicate "touch" will be lost, because it will always require a certain force to release the jacks from the sockets; but in this action the jacks will work upon the under surface of the hammer-butts at all points alike. The wear will be reduced to a minimum and the hammer will be responsive to the most delicate touch or the hardest blow. I prefer to joint the hammer-butt to its flange B so far above the jack that the jack in its upward movement will not reach above a line drawn through the center *f* of the hammer-butt. (See dotted lines, Figs. 1 and 2.) I also prefer to hang the jack-lever 3 to its flange A at such an angle that at no time in operation will the center of the jack $3\frac{1}{2}$ rise above a line drawn at right angles through the center of the flange A. (See Figs. 1 and 2.) By this arrangement the upper end of the jack 4 can operate from the under side *c* of the hammer-butt and move freely toward the back-check head 8, allowing the hammer 5 ample return from the strings to be securely held by the jack 4, the pendent back-check 15, and the button 10.

I do not confine myself to forming the under side of the hammer-butt at an angle below a line drawn horizontally through the jointed center of the hammer-butt. The object of my invention in this particular will be attained if the hammer-butt is beveled in a straight line approximately at a right angle to a line drawn through the jack.

Projecting from the under side of the hammer-butt 6 is a wire 21, which may be adjusted to or from and in a line parallel with the underside of the hammer-butt. This wire passes through a bushed hole 18 in the jack and serves to connect the hammer-butt with the under mechanism of the action and keep the jack and hammer-butt in close working position. The jacks 4, resting against the cushion on the bar 20, come in contact with the hammer-butts only on the cushion *c*, and as the hammer-butt cushion *c* is considerably below the center *f* of the hammer-butt it must move in a circle around its pivotal center *f*, carrying the upper end of the jack with it away from the bar 20, as shown by the circular line on Fig. 4.

The usual way of modifying the tones of the piano is to move the hammers 5 toward the strings 17 by means of the rail 19. The objection to this method is that it breaks the contact between the hammer-butts and the jacks, so that when the keys are pressed they seem very light until contact with the parts is renewed, and this causes a very unsatisfactory and uncertain feeling in the "touch" of the keys. It is, however, desirable to soften the tones of the piano without changing the dip of the keys or moving the hammers toward the strings in a body. I accomplish this feature by moving the jacks 4, by means of the bar 22, to any point desirable along the cushioned surface *c* of the hammer-butts 6. (See Fig. 3.) When the bar 22 is in position against the rail 13 and the jacks 4 rest against the cushion of the bar 20, as shown in Fig. 1, the action is regulated to give the full volume of tone of the piano. In the upward movement of the jacks 4 when thus regulated the feet $4\frac{1}{2}$ of the jacks 4 come in contact with the regulating-button 11 when the hammer 5 is within one-fourth of an inch from the strings 17, as shown in Fig. 1, by the line D; but when the bar 22 moves the jacks 4 forward, as shown by Fig. 3, the feet $4\frac{1}{2}$ of the jacks come in contact with the regulating-buttons 11 at the time the hammers have reached only within one-half of an inch of the strings, as shown by the line E, thus diminishing the quantity of the tone materially without changing the dip of the keys or the position of the hammers 5 on the rail 19.

I prefer to hinge the bar 22 to the action-rail 13, as shown; but it may be hinged to other parts of the action-frame. (Not shown.) The bar 22 is used to move the jacks forward and backward under the beveled surface of the hammer-butts, and any mechanism common to the trade may be used as a means to operate the bar. The pedal mechanism in Fig. 8 is shown as a means to move the bar.

The hammer-butts, as shown by Figs. 1, 2, 3, and 4, are made with the grain of the wood

running in the direction of their greatest length. Their different parts, such as the frazing *g*, the hole *o* for hammer-shank *s*, the extended arm and joint 7, and under beveled surface *c* are all formed of one piece without glue joints, a decided advantage in their manufacture and durability. They can, however, be made of glued-up parts, as shown by Fig. 6, without altering the intent of my invention.

I do not confine myself strictly to forming the under side *c* of the hammer-butts 6 in a right angle to the jacks, but approximately so. Some variation may be made in setting the action in the piano; but in general terms they (the jacks and under sides of the hammer-butts) would be considered at right angles to each other. I prefer to make the regulating-rail 12, as shown in Figs. 1, 2, 3, and 5, to hold both sets of regulating screws and buttons 10 and 11. The screws and buttons 11 are set at a slight angle to a straight line in order to miss the screws and buttons 10. The action may be made with two regulating-rails, one for each set of regulating screws and buttons, without departing from the intent of my invention.

The operation of the action is as follows: When the key 1 is pressed, it operates the extension 2 and jack-lever 3, forcing the jack 4 up against the beveled surface *c* of the hammer-butt 6 and away from the cushion on the bar 20 in a circle, as shown by Fig. 4, and propels the hammer 5 toward the strings 17. When the hammer arrives within one-fourth of an inch of the strings, the foot $4\frac{1}{2}$ of the jack 4 comes in contact with the regulating-button 11 on the regulating-rail 12, which forces the upper end of the jack 4 from its position under the hammer-butt 6 and also the cushion 9 on the jack 4 against the lower end 15 of the pendent back-check 8, which in turn is forced against the regulating-button 10, compressing the back-check, and consequently holding the hammer 5 in its rebound from the strings, and the different parts of the action will have assumed the positions as shown in Fig. 2. The distance of the rebound of the hammer from the strings may be nicely regulated by the screw-eye and button 10, in conjunction with the dip of the keys. The instant the key 1 is released the jack 4, aided by the spring 14, must assume a position along some portion of the inclined hammer-butt surface *c* ready for another stroke, and the bushed hole 18 of the jack 4, through which the wire 21 passes, will strike the wire in the downward movement of the jack and force the hammer-butt into position for another stroke. The operation is exactly similar when the bar 22 moves the jack forward, as shown by Fig. 3; but as the upper end of the jacks must pass over a greater radius in propelling the hammer toward the strings the feet $4\frac{1}{2}$ of the jack come in contact with the button 11 at the time the hammer 5 has only traveled to the line E, Fig. 3, while the dip of the key remains the same. Therefore the tone will not have the power with the same blow as if the jacks and bar 22 were in their normal position against the rail 13.

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

1. In a piano-action the hammer-butts each having the contact portion of its under surface formed in a straight line, the jack-lever and the jack jointed to the jack-lever and operating directly upon the contact-surface of the hammer-butt, substantially as herein set forth.

2. In a piano-action the hammer-butts each having the contact portion of its under surface formed in a straight line approximately at a right angle to the jack, the jack-lever and the jack jointed to the jack-lever and operating directly upon the contact-surface of the hammer-butt, substantially as set forth.

3. In a piano-action the hammer-butts each having an arm extending forward beyond the portion that engages with the jack, a back-check connected to the arm and extending downward between the regulating-rail and the jack, the jack-lever, the jack jointed to the jack-lever and a regulating-rail substantially as set forth.

4. In a piano-action the combination of the hammer-butts each having an arm extending to and connected to a pendent back-check, the under contact-surface of the hammer-butt formed in a straight line approximately at a right angle to the jack, the jack-lever, the jack jointed to the jack-lever and operating directly upon the contact-surface of the hammer-butt, and operating also upon the back-check, the back-check extending from its connection with the hammer-butt arm downward between the jack and a regulating-rail, and the regulating-rail, substantially as shown and described.

5. In a piano-action the combination of the hammer-butts each having an arm extending to and connected to a pendent back-check, the contact portion of under surface of the hammer-butt formed in a straight line, the hammer-butt provided with a wire adjustable to or from its under surface, the jack-lever, the jack jointed to the jack-lever and operating directly upon the contact-surface of the hammer-butt, and operating also upon the back-check, the back-check extending from its connection with the hammer-butt arm downward between the regulating-rail and the jack, and the regulating-rail, substantially as shown and described.

6. In a piano-action the combination of the hammers and hammer-butts, the jacks and jack-levers, the under surface of each of the hammer-butts formed in a straight line some portion of said under contact-surface of the hammer-butt being under all conditions of operation above its jack, and the upper end of the jack being under all conditions of opera-

tion below the contact-surface of the hammer-butt, substantially as shown and described.

7. In a piano-action the hammer-butt, the under side of which is beveled in a straight line, in combination with the jack jointed to the jack-lever and operating directly upon the beveled side of the hammer-butt, and the jack-lever jointed to its flange on a line above the jointed connection of the jack and the jack-lever, substantially as set forth.

8. In a piano-action the hammer-butts each formed with an arm extending forward beyond that portion which engages with the jack to a connection with the pendent back-check, and having its under side beveled in a straight line approximately at a right angle to the jack, in combination with the jack and its auxiliary parts, said jack operating directly on the beveled side of the hammer-butt, and the back-check extending downward between the jack and the regulating-rail, substantially as set forth.

9. In a piano-action the hammer-butts the under side of each of which is beveled in a straight line approximately at a right angle to the jack when the parts are at rest, in combination with the jack-lever, the jack jointed to the jack-lever and operating on said under side of the hammer-butt, and a bar as 20 on the action-rail behind the jacks and in contact with the jacks when the hammer is retracted, substantially as set forth.

10. In a piano-action the combination of the action-rail, the hammer-butts and jack-levers attached thereto, the jacks jointed to the jack-levers and operating under the hammer-butt, a bar as 20 on the action-rail between the jacks and the action-rail, said bar forming a support for the jacks, and a bar as 22 hinged to the action-rail between the jacks and the action-rail, substantially as herein set forth.

11. In a piano-action a hammer-butt having an arm extending forward beyond that portion which engages with the jack, to a connection with the pendent back-check, the back-check extending downward between the jack and the regulating-rail, the contact portion of the under side of the hammer-butt formed in a straight line, approximately at a right angle to the jack, and said hammer-butt provided with a wire arm adjustable to or from its under side, in combination with a jack-lever, the jack jointed to the jack-lever and having a hole in its upper end to receive the wire, substantially as set forth.

12. In a piano-action the combination of the hammers and hammer-butts, the jacks and jack-levers, and a bar hinged to the action-rail between the jacks and the action-rail and means to move the bar substantially as set forth.

13. In a piano-action the combination of the hammers and hammer-butts, the jacks and jack-levers, the action-rail, a movable bar extending between the action-rail and the jacks, said bar adapted to move the jack forward or backward under the hammer-butts, and means to move the bar, substantially as set forth.

14. In a piano-action the hammer-butts each consisting of the following elements, a main body to which is connected the hammer and flange, the contact portion of its under side formed in a straight line and beveled at an angle to a line drawn horizontally through the center of its flange when the hammer is in its retracted position, an arm extending from the main body, and a pendent back-check attached to the arm, in combination with a jack-lever, a jack jointed to the jack-lever and operating directly upon the contact-surface of the hammer-butt, substantially as set forth.

15. In a piano-action the contact portion of the under side of the hammer-butts formed in a straight line approximately at right angles to the jacks, when the hammers are in their retracted positions, in combination with the jacks jointed to the jack-levers and operating directly upon the contact-surface of the said hammer-butts, and the said jacks assuming a position approximately at right angles to the contact-surfaces of the hammer-butts when the parts are at rest, substantially as set forth.

16. In a piano-action a hammer-butt with an arm jointed to a pendent back-check in combination with the pendent back-check, a jack, a regulating screw and button as 10, said back-check extending downward between the jack and the regulating screw and button, substantially as set forth.

17. In a piano-action the combination of a hammer-butt with an arm, a back-check connected to the arm, pendent between and adapted to come in contact with the jack and a regulating-button as 10 on the regulating-rail, a regulating-rail, a jack having a projection or foot adapted to come in contact with a regulating-button as 11 on the regulating-rail, the jack, and the jack-lever, substantially as set forth.

18. In a piano-action the combination of a hammer-butt with an arm jointed to a pendent back-check, the under side of the hammer-butt beveled in a straight line, the jack jointed to the jack-lever, a pendent back-check extending from the arm downward between the jack and the regulating-buttons 10, the jack formed with a projection or foot, the regulating-rail, and buttons 10 and 11 on the regulating-rail, substantially as set forth.

19. In a piano-action the combination of a hammer-butt with an arm jointed to a pendent back-check, the under side of the hammer-butt provided with an adjustable wire, the jack jointed to the jack-lever, a pendent back-check extending from the arm downward between the jack and the regulating-buttons 10, the jack formed with a projection or foot, the regulating-rail, and buttons 10 and 11 on the regulating-rail, substantially as set forth.

20. In a piano-action the jacks and a bar as

22 hinged between the action-rail and the jacks, and means to move the bar, substantially as set forth.

21. In a piano-action the combination of a hammer-butt having an arm jointed to a pendent back-check, the pendent back-check, the jack-lever, and a jack jointed to the jack-lever the regulating buttons and screws 10 and 11, a swinging bar hinged between the jacks and action-rail and means to move the bar, substantially as set forth.

22. In a piano-action the jack-lever, the jack pivoted thereto and formed with a heel extending downward beyond its connection with the jack-lever, and a spring secured within the body of the jack-lever, its lower end extending downward to a connection with the heel of the jack, substantially as set forth.

23. In a piano-action the regulating-rail carrying two sets of regulating screws and buttons in combination with the pendent back-check extending downward between the jack and the regulating-rail, the hammer and hammer-butt, and the jack and jack-lever, substantially as set forth.

24. In a piano-action the pendent back-checks, the jack, the regulating-rail carrying two sets of regulating screws and buttons, one set of which is secured through the rail in a position approximately horizontal to engage the pendent back-checks, and the other set in a perpendicular position above the feet of the jacks, substantially as shown and described.

25. In a piano-action a hammer-butt having the contact portion of its under side formed in a straight line and adapted to come in contact along its entire said under side with the jack, a jack-lever suspended from the action-rail, the jack jointed to the jack-lever and operating directly upon said contact portion of the hammer-butt, substantially as set forth.

26. In a piano-action the combination of the following elements: a hammer and hammer-butt, the under side of the hammer-butt beveled in a straight line and having an arm extending to a connection with a pendent back-check, also a wire attached to and adjustable to and from its under side, a pendent back-check extending from the hammer-butt arm downward between a regulating-rail and the jack, a regulating-rail carrying the regulating-buttons, a jack jointed to the jack-lever and extending upward to a contact with the under side of the hammer-butt, an action-rail and a swinging bar hinged to the action-rail, substantially as shown and described.

27. In a piano-action the combination of the following elements: a hammer and its hammer-butt, the hammer-butt connectod to a pendent back-check, the pendent back-check extending downward between the regulating-rail and the jack, a regulating rail and buttons, a jack-lever and jack, and an action-rail upon which the several parts are supported, substantially as shown and described.

28. In a piano-action the combination of the following elements: a hammer and hammer-butt having an arm, a pendent back-check extending from the hammer-butt arm downward between the regulating-rail and the jack, a regulating-rail, a jack and jack-lever, an action-rail to which the various parts are connected, and a bar secured to the action-rail between the action-rail and the jacks upon which the jacks rest, substantially as shown and described.

29. In a piano-action the combination of the following elements: a hammer and hammer-butt having an arm, a pendent back-check extending from the hammer-butt arm downward between the regulating-rail and the jack, a regulating-rail, a jack-lever and jack, an action-rail to which the several parts are connected, and a swinging bar hinged to the action-rail, substantially as shown and described.

30. In a piano-action the combination of the following parts: the hammer-butts each with its hammer and extended arm, its under side beveled in a straight line approximately at a right angle to the jack, and provided with a wire, a back-check connected to the arm and pendent between the jack and a regulating-rail, a regulating-rail carrying adjusting devices, a jack-lever, a jack with an extension or foot adapted to come in contact with one of the adjusting devices on the regulating-rail, a spring attached to the jack-lever and operating against the jack, an action-rail to which the several parts are connected, a bar operating between the rail and the jacks and means to move the bar, substantially as shown and described.

31. In a piano-action the hammer-butts the contact-surface of each formed in a straight line and having an arm to which is attached a pendent back-check, the back-check extending downward between the regulating-rail and the jack, the regulating-rail carrying regulating devices adapted to force the jack to a contact with the back-check and to hold the upper end of the jack in position under the contact-surface of the hammer-butt, the jack-lever, and the jack jointed to the jack-lever substantially as set forth.

SAMUEL R. PERRY.

Witnesses:
J. H. BURNS,
FRANK J. MCANDREWS.