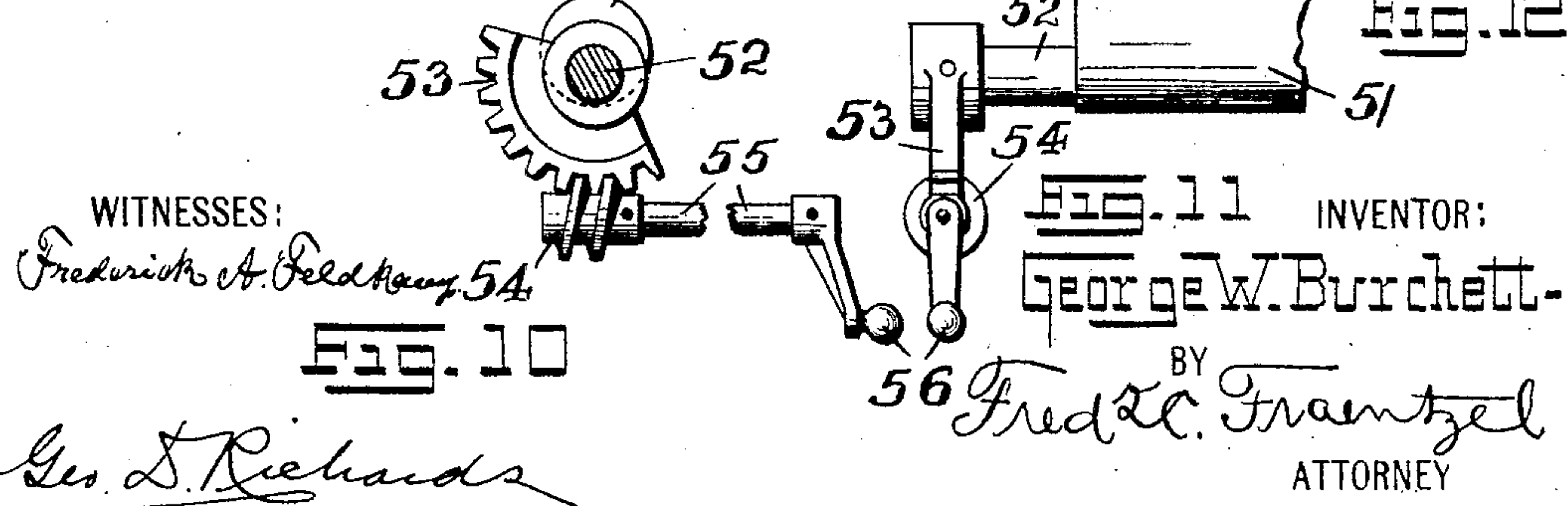
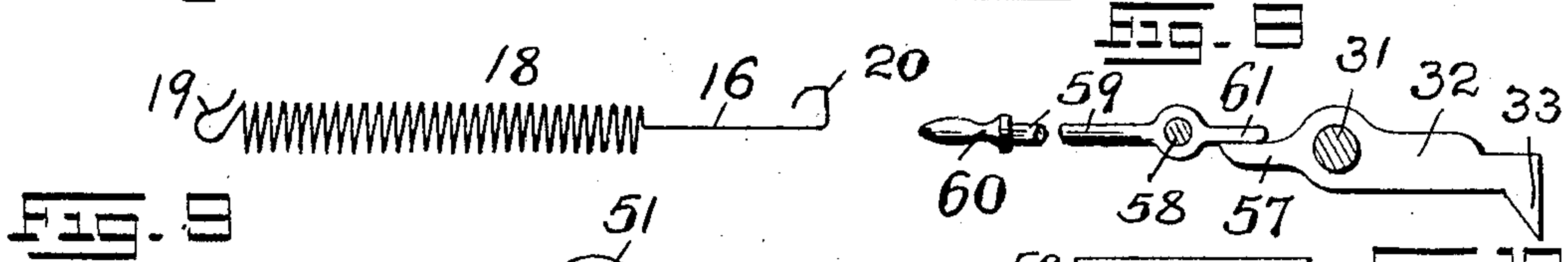
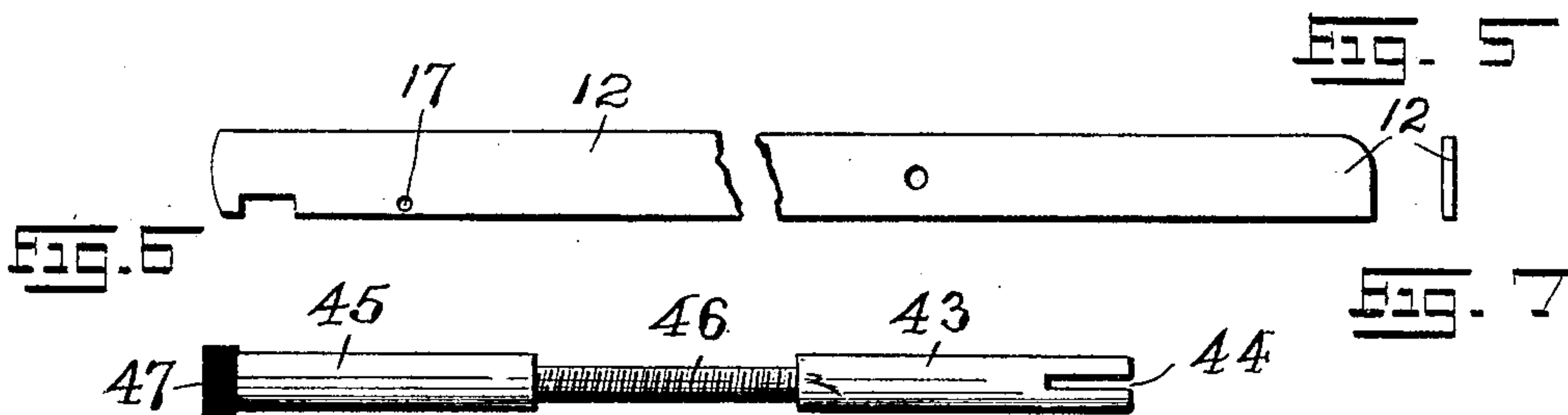
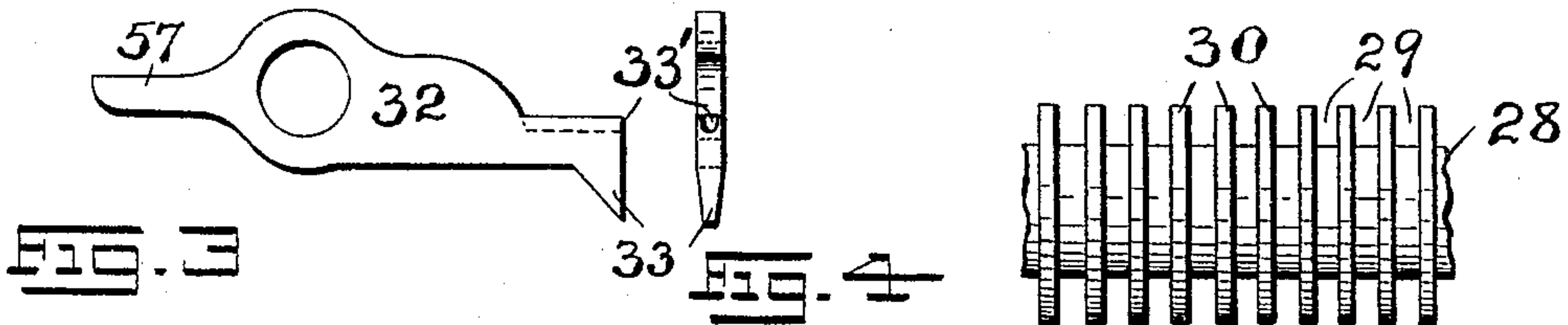
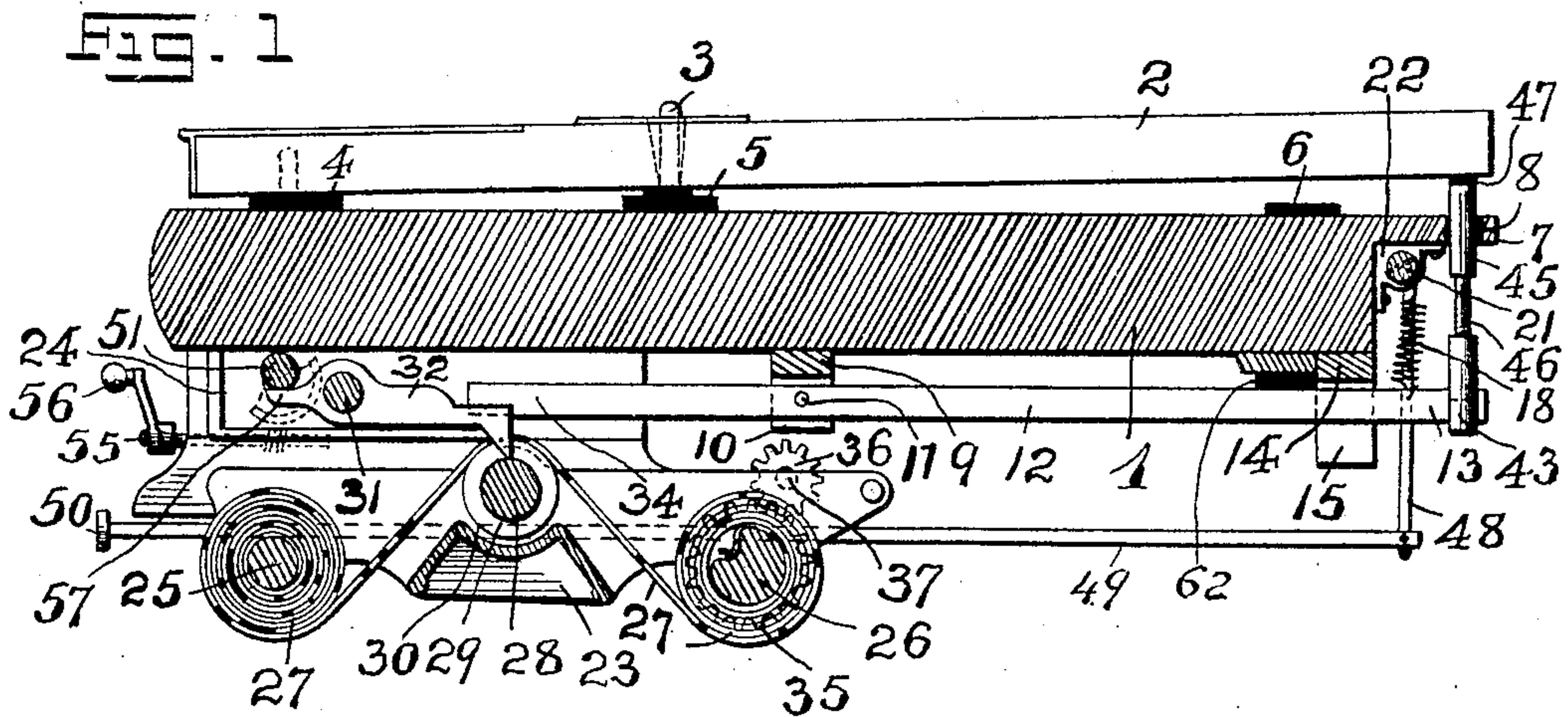


No. 817,545.

PATENTED APR. 10, 1906.

G. W. BURCHETT.
SELF PLAYING PIANO.
APPLICATION FILED MAR. 27, 1903.

2 SHEETS—SHEET 1.



UNITED STATES PATENT OFFICE.

GEORGE W. BURCHETT, OF BELLEVILLE, NEW JERSEY.

SELF-PLAYING PIANO.

No. 817,545.

Specification of Letters Patent.

Patented April 10, 1906.

Application filed March 27, 1903. Serial No. 149,782.

To all whom it may concern:

Be it known that I, GEORGE W. BURCHETT, a citizen of the United States, residing at Belleville, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Attachments for Self-Playing Pianos; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to numerals of reference marked thereon, which form a part of this specification.

The invention which forms the subject of this patent relates to self-playing pianos and like musical instruments; and the invention therein resides in certain parts and combinations of parts of a playing attachment the joint coöperating functions of which produce certain new and advantageous results and which will be specifically pointed out in the claims appended hereto.

A feature of my invention is the pivoting of all the key-actuating levers to a single bar directly to the under side of the keyboard and connecting the levers by short upward-pulling coiled springs, with a rod 21 mounted at the rear end of the keyboard, and for connecting the levers by short rods with the rear ends of the keys, whereby certain new results are obtained. The provision of hangers 24, fixed to and depending from the under side of the keyboard, constitute a frame containing certain of the operating parts and form guides for the slidable frame of the music-sheet holder. These hangers contain the driving-pinion 36, which is arranged to form a stop to limit the inward sliding movement of the music-sheet holder to make engagement with the gear 35 of the music-sheet roll which is carried by the slidable frame. In sliding the music-sheet holder inward its gear engagement with the pinion 36 stops the grooved roll 28 at the exact point at the inner ends of the levers 12 to allow the music-sheet to receive the engagement by its perforations of the beveled ends of the music-sheet-actuating arms 32, by which the key-actuating levers are actuated, so that the act of sliding the music-sheet holder in place gives novelty to the construction as the means of engaging the music-sheet-driving gear and by the same movement stop the beveled ends of arms 32 at the point at which they engage with the

music-sheet. This novel construction also allows the music-sheet holder to be pulled out from the guide-hangers when it is desired to play by hand. A feature of importance is the compact arrangement whereby the rear ends of the keys are caused to receive the impact-blows of short rods and in the arrangement of short springs acting with a direct upward pulling force on the keys, giving a more sensitive result upon the keys, and of adjusting both the rods and the springs to produce the desired expression of the composition.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is a transverse vertical section of the keyboard of a piano, illustrating in side elevation one of the playing-keys thereon and the attachment which embodies the invention being also represented in transverse vertical section. Fig. 2 is a bottom view of the said keyboard and the playing attachment represented in said Fig. 1, but a portion of the music holder or drawer and the perforated music-sheet being represented as broken away. Figs. 3 and 4 are a side and end view, respectively, of one of the oscillating arms for actuating the piano-key-actuating levers; and Fig. 5 is a detail view of a portion of a grooved or channeled roll employed with the perforated music-sheet holder or drawer. Figs. 6 and 7 are a side and end view, respectively, of one of the said piano-key-actuating levers; and Fig. 8 is a detail view of one of the adjustable rods arranged at the end of each piano-key-actuating lever for operating the piano-key. Fig. 9 is a view of a spring employed in connection with each piano-key-actuating lever. Fig. 10 is a transverse vertical section of an eccentric-shaft for actuating the said oscillating arms for raising or lowering the ends of the said arms away from contact with the perforated music-sheet; and Fig. 11 is a side view of the same, both said views being details of construction. Fig. 12 is a side view of one of the said oscillating arms and a means for raising and lowering said arms, said means being of a modified form of construction.

Referring now to the said drawings, 1 indicates the usual form of keyboard for a piano or other similar musical instrument, and 2 indicates one of the piano-keys which oscillates on the usual pivot or post 3, as represented in Fig. 1. The keyboard 1 is provided with the usual felts 4, 5, and 6, and at

the rear end the said keyboard is made with an extension 7, provided with perforations 8. Suitably secured against the under side or bottom of the said keyboard 1 is a strip or bar 9, provided with a series of slots 10, in which are arranged upon pivotal pins 11 a series of levers 12, which for sake of clearness I have termed the "piano-key-actuating arms or levers." These levers 12 are arranged, preferably, in the manner represented in said Fig. 2 and have their back ends 13 extending into and movably arranged in correspondingly-formed slots 15 in a strip or bar 14, which is also secured to the bottom or under side of the said keyboard 1, substantially as illustrated. The said end portions 13 of the said piano-key-actuating levers 12 all extend back of the said strip or bar 14 and directly beneath the said extension 7 of the keyboard, each lever 12 having a perforation 17, in which is secured the end 19 of a spring 18, said springs 18 having the straight portions 16 and the attaching ends 20 for securing said springs to a rod 21, movably arranged in bearings 22, which are secured to the back of the keyboard 1 and beneath the said extension 7 and in which bearings the said rod 21 is free to oscillate in the manner and for the purposes to be presently described.

The framework of the music-sheet holder or drawer is indicated by the reference character 23, the same being slidably arranged between the guides 24, secured to the under side of the keyboard. In this holder 23 the reference characters 25 and 26 indicate the two reels upon which the perforated music-sheet 27 is arranged in the usual manner, and 28 is an auxiliary roll provided with a series of annular grooves or channels 29, which are formed by the correspondingly-placed annular ribs 30, over which the perforated music-sheet 27 is passed and which ribs 30 support the said sheet, as clearly illustrated in Fig. 1. Arranged in the said framework and between the two guides 24 is a rod 31, upon which are loosely arranged, so as to have a free oscillatory movement upon said rod 31, a series of oscillating arms 32, each arm 32 having an inwardly-extending portion or member provided with a channel 33', in which the end portion 34 of the piano-key-actuating lever 12 rests, and each arm being further provided with a downwardly-extending lug or nosing 33, which when the attachment is in use rests directly upon the perforated sheet 27 at its support on the roll-ribs 20 and is permitted from time to time to drop into a perforation in said sheet, passing directly over one of the channels 29 in the roll 28 to thereby permit the piano-key-actuating lever 12 to actuate the piano-key 2, as and in the manner to be presently described.

One manner of causing the rotary movement of the reel 26 for moving the perfo-

rated sheet 27 beneath the several lugs or nosings 33 of the oscillating arms 32 is represented in said Figs. 1 and 2 and consists, essentially, of a gear 35, which is connected with the side or end of the said reel 26. In mesh with the said gear 35 is a pinion 36, secured upon a shaft 37, said shaft having a bevel-gear 38, which is in mesh with another bevel-gear 39 on a shaft 40 and is actuated from said bevel-gear 39 when the shaft 40 is turned by means of a crank 41. The shafts 37 and 40 are rotatively arranged in suitable bearings 42, secured upon the bottom of the keyboard 1. It will be evident, however, that instead of rotating the shaft 40 by means of the crank connected therewith any other means may be employed for causing the rotary movements of the said parts, and any suitable motive power, such as electricity, if desired, may be employed.

As has been stated, the end portion 34 of each piano-key-actuating lever 12 rests lightly in a channel 33' of its correspondingly-placed oscillating arm 32, the tension of the spring 18 at the opposite end 13 of the arm 12 causing the operative engagement of the said parts. Resting upon the end portion 13 of each lever 12 is a bar or pin 43, having the slotted end 44 arranged over the said end portion 13, as shown, and 45 is another bar or pin. These bars or pins 43 and 45 are adjustably connected by means of a screw connection 46, and upon the free end of said bar or pin 45 is a piece of felt 47, as shown. These connected parts form the impact-rod. When these parts have in this manner been arranged upon the end of the lever 12 and properly adjusted, then this felt 47 will rest lightly against the under surface of the inner end of the piano-key 2, and when any one or more of the said lugs or nosings 33 of the oscillating arms 32 enter a perforation or perforations in the moving music-sheet 27 then the spring or springs 18 of the corresponding lever or levers 12 will sufficiently raise the rear end portion or portions of the actuated lever or levers 12, whereby the connected slotted pins 43 and 45 will in turn actuate the correspondingly-placed piano-key and cause the string to be struck. By winding or unwinding the straight portions 16 of the said springs 18 to any degree about the rod 21 the tension of the said springs may be made greater or less, according to the strength of tone intended to be played. One means of quickly changing the tension of the said springs 18 is illustrated in said Fig. 1 and consists, essentially, of one or more downwardly-extending crank-rods 48, secured at their upper ends to said rod 21, each crank-rod 48 having pivotally attached to its lower end a link or bar 49, provided at its forward end with a push-button 50 within easy reach of the person seated at the front of the piano. It will be understood that any ar-

5 rangement of several of such cranks 48 and the bars 49, the movements of said parts being variously limited, may be made whereby the tensions of the several springs 18 can be variously changed to produce the loud and soft effects of playing.

When it is desired to remove the music-holder for the placing of another perforated music-sheet therein or for the purpose of actuating the piano-keys by hand in the ordinary manner of playing, all the end portions of the oscillating arms 32, provided with the lugs or nosing 33, can be sufficiently raised above the sheet 27 by the device represented more particularly in Figs. 10 and 11 of the drawings. This device consists, essentially, of a rod 51, having the bearing portions 52 rotatively arranged in bearings in the guides 24, the main body portion of the said rod 51 being eccentric with the central axes of the said bearing portions 52. One of said bearing portions is provided with a toothed sector 53, which can be actuated by means of a worm 54 on a rod 55, turned by means of a crank 56. Thus when the rod 55 is turned by means of its crank 56 the worm 54 actuates the said toothed sector 53, and thereby brings the eccentric body portion of the rod 51 directly upon the forwardly-extending fingers or ends 57 of the several oscillating arms 32. In this manner the said ends or fingers 57 are lowered and the arms 32 raised sufficiently above the music-sheet, that it can be removed from the music holder or drawer or placed in the same, as the case may be. The upward movement and the raised position of the inner end portions of the said oscillating arms 32 also produces a downward movement of the inner end portions 13 of the piano-key-actuating levers 12 against the tensions of their springs, whereby the said pins 43 and 45, hereinabove mentioned, will drop sufficiently below the under surfaces of the piano-keys 2, that said keys can be played in the ordinary manner by hand without the said pins interfering with such playing. The various parts of the playing mechanism can thus be retained in their inoperative positions until the handle or crank 56 is again turned and the lugs or nosings 33 of the oscillating arms 32 brought in their operative positions upon the upper surface of the perforated music-sheet 27. In lieu of this mechanism for raising and lowering the said oscillating arms 32 there may be arranged upon a rod 58 a plate 59, having a handle 60, which when raised depresses the edge portion 61 of the said plate upon all the ends or fingers 57 of the said oscillating arms 32, whereby the inner portions of said arms, which are provided with the lugs or nosings 33, are raised in a manner similar to that above described and for the same purpose.

It will be understood that changes may be made in the several arrangements and com-

binations of the devices and in the details of the construction of the parts thereof without departing from the scope of my present invention and that the said music-sheet may be made of any kind of metal or of paper suitably perforated. Hence I do not limit my invention to the exact arrangements and combinations of the devices as described in the foregoing specification and as illustrated in the accompanying drawings, nor do I confine myself to the exact details of the construction of the said parts.

The lever impact-rod terminates in a felt 47 to cushion the impact on the key, and for limiting and cushioning the upward movement of the key-actuating lever a cushion-stop 62 is secured on the under side of the keyboard in close proximity to the spring 18, so that the lever is cushioned at its spring-connected end and at its point of impact with the key, while the cushion-stop 62 in its relation to the pivot of the lever, the spring, and the slotted guide between the stop and the spring gives the perfect action to the key-actuating lever. As the interlocking ends of the key-actuating levers and the oscillating arms are maintained from lateral displacement, it is important that the inner ends of said levers which deliver their impact upon the keys be supported against lateral play, and this is the function of the slotted hanger 15, so that there is a coöperative function of the slotted bar 9, the slotted bar 14, and the interlocked ends of the levers and their actuating arms in maintaining the easy working of these parts. Moreover, the function of the bar 14, having the slots, in rendering the movement of the inner end of lever true is important in its conjoint operation with the impact-rod to prevent its free end binding or cramping in its vertical movement in the keyboard-guide 8.

Looking at Fig. 1 it is important to note that the springs 18 are at the inner edge of the keyboard and are arranged for giving a direct blow upon the keys, which give the advantage of a more effective control of the force of the blow, as the short springs are the direct means of the power to strike the blow. In this arrangement of the springs another important matter enters and that is the means for giving the proper movement to the key-actuating lever at its spring-connected end. For this purpose the key-actuating levers are pivoted about one-third of their length from their front ends, and the toothed ends of the oscillating arms are adapted to have a drop through the perforations in the music-sheet of about three-sixteenths of an inch. This will give a stroke to the spring-connected end of the lever of about three-eighths of an inch, which is the necessary distance required to give a full striking blow to the keys. The advantage of this will be apparent to the expert in the repetition of the

notes, for if the drop of the tooth 33 were a greater distance the perforations in the music-sheet would have to be much longer, and it would in such case make it necessary for the sheet to travel much more rapidly to reproduce the selection in time. The relative arrangement shown of the springs, the lever-pivots, the impact-rod, and the distance of the drop of the music-engaging arms is of vital importance in providing for a direct blow of the springs upon the keys.

In Fig. 2 is seen one of the hangers 24, which forms one of the guides for the slidable music-sheet holder, and it will be seen that the hanger at the other end of this sheet-holder is removed, together with a portion of the music-sheet, and its rolls broken away to expose certain of the key-actuating arms 32. The shaft 37, which carries the pinion 36 for driving the roll-gear 35, while the shaft 31, on which the arms 32 are mounted, and also the eccentric 51 are mounted in the hangers. In Figs. 3 and 4 is seen the channel or groove 33' in the toothed end of the oscillating arm and in Fig. 1 is seen how the ends of the levers are interlocked and abut with the grooved ends of these arms, and thereby hold the arms and levers in engagement. In Fig. 6 is seen a notch at the left-hand end of the key-actuating lever, and this notch engages with the slotted end of the rod 43, (seen in Fig. 8,) by which the lever and the rod are interlocked, so that they cannot slip apart.

The music-sheet-carrying rolls are horizontal and of a length equal to the width of the music-sheet and with the mediate roll are for the music-sheet to travel from one roll to the other in a direct line on each side of the mediate roll when drawn from the music-roll and wound upon the take-up roll. The grooves of the music-roll correspond in position to the parallel rows of perforations in the music-sheet and the annular surface parts between the gooves correspond to the imperforated portions of the music-sheet as the latter is drawn over the mediate roll. The slidable frame contains the three rolls, and between and parallel with its sides the pivoted arms are arranged side by side, with their toothed ends resting on the music-sheet above the axis of the mediate roll and in line with the rows of perforations in the music-sheet. The slidable frame is mediate of the length of the keyboard and directly beneath its front portion, and the levers from their engagement with the ends of the pivoted arms are arranged to diverge toward the right and toward the left on each side of a mediate line drawn through the frame, so that the levers terminate at their rear ends coincident with the rear ends of the keys. The rotation of the crank-shaft imparts motion to the music-sheet roll, causing the sheet to be drawn over the grooved roll, and as the note-perforations in the music-sheet

register with the grooves in its supporting-roll the beveled ends of the pivoted arms will enter and fall through the note-openings and by such falling will cause the levers to actuate the keys, and thereby produce notes.

The pivoting of the key-actuating levers directly to the under side of the keyboard gives the advantage of arranging the music-sheet holder directly beneath the levers and the loosely-mounted arms above the music-sheet, thereby allowing the arms to act by the spring 18 and by gravity in effecting their engagement with the note-openings of the music-sheet, rendering such engagement less liable to injury or wear the note-openings which is constantly liable to result from the action of spring-pressure heretofore employed in forcing the ends of the pivoted arms into the note-openings. For this purpose the arms 32 are loose upon their rod 31 and their music-sheet-engaging ends underlap the ends of the key-actuating levers, leaving the arms resting freely on the music-sheet to fall by their weight through the note-openings.

Having thus described my invention, what I claim is—

1. A self-playing attachment for pianos including a perforated music-sheet, in combination with a series of key-actuating levers fulcrumed on the under side of the keyboard, a rod transversely mounted on the rear end of the keyboard, a spring connecting said rod with each key-connected lever constantly exerting an upward tension on the latter, an adjustable key impact-rod connecting the inner end of each lever at the side of and parallel with the spring, and means engaging the front ends of the levers and the perforated music-sheet for controlling the levers in the way stated.

2. A self-playing attachment for pianos including a perforated music-sheet in combination with a series of key-actuating levers fulcrumed on the under side of the keyboard, a rod mounted transversely at the under side of the latter near its front, a series of oscillating arms fulcrumed on said rod, having their inner ends resting normally on the music-sheet and supporting the front ends of the key-actuating levers, the rear ends of the latter extending beyond the keyboard and having each an adjustable impact-rod, and a spring at the side of and parallel with the rod and connected to constantly elevate the inner end of each key-connected lever.

3. A self-playing piano including the keys in combination with a perforated music-sheet, a transverse bar on the under side of the keyboard and provided with a series of perforations, an extension at the rear end of the board provided with a series of slots, a series of key-actuating levers each pivotally mounted in a slot of said bar, adjustable rods for the keys, one connected to the rear end

of each lever, an adjustable rod transversely mounted at the inner end of the key-board, coil-springs each parallel with and at the inner side of the said adjustable rods and connected to said transverse rod and to said levers.

4. A self-playing attachment for pianos and the like, comprising a series of spring-actuated levers pivoted directly to the under side of the keyboard, the music-sheet mounted beneath the levers, the lever-controlling arms loosely mounted above the music-sheet the acting end of each arm underlying the end of each lever and engaging the note-openings of the music-sheet.

5. A self-playing attachment for pianos including in combination with a transverse bar provided with slots and fixed on the under side of the keyboard, an extension at the rear of the board provided with vertical perforations, guide-hangers 24 fixed to and depending from the under side of the keyboard, a series of key-actuating levers each fulcrumed in slots of said bar, adjustable rods one connected to the rear end of each lever and passing up through the extension perforations, a rod under said extension, coil-springs each connecting a lever with said rod, oscillating arms and the eccentric for raising them both mounted on the keyboard, a driving-pinion 36, all arranged and combined with the music-sheet holder slidable in said hangers and having the gear 35 whereby to engage the said pinion and form a stop to limit the inward movement of the music-sheet holder to stop the beveled points of the oscillating arms at the points for engagement with the music-sheet.

6. A self-playing attachment for pianos and the like, comprising a series of levers pivotally mounted on the under side of the keyboard and parallel with the keys, a series of oscillating levers, one of said series having a groove and the other a projection interlocking with said groove, adjustable connections between the keys and first-named levers, springs for actuating the first-named levers said springs being adjustable as to tension, a perforated sheet at the oscillating levers for controlling the movement thereof, and a hand-controlled bar for moving said oscillating levers to throw the attachment out of action.

7. A self-playing attachment for pianos comprising in combination the key-actuating levers fulcrumed on the under side of the keyboard, the oscillating arms provided with grooves interlocked with said levers, a slotted guide for the rear ends of the levers depending from the rear end of the keyboard, an upward-pulling spring and an impact-rod both attached to the end of each lever, a music-sheet and means for actuating it.

8. A self-playing attachment for pianos including, in combination with the music-

sheet a bar having slots fixed to the under side of the keyboard about mediately of its width, a series of key-actuating levers, pivots for the levers in alinement each with the other in said bar, a spring connecting the inner end of each lever with the keyboard, a vertical impact-rod on the inner end of each lever terminating in a cushion for each key, and means actuated by the music-sheet for oscillating the key-actuating levers.

9. A self-playing attachment for pianos and including a music-sheet, in combination with a series of keys, levers for raising the inner ends of said keys, pivots for said levers in alinement each with the other, oscillating arms, one for actuating each lever, the meeting ends for each pair—a lever and an arm—interlocking by a groove, a yielding stop for the inner end of each lever, an impact-rod on the inner end of each lever forcing the inner end of the key upward thereby striking the blow to the string, and a guide for the inner end of each lever depending from the keyboard, whereby the levers and their interlocking arms are maintained in engagement and easy working.

10. A self-playing attachment for pianos including the music-sheet, in combination with a series of keys, levers for raising the inner ends of said keys, a bearing-bar for the levers, oscillating arms one for each lever the meeting ends of each pair—a lever and an arm—interlocking, a yielding stop for the inner end of each lever, a slotted guide for the inner end of each lever, an impact-rod on the inner end of the lever for raising the inner end of the key, and a guide for the free end of the impact-rod for the purpose stated.

11. In an attachment for playing pianos and in combination, the music-sheet, a series of key-actuating levers fulcrumed on the under side of the keyboard extending beyond the rear thereof the arms engaging the music-sheet and the levers, an extension of the keyboard overhanging the rear ends of the key-actuating levers and having openings, a rod mounted loosely on the rear end of each lever and passing through openings in said extension, a coil-spring located between said rod and the end of the keyboard, connecting the latter with said lever, and constantly tending to pull the latter up, the said levers being pivotally mounted at about one-third their length from their front ends and the springs and rods connected to the long rear ends of the levers.

12. In an attachment for playing pianos in combination, the perforated music-sheet, a series of key-actuating levers pivotally mounted on the under side of the keyboard, an adjustable coil-spring connecting the rear end of the lever with the rear end of the keyboard, an adjustable rod connected to the rear end of the lever at the outer side of the spring and engaging the rear end of the key

and means operated by the movement of the perforated music-sheet to govern the lever and permit it to give the impact-blow.

13. In an attachment for playing pianos in combination, the perforated music-sheet, a series of key-actuated levers pivotally mounted on the under side of the keyboard, an adjustable coil-spring connecting the rear end of the lever with the rear end of the keyboard, an adjustable rod connected to the rear end of the lever at the outer side of the spring and terminating in a cushion engaging the rear end of the key, a cushion-stop secured on the under side of the keyboard to limit the upward movement of the key-actuating lever, and its impact-rod, and means operated by the movement of the perforated music-sheet to govern the lever and permit it to give the impact-blow.

14. In a self-playing piano, and in combination with a music-sheet and the keys, the key-actuating levers fulcrumed on the under side of the keyboard, and terminating at the rear ends of the keys, slotted guides for the inner ends of the levers, a cushioned stop for the latter adjacent the guides, a spring connected to pull up the rear end of each lever, a key impact-rod connected to the rear end of each lever, and means for actuating the keys.

15. In a self-playing piano and in combination, the keys, key-actuating levers, oscil-

lating arms for actuating the levers, guide-hangers fixed to and depending from the keyboard, a music-sheet holder slidable in the hangers, a gear carried by the slidable holder for moving the music-sheet, and a pinion for driving the gear of the holder and forming a stop to limit the inward sliding movement of the music-sheet holder at a point coincident with the engagement of the oscillating arms with the music-sheet.

16. A self-playing attachment for pianos and the like, comprising a series of levers pivoted directly to the under side of the keyboard, the music-sheet mounted beneath the levers, the arms loosely mounted above the music-sheet the acting end of each arm underlying the end of each lever and engaging the note-openings of the music-sheet, a cushion-stop on the under side of the keyboard for limiting the upward movement of the inner end of each lever, a spring connected to effect such lever movement and a key impact-rod connected to the lever.

In testimony that I claim the invention set forth above I have hereunto set my hand this 25th day of March, 1903.

GEO. W. BURCHETT.

Witnesses:

JNO. J. HOPPIN,
R. ARTHUR HELLER.