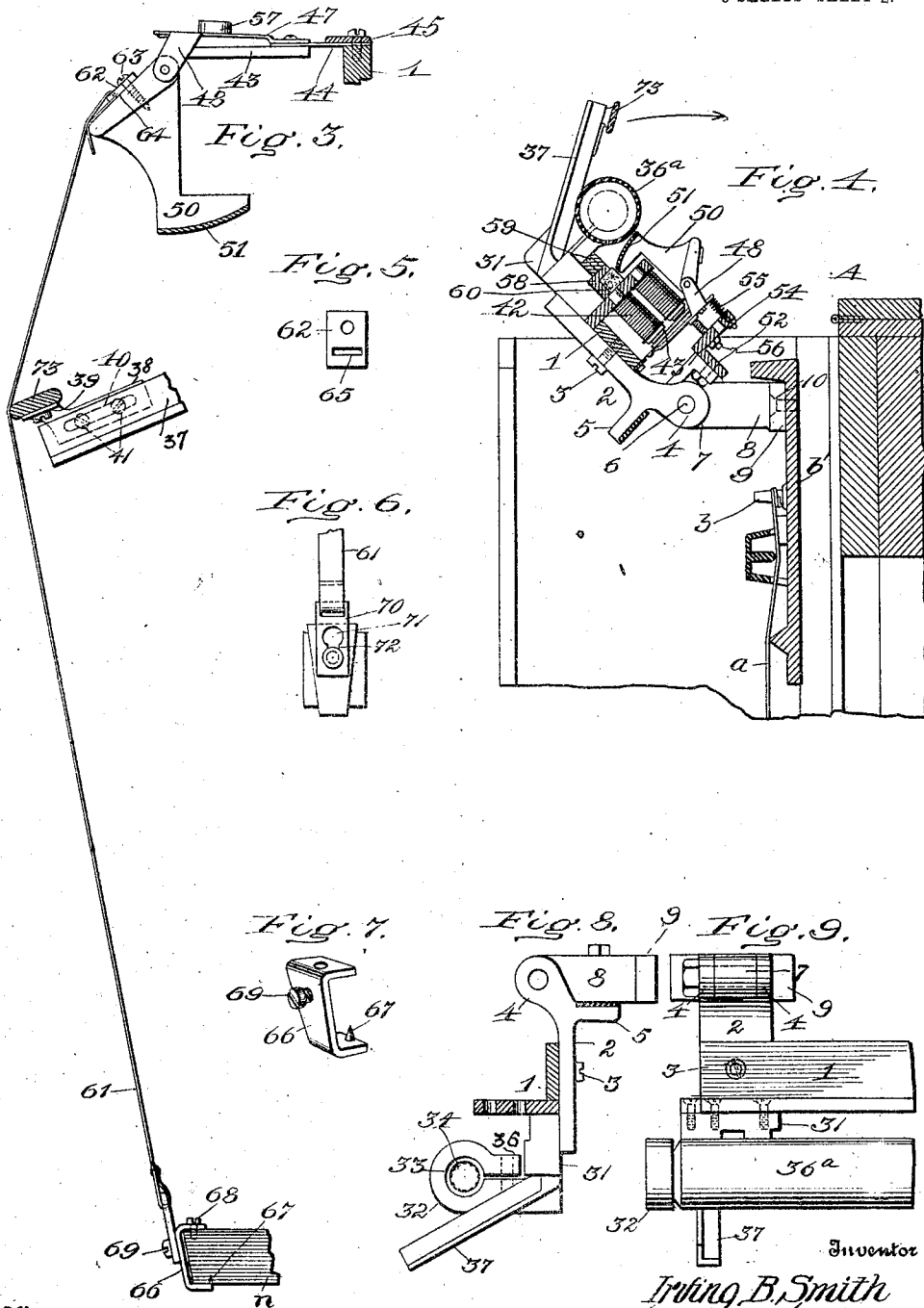


I. B. SMITH.
 AUTOMATIC MUSIC PLAYING ATTACHMENT FOR PIANOS.
 APPLICATION FILED AUG. 29, 1905.

913,242.

Patented Feb. 23, 1909.
 3 SHEETS—SHEET 2.



Witnesses
 Chester B. Underhill
 Gertrude M. Stucker

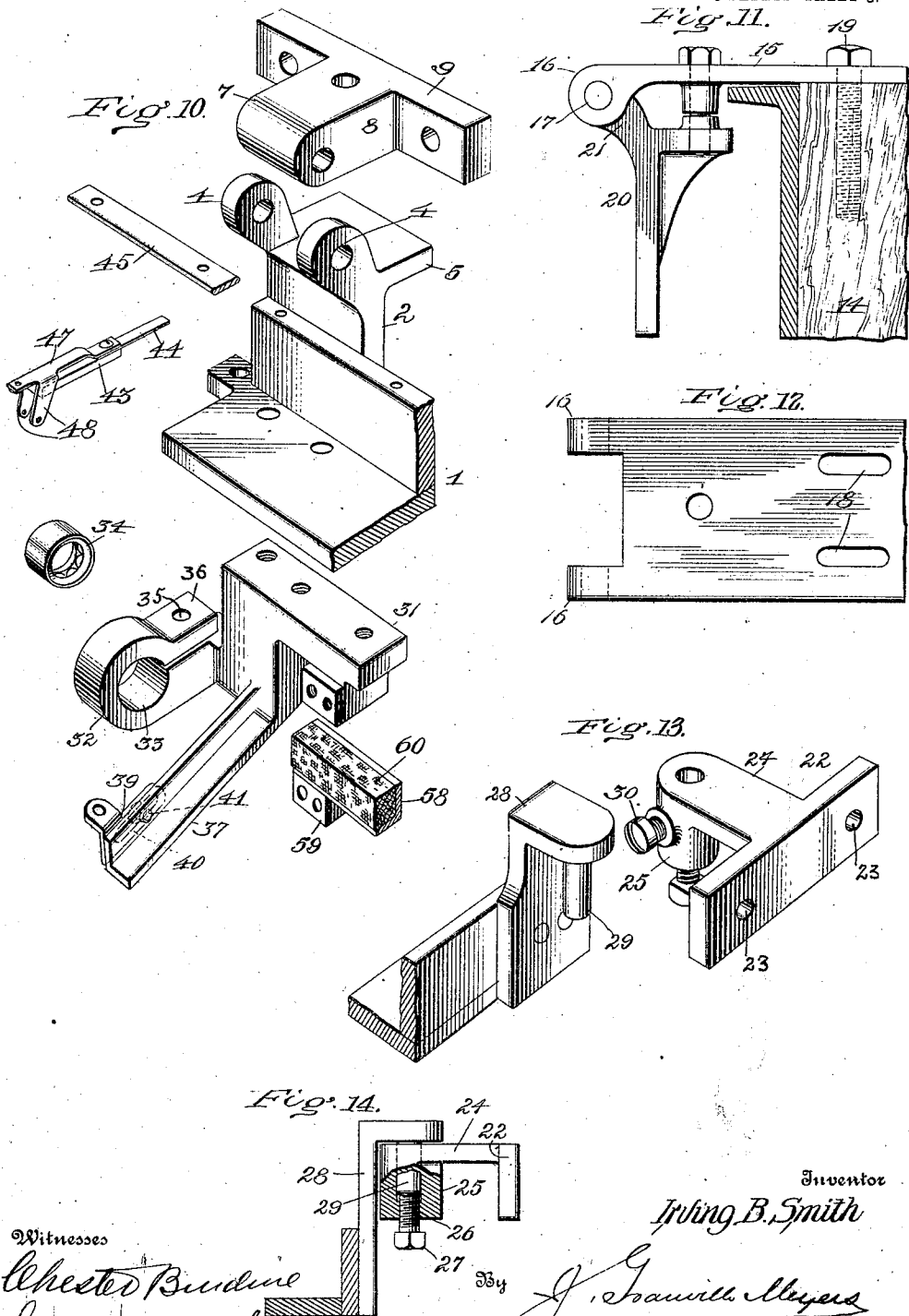
Inventor
 Irving B. Smith
 By J. G. Haworth Meyer
 Attorney

I. B. SMITH.
 AUTOMATIC MUSIC PLAYING ATTACHMENT FOR PIANOS.
 APPLICATION FILED AUG. 29, 1905.

913,242.

Patented Feb. 23, 1909.

3 SHEETS—SHEET 3.



Witnesses

Chester Burdine
 Gertrude M. Stucker.

Inventor

Irving B. Smith

J. Fawcett Myers
 Attorney

UNITED STATES PATENT OFFICE.

IRVING B. SMITH, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ELECTRELLE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

AUTOMATIC MUSIC-PLAYING ATTACHMENT FOR PIANOS.

No. 913,242.

Specification of Letters Patent.

Patented Feb. 23, 1909.

Application filed August 29, 1905. Serial No. 276,189.

To all whom it may concern:

Be it known that I, IRVING B. SMITH, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Automatic Music-Playing Attachments for Pianos, of which the following is a specification.

My present invention relates to certain new and useful improvements in self-playing attachments for pianos, of the type wherein the actuating mechanism for the sound-producing devices is controlled by a perforated music sheet or web.

The improvements now sought to be protected relate more particularly to electrically controlled actuating mechanism which in the instance shown is of the well known "shoe and roller" type. Heretofore and prior to my invention, it has been the practice to locate this actuating mechanism in the lower part of the piano case; or, more properly speaking, below the key-board. This arrangement has always given more or less trouble and is open to many serious objections, chief among which may be noted the fact that considerable cutting of the piano frame and case is necessary, and adjustment of the various parts is not only very difficult but, in some cases, impossible, unless the piano is taken to the factory and "jacked".

It is one purpose of this invention, therefore, to overcome the above noted objections, and this is accomplished by mounting the entire actuating mechanism in the upper part of the piano case in such manner that all parts may be exposed to view and readily gotten at for purposes of adjustment and repair, access being gained thereto by simply removing the upper front board of the piano.

A further and important feature of the invention relates to the manner of mounting the actuating mechanism in the upper part of the piano, provision being made for moving the said mechanism bodily into and out of operative position whereby access may be had to the string pins, for tuning purposes, or for the attachment of new strings.

A further important feature of the invention resides in the provision of pull tapes, straps or cords for operating the sound-producing devices (in the present instance, the piano hammers), each tape, strap or cord

having a connection at one end with a part of the hammer action and connected at its other end to a member of the actuating mechanism, the construction and arrangement of the parts being such that the hammers may be actuated directly from the manual keys without affecting or operating the pull cords or tapes; or said hammers may be operated through the medium of the pull cords or tapes and their actuating mechanism without affecting or operating the manual keys.

A still further feature of the invention resides in the means of attaching each pull cord or tape to its actuating element and to a part of the hammer action, said means embodying in part, a novel and simple form of clip adapted to be readily attached to an element common in most forms of piano actions, thus enabling the attachment to be easily and quickly applied to a piano without in any manner cutting or changing the construction of its regular operating parts.

The invention has in view other more or less important objects, all of which will be more clearly brought out in the detailed description to follow this statement of objects.

In order to enable others skilled in the art to clearly understand, make and apply my said improvements, I will now proceed to describe the same in detail, reference being had for this purpose to the accompanying drawings in which—

Figure 1 is a vertical sectional view of the upper part of a piano, showing my improved attachment applied in position for use; Fig. 2 is a detail view of the attachment, the parts being shown in the position they assume when in the act of operating the hammer action; Fig. 3 is an enlarged detail view of one of the actuating shoes and its flexible connection with a part of the hammer action; Fig. 4 is a view showing the attachment swung out of operative position to gain access to the tuning pins; Figs. 5 and 6 are detail views of the plates by which the flexible tapes are connected to the shoe and wippen, respectively; Fig. 7 is a perspective view of the wippen attaching clip; Figs. 8 and 9 are, respectively, a side and a front elevation of one form of attaching hinge or bracket for the attachment; Fig. 10 is an assembled view in perspective of the various supporting ele-

ments for the attachment; Fig. 11 is a side elevation of a slightly modified form of hinged attaching bracket; Fig. 12 is a top plan view of one of the hinge members shown in Fig. 11; Fig. 13 is a perspective view of a further modified form of supporting and attaching means for the attachment; and Fig. 14 is a side elevation, partly in section, of the form of device shown in Fig. 13.

Before proceeding with the detailed description of the improvements sought to be covered herein, I will recite in a brief manner the general operation of a self-playing attachment constructed in accordance with the present invention.

A rotary drum or shaft is provided and a suitable motor employed to drive the same at a constant and rapid speed. A plurality of friction shoes (one for each key of the piano) are arranged adjacent to, but normally held out of contact with the drum or shaft, the shoes being suitably connected to the armatures of electro-magnets. A flexible pull-device is attached at one end to each shoe and at its other end said device has a detachable connection with a part of the hammer action of the piano. A note-selecting device or reader is employed to control the operation of the playing mechanism, said note-selecting device usually consisting of a contact-bar or roll and a plurality of selector-fingers, one for each of the before-mentioned electro-magnets. A perforated sheet or web is caused to travel between the contact roll and selector fingers, and whenever one or more of the latter enter the perforations in the sheet or web and make contact with the said roll, the corresponding electro-magnets with which the selector fingers are in circuit are energized, thus attracting their armatures and moving the shoes into frictional contact with the continuously rotating shaft or roll. These contacting shoes are thus thrust forward imparting a quick or sudden upward pull upon the pull-devices which, owing to their connections with the several hammer actions, cause the hammers to strike the strings of the piano in the same manner as when the piano is being played manually.

As the note-selecting device forms no part of the present invention, and as such devices are common and well known in the art, I do not deem it necessary to either show or more specifically describe the same herein.

Referring first to the piano proper, A designates the top of the case; B the removable front board; D the key-base; E a manual key pivoted at F, and provided at its rear end with a capstan screw G. *a* designates one of the piano strings; *b* its tuning pin; *b'* the pin-plate; *c* the hammer-head; *d* the hammer shank; *e* the rest rail; *f* the butt pivoted at *g*; *h* the counter check; *i* the back-check; *j* the jack, pivoted at *k*; *l* the jack portion that engages the knock-out stop to release the

jack from the butt; and *m* the rail for supporting the stop. *n* is the wippen-part of the action pivoted at *o*; *p* the extension pivoted to the wippen; *q* the extension guide pivoted at *r*, and *s* the felted end of the extension which rests upon the capstan screw G, carried by the rear end of the manual key E.

The reference numeral 1 designates a magnet rail which supports the entire attachment. This rail is preferably of angle form, as shown and is supported in a novel manner, so that the entire attachment may be easily and quickly applied in position for use, and may also be either bodily removed, or bodily swung out of operative position, in order to gain unobstructed access to the tuning pins.

One means for supporting the attachment is shown in Figs. 1 and 10 and consists of a hinged plate 2, secured to the magnet rail by screws 3, said plate having a pair of upwardly extending ears 4, and a rearwardly extending portion 5, for a purpose to presently appear. The said hinge plate 2 is hinged by means of a pintle 6 to the forward extension 7, of a hinged block 8, the latter being provided with attaching lugs 9, through which fastening screws 10 pass, and by which the said block may be attached to any suitable part of the piano. In Fig. 1 the said block is shown attached to the pin plate directly above the tuning pins *b*; but obviously, the said block or its equivalent may be otherwise attached, as will hereinafter appear. Extending vertically through an opening in the hinged block and a threaded opening in the rearwardly extending portion 5 of the hinge plate, is a threaded screw 12, which serves to firmly connect the hinge members against movement, but at the same time permits the parts to be adjusted relatively to each other in the arc of a circle, to shift the position of the entire attachment. Spacing washers or plates 13, of varying thickness, may, if desired, be located between the under face of the hinge block and the upper face of the rearward extension 7, of the hinge plate, in order to maintain the attachment in the exact position desired when once adjusted. These spacing washers are necessary only when the attachment is required to be a trifle out of vertical position, which is sometimes the case. By this manner of mounting the attachment it will be apparent that the same may be swung bodily upward in the arc of a circle in order to permit free access to the tuning pins when desired.

Instead of the form of hinge block just described, I may employ the form shown in Fig. 11, which is adapted to be attached directly to the top of the wooden bolster 14, forming part of the piano frame. In this case the hinge block consists of a flat plate 15, having at its forward end downwardly extending ears 16, provided with openings

17 through which the hinge pintle passes, and also provided with an opening through which a screw corresponding to the screw 12, may pass. The rear end of the plate 15, is provided with a pair of elongated slots 18, through which attaching screws 19 may pass into the bolster 14, as shown. The slots permit the plate to be adjusted back and forth as desired to properly position the attachment, which latter is attached to the other member of the hinge consisting of the hinge plate 20, in all substantial respects like the hinge plate 2, except that it has a single upwardly extending ear 21, which fits between the ears 16 and connects with the hinge pintle, instead of having two ears as in the construction first described. This latter described form of hinge is especially adapted to some makes of pianos, while that first described is adapted to other makes.

Instead of the hinged arrangements described, I may in lieu thereof, employ a bodily removable construction, such as illustrated in Fig. 13. In this figure the reference numeral 22 designates a supporting bracket having screw holes 23, by which it may be attached to the pin plate or other part of the piano. This bracket has a forwardly extending lug 24, provided with a downwardly extending boss 25, having a vertical opening 26, therethrough whose lower end is threaded and in which threaded end is a screw 27 for a purpose presently to appear. With this form of bracket there is employed another bracket attached to the magnet rail 1, and consisting of a plate 28, carrying a downwardly extending pin 29, adapted to fit in the vertical opening 26, formed in the boss 25. The screw 27 determines to what depth the pin 29 may go, and therefore serves as a vertical adjustment. This screw is set once for all and insures the action returning to its proper place when temporarily removed. In order to firmly connect the bracket members when in position, I provide a screw 30, which is tapped in a threaded opening in the side of the boss 25, said screw serving to impinge the pin 29.

In the foregoing description of the supporting members for the attachment, I have in each case described only a single pair of such members, but it will be apparent that in practice I will employ at least two pairs of such members for each attachment.

Having described the supporting means for the attachment, I will now proceed to describe the attachment itself and the novel manner of connecting each actuating element with its associated hammer action.

Secured to the underside of the magnet rail 1, at opposite ends thereof, are two brackets 31, each bracket having an integral outstanding split sleeve 32, whose opening

33 is adapted to receive a ball-cup 34. The said ball-cup 34, is held clamped in the split sleeve 32 by means of a screw (not shown) passing through an aperture 35, in the lug 36, as clearly shown in Fig. 10. By this construction it will be apparent that the ball cup may be removed and replaced at will without removing any of the parts of the attachment. A rotary shaft or drum 36^a is journaled at its opposite ends in the said ball cups, said shaft being driven at a rapid and constant speed by any suitable motor, (not shown). Each bracket 31 is further provided with a forwardly and downwardly extending arm 37, to the outer end of which is extensibly connected a plate 38, having an apertured ear 39, for a purpose presently to appear. The plate 38 is provided with an elongated slot 40, through which attaching screws 41 extend into the bracket arm 37.

Supported on the substantially horizontal member of the magnet rail 1, is a plurality of electro-magnets 42, one for each of the keys of the piano, said electro-magnets being in circuit with a suitable source of E. M. F. and with the members of the scale readers or contact fingers (not shown), between which the perforated music sheet passes. The armature 43 of each electro-magnet is carried by a blade spring 44, the rear end of which spring is connected by means of a plate 45 and screws 46 to the upper edge of the vertical member of the magnet rail 1. Attached at one end to each armature 43, is a metal strip 47 having its forward end raised above the face of the armature and provided with two downwardly extending ears 48, which I may, for convenience, term a saddle; and pivotally connected between said ears by means of a pivot pin 49, is an actuating element, shown in the present instance as consisting of a friction shoe 50, whose curved face 51 is normally located above and out of contact with the shaft or roll 36^a. Arranged above the magnet rail 1, is an angle bar 52, attached by means of brackets 53 to the said magnet rail 1. The angle bar 52 carries a plurality of yieldable supports and adjustable stops for the armatures, one of each for each armature, the former of these elements in the present instance, consisting of a screw 54 having a spring connection 55, with the outer end of the armature and the adjustable element consisting of a screw 56 having a felt covered head 57 at its lower end. The screws 54 and 56 are each held in locked position by means of lock nuts, as shown. The spring 55 normally supports the armature and the shoe in elevated position, but permits these elements to be lowered slightly when the magnets are energized. The felt covered head 57 limits the upward movement of the armature. It will be noted from the drawing that the elements above

referred to are made adjustable, so that all parts may be delicately and accurately adjusted.

An adjustable stop rail is provided for the friction shoes, said rail consisting of an angle bar 58 located below the magnet rail, said stop rail being attached at its opposite ends to blocks 59, that are suitably connected to the brackets 31. The angle bar 58 supports a felt strip 60 against which the shoes normally rest, this construction being provided to prevent noise.

It will be noted that the entire actuating mechanism or attachment is located in the upper part of the piano case, above the piano hammers, where such parts as need adjustment from time to time may be gotten at readily by simply removing the front board of the piano case. This I consider one of the important features of the present invention, since the construction and arrangement overcomes one of the serious difficulties present in those attachments that are located below the keyboard.

The connecting means between the actuating mechanism (in the present instance, the friction shoes), and the piano hammers, consists of a flexible pull tape or cord 61, which is connected at its opposite ends respectively, to the shoe and to a part of the hammer action. One manner of connecting the tape to the shoes consists of a plate 62 held by means of a screw 63 to the upper inclined face 64 of the shoe 50, said plate 62 being provided with an elongated slot 65, through which the tape or cord 61 is caused to pass, the tape being threaded through the slot 65 and the free end being brought under the plate so that when the screw 63 is screwed firmly home, a biting action on the cord or tape against the inclined face of the shoe will take place, thus firmly securing the said cord or tape in position and against slipping. As this entire apparatus is essentially an attachment to a piano, and as the prime purpose of the invention is to provide the several parts so that they may be easily attached and detached without in any manner altering the construction of the piano, I have carried this idea forward in the manner of attaching the pull tapes or cords 61 to a part of the hammer action. One manner of attaching the same consists of a substantially U-shaped clip 66, adapted to be attached to the wippen-part *n* of the action, as shown, one arm of said clip being provided with a spur 67 adapted to take into the under face of the wippen and the other arm being provided with a screw 68 to take into the upper face of the wippen thereby to firmly attach the clip in position. As all standard piano actions have in their construction a wippen, it will be apparent that a clip of the type referred to will enable the attachment to be applied to instruments now on the market

without altering their construction. Each clip is further provided with a headed element consisting in the present instance of a screw 69, and each pull tape or cord 61 is preferably provided at its lower end with a plate 70 having a keyhole slot 71, and an elongated slot 72, through which latter the pull tape or cord passes. It will be apparent that the pull tape or cord may be readily attached to the clip by simply passing the keyhole slot 70 over the headed element or screw 69. This construction is of especial advantage when used in connection with the hinged supporting brackets first above referred to, for when it is desired to swing the entire attachment out of operative position, as for instance when tuning the piano, it is only necessary to detach the plates 70 from their connection with the clips, which is a simple operation.

In order to prevent the pull tapes or cords 61 from in any manner interfering with the hammer action, I have provided a bar 73, said bar being attached to the ears 39 carried by the extensible plates 38, heretofore referred to. In view of the fact that these plates are extensibly connected, it will be apparent that the bar 73 may be readily moved inward or outward as occasion may require, in order to prevent the tapes or cords from in any manner interfering with any part of the hammer action.

I do not wish to be understood as limiting myself to the precise manner herein shown and described of attaching the flexible tapes or cords to the hammer action, except as I may be limited by the appended claims for it will be obvious that they may be otherwise attached without departing from the spirit of the present invention, which resides broadly in a flexible connection between an actuating element and a part of the hammer action.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A piano having a playing attachment comprising electrically-controlled actuating means located in the upper part of the piano case for actuating the hammer action, a clip detachably connected to a part of the action, and a flexible connection between said clip and the actuating means.

2. A piano having a playing attachment, comprising electro-mechanical actuation means located in the upper part of the piano case for actuating the hammer action, a clip attached to a part of the action, and a flexible tape or cord connection between said clip and said actuating means.

3. In a piano, the combination of the hammer action having a headed element attached to a part thereof, an actuating element located in the upper part of the piano case above the hammer heads, and a flexible

tape or cord connected at its upper end to said actuating element and provided at its lower end with a plate having a keyhole slot adapted to be detachably connected to said headed element.

4. A piano having a playing attachment, comprising electrically-controlled shoe-and-roller actuating mechanism located in the upper part of the piano case above the hammer heads, and a flexible connection between said shoe and a part of the hammer action for actuating the latter.

5. A piano having a playing attachment, comprising electrically controlled shoe-and-roller actuating mechanism located in the upper part of the piano case proper above the hammer heads, and a flexible cord or tape attached at one end to said shoe and having a detachable connection at its opposite end to a part of the hammer action.

6. A piano having a playing attachment, comprising an actuating element located above the action, a flexible connection between the actuating element and a part of the hammer action, and means for maintaining the intermediate part of said flexible connection out of contact with the hammer action.

7. A piano having a playing attachment, comprising an actuating element located above the action, a pull tape connected at its opposite ends respectively to said actuating element and to a part of the hammer action, and means for holding the intermediate part of said pull tape free of the action.

8. A piano having a playing attachment, comprising an actuating element located above the piano action, a flexible tape or cord connected at its opposite ends respectively to said actuating element and a part of the action, and an adjustable rail for flexing the tape or cord intermediate its ends to maintain the same out of contact with the action.

9. In a piano the combination with the hammer action including a wippen, of an actuator therefor, comprising in part a pull tape or cord, a U-shaped clip having a detachable connection with the wippen and provided with a headed stud, and a detachable connection between the pull tape or cord and the said stud.

10. A piano having a playing attachment comprising a plurality of electrically controlled hammer-actuating elements, a supporting member therefor, and means for movably attaching said member in position for use within the piano-case above the hammer heads.

11. A piano having a playing attachment comprising a plurality of electrically controlled hammer actuating elements, a supporting member therefor, attachable brackets for supporting said member wholly

within the piano case above the hammers, and means for movably connecting said member to said brackets.

12. A piano having a playing attachment comprising a plurality of hammer-actuating elements located wholly within the piano-case above the hammer heads, a supporting member therefor, brackets carried by said member, attachable brackets having means for attachment to a piano, and a pivotal connection between the said brackets on the supporting members and the attachable brackets.

13. A piano having a playing attachment located wholly within the upper part of the piano case opposite the string-plate and above the hammer heads and comprising a plurality of electrically controlled hammer actuating elements, a supporting member therefor, brackets carried by said member, attachable brackets having means for attachment to a piano, and a hinge connection between the said brackets on the supporting member and the attachable brackets.

14. A piano having a playing attachment located within the piano case above the hammers and comprising a supporting member, shoe-and-roller actuating mechanism carried by said member, a flexible pull-device carried by each shoe and having means at its free end for attachment to a part of the hammer action, and means for attaching said supporting member to the piano.

15. A piano having a playing attachment comprising a plurality of hammer-actuating elements located wholly within the piano case above the hammers and opposite the string-plate, a supporting member therefor, and means for attaching said supporting member in position for use and for permitting the attachment to be moved into and out of operative position.

16. In a piano playing attachment, a plurality of actuating elements, a supporting member therefor, hinge elements for attaching the supporting member in position for use, and means for adjusting said hinge members relatively to each other to vary the position of the attachment.

17. A piano having a playing attachment comprising a plurality of actuating elements located wholly within the piano case above the hammers, a supporting member therefor, bracket elements for attaching the supporting member in position for use, and means for adjusting said bracket elements relatively to each other to vary the position of the attachment relative to the hammer action.

18. A piano having a playing attachment comprising a plurality of electrically controlled hammer-actuating elements located in the upper part of the piano-case opposite the string-plate and above the hammer

heads, a common support for said elements, and a flexible connection between each individual element and hammer action.

19. A piano having a playing attachment comprising a plurality of electrically controlled hammer actuating elements located in the upper part of the piano case opposite the string-plate and above the hammer heads, a supporting rail common to all said elements, a flexible connection between each individual element and hammer action, and means for movably attaching the support to the interior of the piano whereby the whole attachment may be moved outward away from the tuning pins to permit access thereto.

20. A piano having a playing attachment comprising a plurality of electrically controlled hammer actuating elements located in the upper part of the piano case opposite the string-plate and above the hammer heads, a flexible connecting member between each individual element and hammer action, and means whereby each flexible member may be adjusted at one end and maintained in adjusted position.

21. A piano having attachable playing mechanism located in the upper part of the piano case above the hammer heads, said mechanism comprising a rotary shaft and a plurality of electromagnetically controlled

friction shoes, and a flexible connection between each shoe and piano hammer action.

22. A piano having a playing attachment located in the upper part of the piano case above the hammer heads, said attachment comprising a supporting member, a rotary shaft journaled therein, a plurality of electromagnetically controlled friction shoes, a flexible connection between each shoe and piano hammer action, and means connecting the supporting member to the piano whereby the attachment may be moved outward away from the tuning pins to permit access thereto.

23. A piano having a playing attachment located in the upper part of the piano case above the hammer heads, said attachment comprising a rotary shaft, a plurality of friction shoes coöperating therewith, a plurality of electro-magnets each having its armature connected to one of the friction shoes, and a flexible connection between each shoe and individual hammer action.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

IRVING B. SMITH.

Witnesses:

F. W. ECKELMEYER,
HARRY R. CROCKFORD.