G. H. DAVIS.

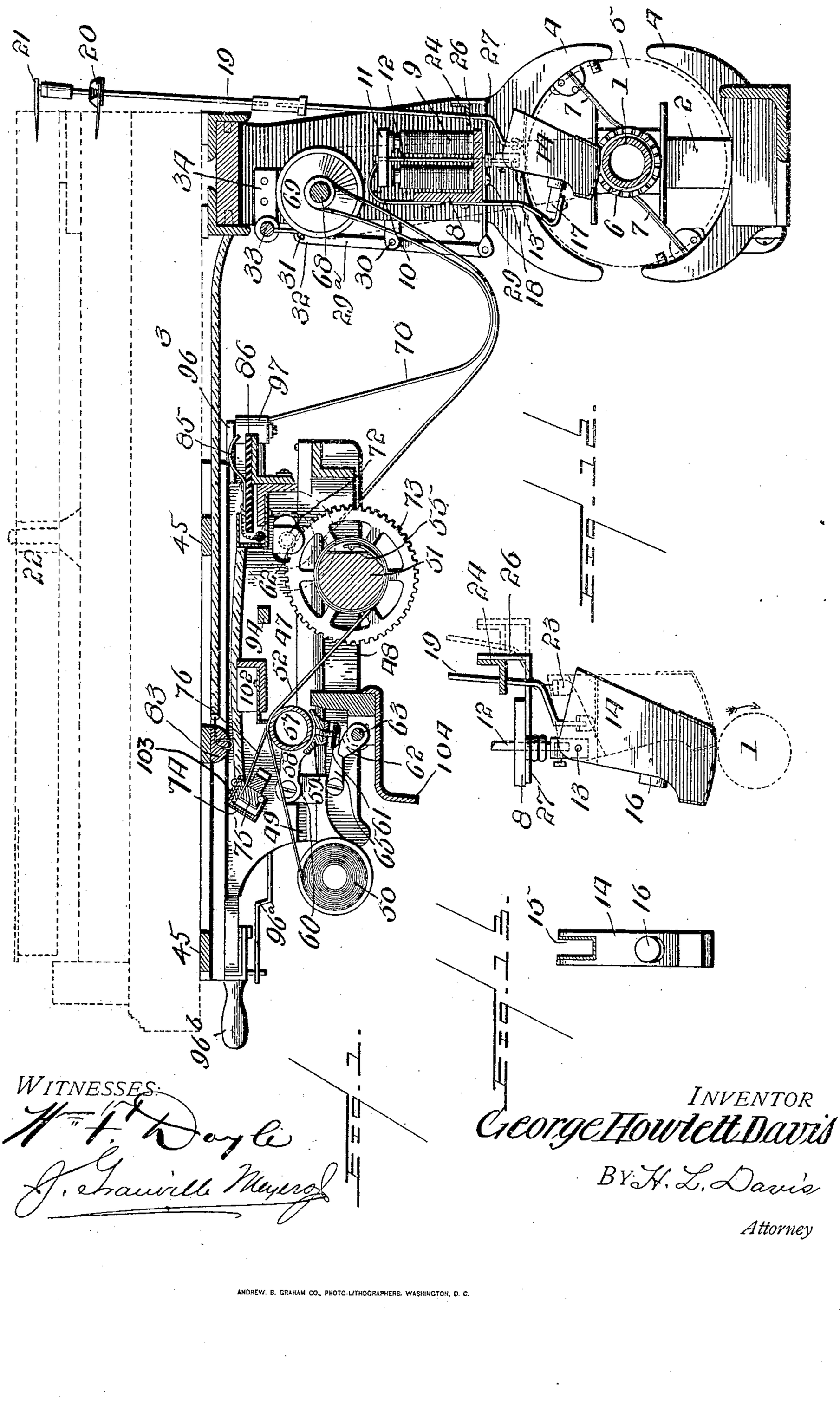
ELECTRICAL MUSICAL INSTRUMENT.

APPLICATION FILED JUNE 3, 1903.

931,281.

Patented Aug. 17, 1909.

6 SHEETS—SHEET 1.



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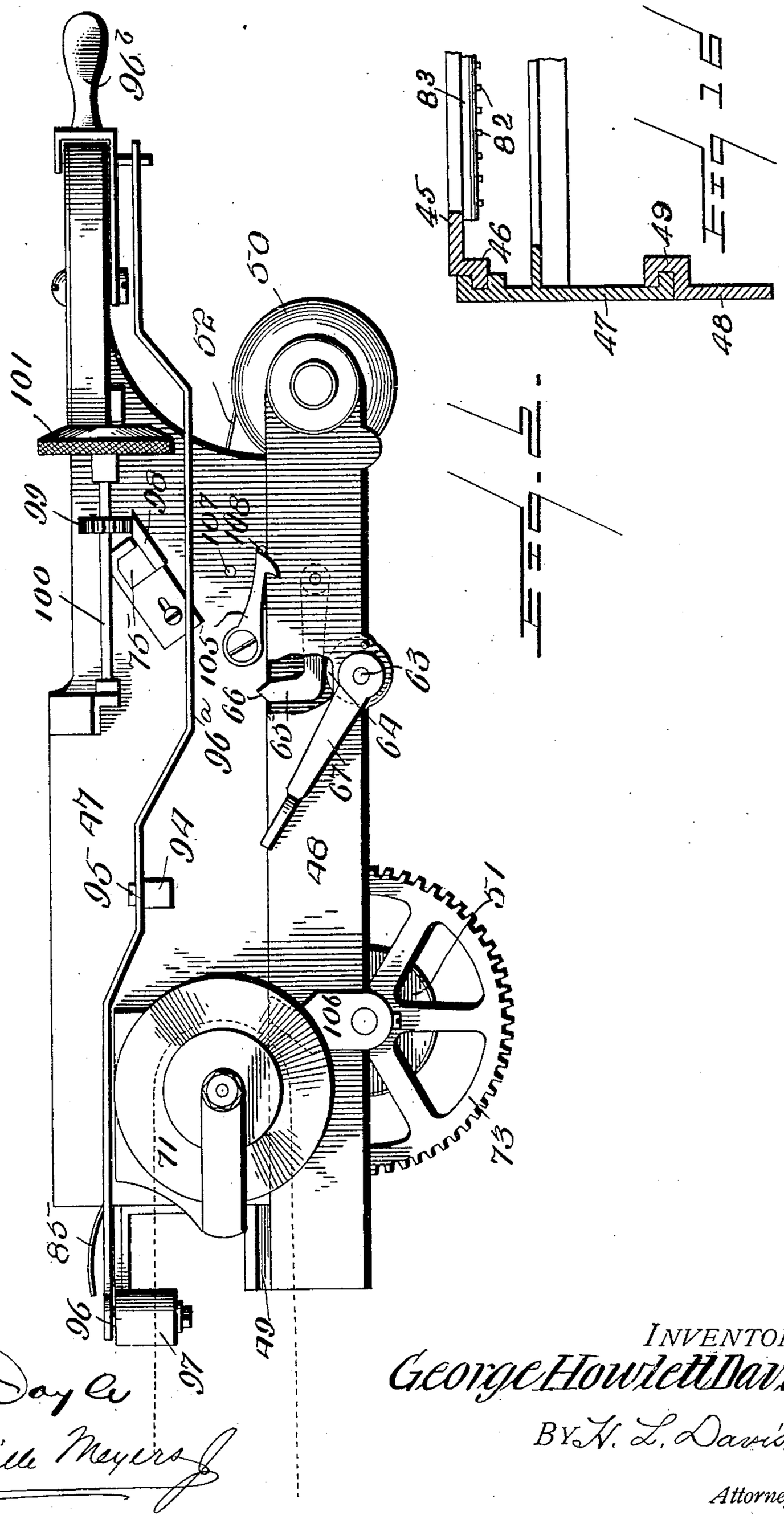

FIG. 2.

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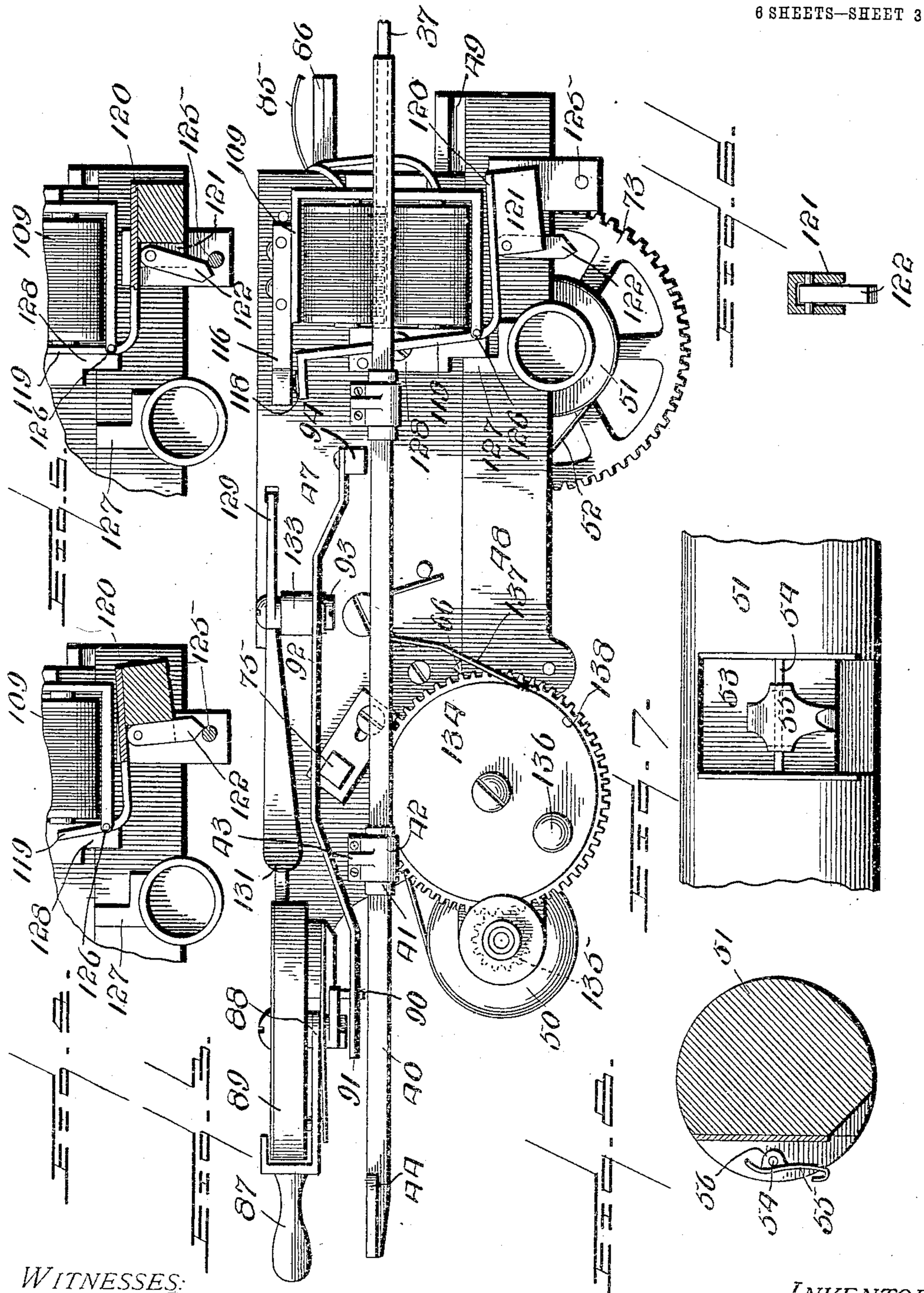

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6 SHEETS—SHEET 4.

Fig. 9.

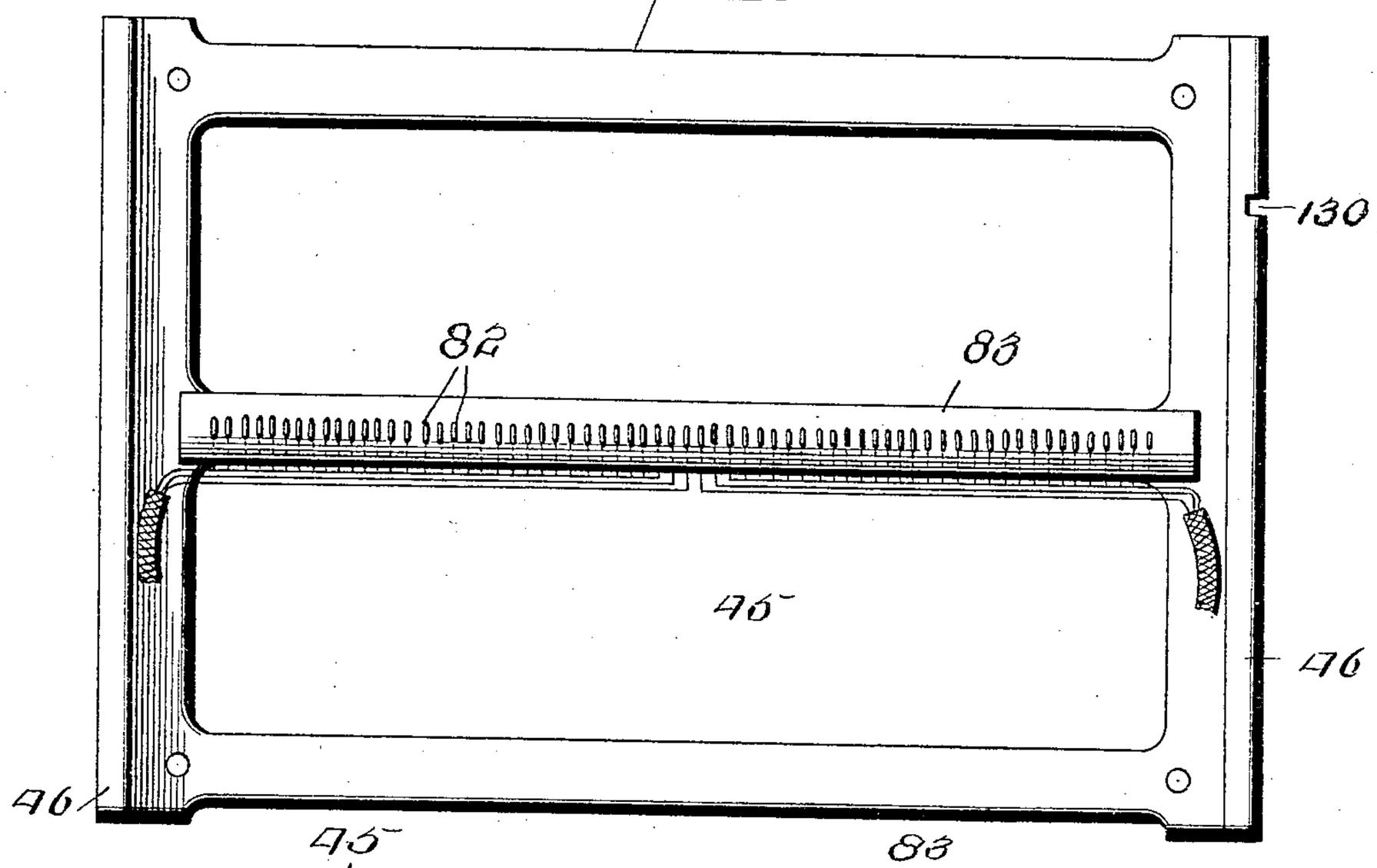


Fig. 10.

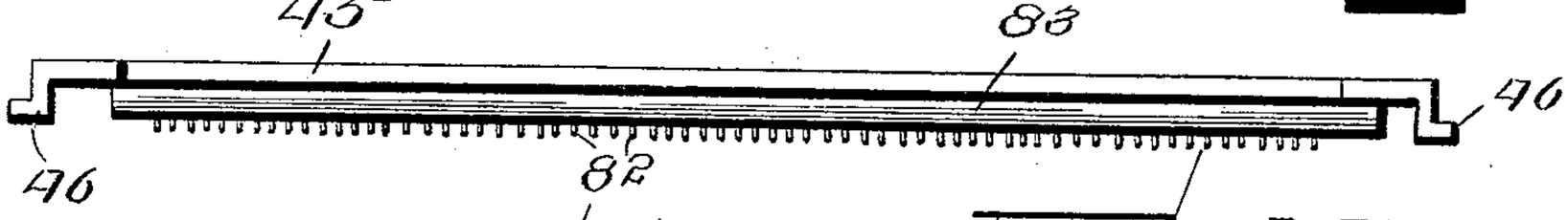
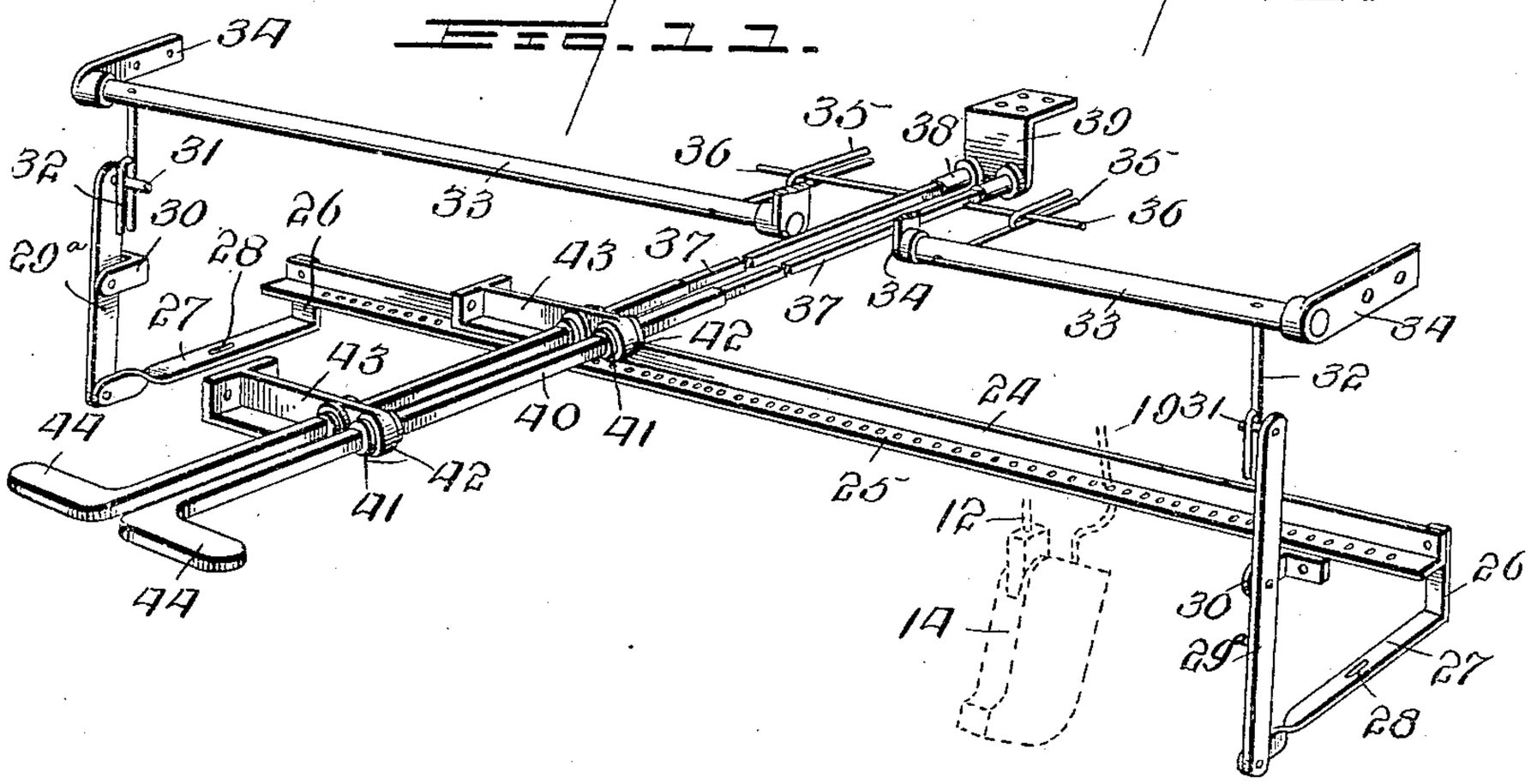


Fig. 11.



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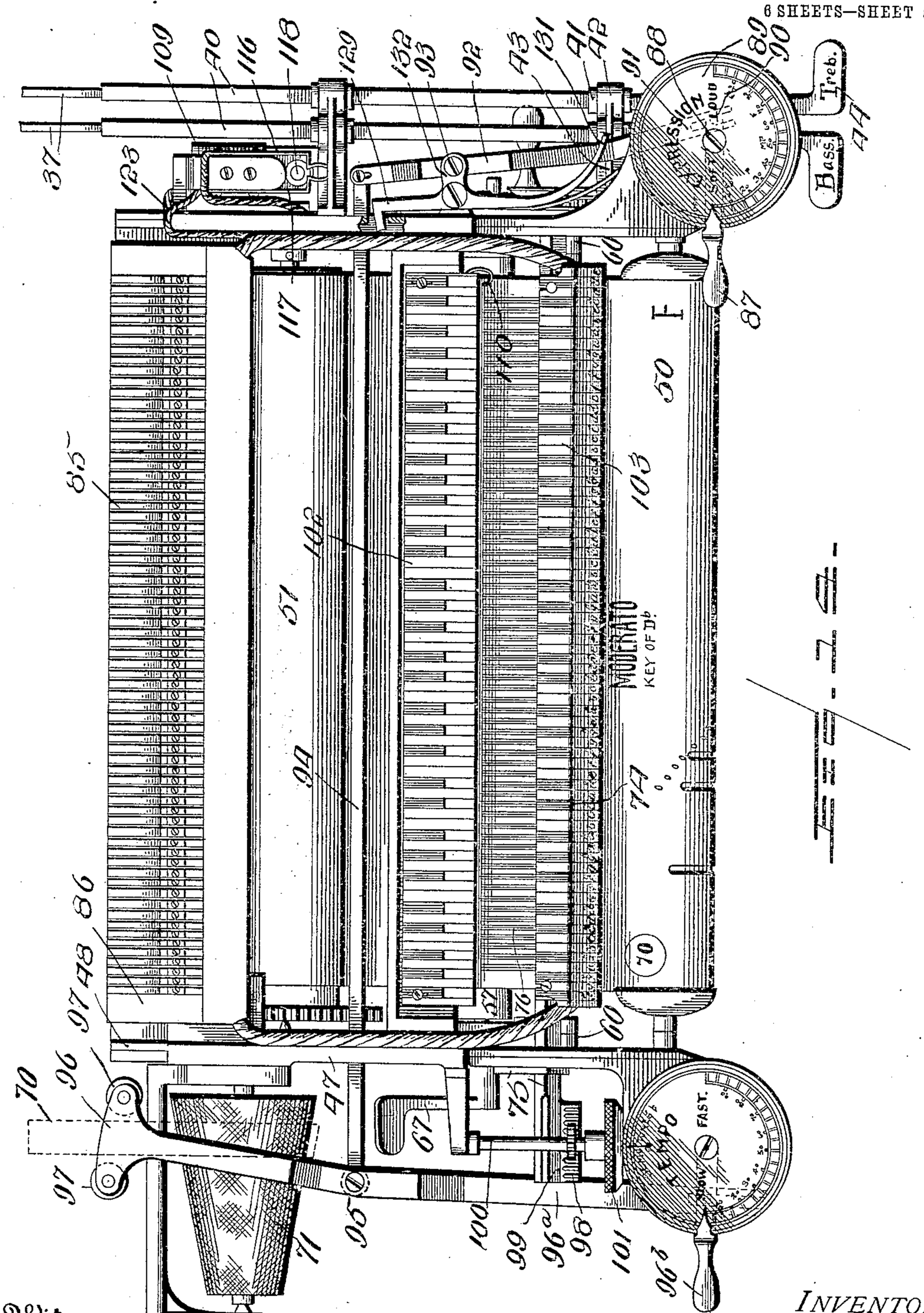
6 SHEETS—SHEET 5.



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ELECTRICAL MUSICAL INSTRUMENT

APPLICATION FILED JUNE 3, 1903.

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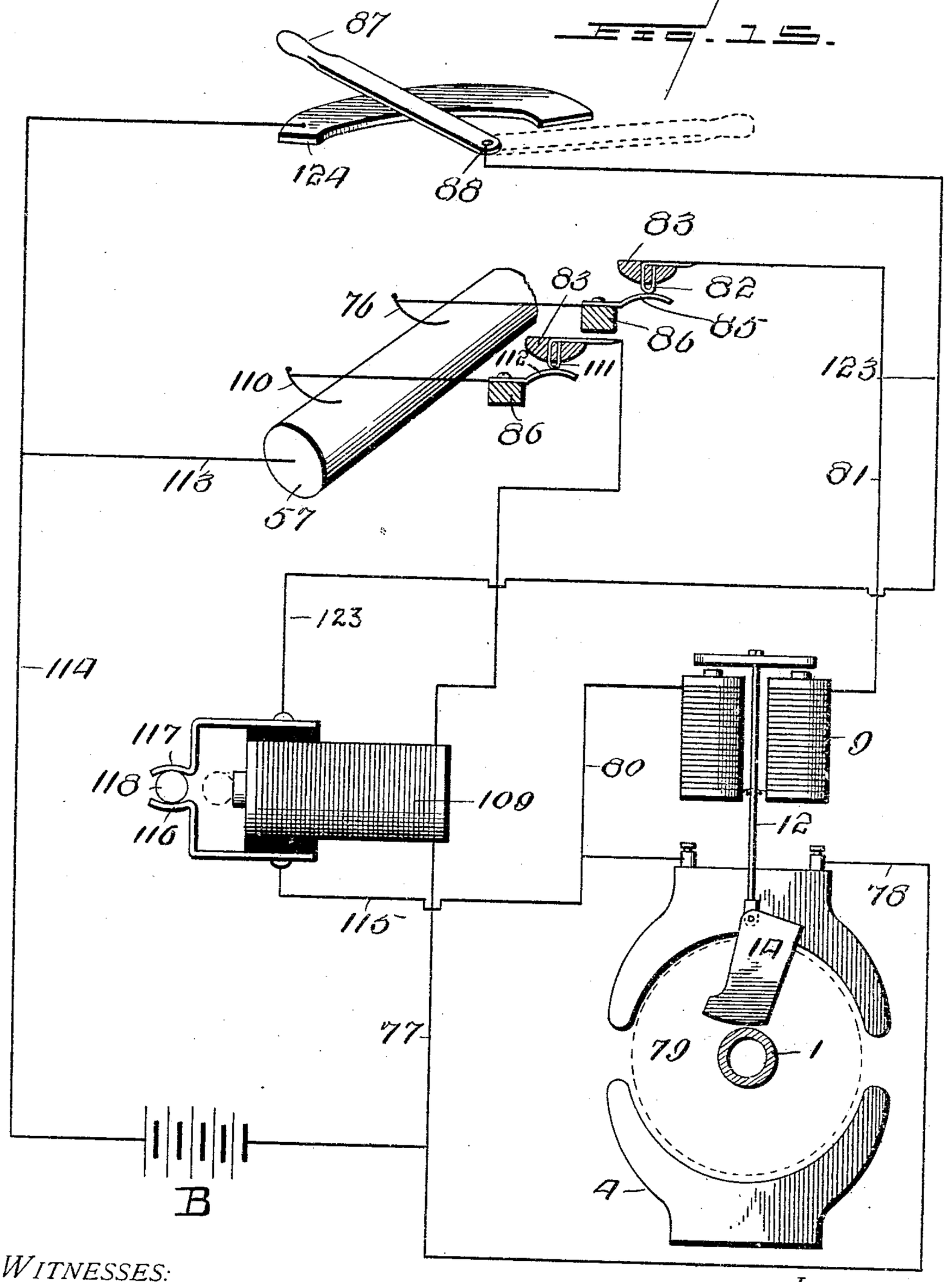
6 SHEETS—SHEET 6

Fig. 15.



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UNITED STATES PATENT OFFICE.

GEORGE HOWLETT DAVIS, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY.

ELECTRICAL MUSICAL INSTRUMENT.

No. 931,281. Specification of Letters Patent. Patented Aug. 17, 1909.

Application filed June 3, 1903. Serial No. 159,926.

To all whom it may concern:

Be it known that I, GEORGE HOWLETT DAVIS, a citizen of the United States, residing at Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Electrical Musical Instruments, of which the following is a specification.

This invention relates to self-playing piano attachments and music roll holders therefor, and more especially to electrically operated self-playing attachments, though it will be obvious from the description hereinafter following that many of the more important features of the present invention may be employed in other than electrically operated attachments.

The invention is herein shown as being embodied in that type of self-playing attachments wherein the music roll holder comprises two movable members adapted to slide one upon the other and so constructed and arranged that when the holder is not in use it may be slid in under the keyboard of the piano where it is concealed and is out of the way, but when in use is drawn out from under the keyboard in order that the music sheet will be plainly exposed to view in order to enable the operator to see and watch the expression marks delineated on the music sheet and thereby permit him to manipulate the expression and tempo controlling devices at the proper moments to impart to the music being played the proper time and pianissimo and forte effects; and, also, wherein the member carrying the delivery and take-up roll may be still farther drawn out to remove and put in place a music sheet.

The present invention has for its object to provide a novel transposing device by means of which the note selecting devices may be instantly and simultaneously shifted so as to cause the music to be played in any key desired; also to provide a fixed chart representing the keyboard of the piano to enable the performer to determine at any moment the particular note or notes being played and to aid in readily determining the transposition to be made.

It has for another object to provide improved means for automatically breaking all the key selecting circuits when the lower member of the sliding music roll holder is drawn out to remove and replace a music sheet, and to automatically close said circuits when the said member is pushed back into operative position.

It has for still another object to provide novel means for locking the two members of the roll holder together in such manner that when they are unlocked to draw out the lower member from beneath the upper member for the purpose of removing or replacing a sheet of music, the contact roller will be automatically thrown out of contact with the selector or contact fingers, and when said lower member is moved back into place and the two members locked together the contact roller will be automatically thrown into contact with said fingers.

Finally it has certain other objects in view which will be rendered apparent in the description hereinafter following.

To these several ends my invention consists in the features, and in the construction, combination and arrangement of parts hereinafter described and particularly pointed out in the claims following the description, reference being had to the accompanying drawings forming a part of this specification, wherein:—

Figure 1 is a sectional elevation of my improved self-playing attachment, the music roll holder being shown in inoperative position. Fig. 2 is a view in side elevation of the music roll holder, the parts being shown in operative or playing position. Fig. 3 is a similar view of the roll holder viewed from the opposite side. Figs. 4, 5, and 6 are detail views of the tripping mechanism employed for breaking and restoring the key selector circuits when the lower member of the holder is moved in and out in changing a music sheet, the parts illustrated in Figs. 4 and 5 being shown in two different positions. Figs. 7 and 8 are respectively views in elevation and section of the take-up roller, showing the pivoted hook for attaching the end of the music sheet to said roller. Fig. 9 is a bottom plan view of the frame for supporting the two slidable members of the music roll holder in place. Fig. 10 is a front end view of the same. Fig. 11 is a detail perspective view of the mechanism for shifting the key actuating rods toward and from the fulcrums or pivots of the shoes to vary the force of the blow upon the keys. Fig. 12 is a detail view illustrating one of the shoes and one of the key actuating rods in two different positions. Fig. 13 is an edge view of one of the shoes. Fig. 14 is a top

plan view of the music roll holder, illustrating the transposition scale and the fixed chart representing the keyboard of the piano. Fig. 15 is a diagrammatic view illustrating the electric circuits. Fig. 16 is a transverse sectional view taken through one side of the two part music roll holder.

Referring to Fig. 1 of the drawings the numeral 1 indicates a shaft journaled at its opposite ends in two hangers 2 pendent from the rear underside of the key-board 3 of the piano, and constituting a drum. Supported on one of said hangers are the field magnets 4 of the motor, the armature 5 and commutator 6 being fixed on one end of the shaft or drum 1.

The numeral 7 indicates the commutator brushes. Supported between the hangers is an angle bracket 8 on which is fixed electro-magnets 9, one for each key of the piano. Fixed to the angle bracket is a plurality of springs 10, one for each magnet, each of which supports an armature 11 and a pendent rod 12, and to the lower ends of said rods are pivoted, as at 13, shoes 14, the arrangement being such that when the magnets are demagnetized and the armatures therefore in their raised positions, the lower curved ends of the shoes will be held suspended out of engagement with the drum 1. The upper ends of the shoes are bifurcated, as at 15, see Fig. 13, and on the forward edge of each shoe is fixed a pad or cushion 16, which, when the shoe drops back into place strikes against a stop-bar 17, supported on hangers 18 pendent from the angle-bracket 8. Said bar operates to arrest the movement of the shoes in resuming their normal positions and the pads or cushions serve to deaden and absorb the noise of the shoes striking said bar.

The numeral 19 indicates pusher-rods, one for each shoe and key, which are vertically movable in guides 20 fixed to the back of the keyboard 3, and arranged at their upper ends to strike the undersides of pins 21 on the rear ends of the piano keys 22 and thus depress the latter to sound corresponding notes. The lower ends of the rods 19 rest on the bottoms of the felt lined grooves 15 in the upper edges of the shoes 14, and are tipped with felt, rubber or similar material, as indicated at 23, to prevent noise. When any one of the magnets 9 is energized, its armature 11 is attracted, thereby forcing the corresponding shoe down into contact with the drum 1, which latter is constantly rotated by the motor in the direction of the arrow shown in Fig. 12. The rotation of the drum throws the shoe into the position shown by dotted lines in Fig. 12, thereby thrusting upward the rod 19 and depressing the corresponding piano key 22 and sounding a corresponding note. When the magnet is demagnetized the spring 10 raises the armature 11 and lifts the shoe out of engagement with the drum 1, whereupon the shoe will drop by gravity back against the rail 17.

It will be obvious that the pianissimo or forte effect of the note sounded will depend upon the degree of force with which the piano key is depressed, and it will be also evident that the greater the distance between the tips 23 of the rods 19 and the pivotal points 13 of the shoes, the greater will be the depression of the keys and consequently the louder the notes sounded, and vice versa. In order, therefore, to control and vary the pianissimo and forte effects, I provide the following mechanism, reference being had to Figs. 1, 11 and 12 of the drawings.

The numeral 24 indicates an angle-bar the horizontal portion of which is provided with perforations 25, one for each pusher-rod 19, through which the pusher-rods loosely pass. Said angle-bar is affixed at its opposite ends to the upturned ends 26 of two arms 27, which are slotted as at 28, and are movably supported on pins 29, which pass loosely through said slots into the underside of the angle bar 8. Pivotally attached to the ends of the arms 27 are the lower ends of levers 29ª, which are fulcrumed intermediate their ends on lugs 30, fixed to the hangers 2. Fixed in the upper ends of the levers 29 are laterally projecting pins 31, which are adapted to be engaged by forked pins 32 fixed in and projecting at right angles from the outer ends of two rock-shafts 33, journaled in bracket-arms 34 secured to the frame supporting the drum and motor. Fixed in the inner ends of said rock-shafts are forked pins 35 which project therefrom at right angles to the pins 32, and are adapted to be engaged by pins 36. The pins 36 are fixed in the rear ends of rods 37, which are journaled at said ends in bearings 38, formed in a bracket 39 attached to the upper part of the frame supporting the drum and motor, and the forward portions of said rods are telescoped in the hollow rear ends of two corresponding rods 40. The rods 40 have fitted on them cylindrical bushings 41, which are rotatably mounted in bearings 42 formed in fixed bracket arms 43. The forward ends of the rods 40 are provided with handles or thumb-pieces 44 by means of which they may be turned or partially rotated. The operation of this part of the invention is as follows. Let it be assumed that the parts are in the position shown in Fig. 11, in which position the tips 23 of the pusher rods will be nearest the pivotal points of the shoes and hence the keys will be struck with a pianissimo effect. By depressing one or the other of the handles 44 the rods 40 and 37 will be partially rotated causing one of the pins 36 to rock the corresponding shaft 33 through the medium of the forked pin 35, and said

shaft and the forked pin 33 in turn will rock the lever 29ª on its fulcrum and through the medium of the corresponding arm 27 will move one end of the angle bracket 24 rearwardly, thus moving the tips 23 of the pusher rods farther away from the pivotal points of the shoes, thereby increasing the throw of said rods and the depression of the piano keys and consequently augmenting the sound of the notes played. It will be noted that the angle bracket 24 is not moved bodily back and forth, but that it is only moved from one end or the other at a time. For example, let it be assumed that the handle 44 on the left is depressed, then the left end only of the angle bracket will be moved rearwardly, the right end remaining fixed. It will be apparent, then, that the bass notes will be sounded the loudest and that from the lowest bass note up to the highest treble note the forte effect will gradually grow less and less. It will be obvious that the converse of this is also true. It will also be apparent that by raising or lowering the handles 44 to a greater or less extent any degree of pianissimo or forte effect desired can be obtained. By telescoping the rods 37 and 40 in the manner shown and described provision is made for permitting the two members of the roll holder to be moved in and out, as will more fully hereinafter appear.

I will now proceed to describe the music roll holder, referring more particularly to Figs. 1, 2, 3, 9, and 10 of the drawings.

The numeral 45 indicates a rectangular skeleton frame fixed to the underside of the keyboard 3, and provided on its opposite side edges with pendent horizontal flanges 46, which form ways for the upper member 47 of the roll holder to travel on. Said upper member comprises a rectangular frame provided at its upper edges with inwardly projecting flanges which overhang and rest on the flanges 46 of the fixed frame 45 and are adapted to freely slide thereon. The sides of the upper member 47 of the roll holder are provided on their inner faces near their lower edges with inwardly extending ribs or cleats which project into grooves 49 (see Figs. 3 and 16) formed on the outer faces, and near the upper edges, of the sides of the lower frame 48 of the roll holder. It will thus be seen that both members of the roll holder may be freely moved in and out together, traveling on the fixed frame 45, while the lower member 48, also, may be moved in and out independently of the upper member 47.

Removably journaled in the outer ends of the sides of the lower member 48 of the roll holder is a roll carrying a perforated sheet music 50, termed by me for the sake of description a "delivery roll", and journaled in the inner ends of said sides of the holder is a take-up roller 51, to which the free end of the music sheet 52 is adapted to be secured. For this purpose I prefer to form a recess or mortise 53 centrally in the periphery of the take-up roller (see Figs. 7 and 8) and fix therein a transverse pin or rod 54, on which is pivotally mounted or suspended a hook 55, consisting of a piece of sheet metal bent back at one end to form a hook and provided on its opposite side edges with perforated ears or lugs 56 which are loosely fitted on the rod or pin 54. The free end of the music sheet, as usual, is perforated or provided with a ring which is adapted to be slipped over the hooked end of the hook 55 to secure the music sheet to the take-up roller.

Arranged intermediate the delivery and take-up rollers is the metallic contact roller 57, which is journaled at its opposite ends in a swinging cradle comprising two side arms 58 (see Fig. 1) united at their free ends by a preferably integral cross-brace 59. The other ends of the two side arms 58 are pivoted to upright lugs 60 formed on the sides of the lower member 48 of the roll holder. Screwed in the lower side of the cross-brace 59 of the cradle is an adjusting screw 61, the head of which rests on a cam 62, fixed on a rock shaft 63 journaled at its opposite ends in the sides of the lower member 48 of the roll holder. Also fixed on said shaft is a second cam 64 on which rests the hooked end of a latch 65, which is pivoted at its other end to one side of the lower member 48. The hooked end of the latch, when the two members 47 and 48 are in normal position, engages a notch 66 formed in the lower edge of one side of the upper member 47, and is held in such engagement by the cam 64. On one end of the rock shaft 63 is fixed a crank or handle 67 for turning the shaft and cams. The relative arrangement of the two cams 62 and 64 on the shaft 63 is such that when the shaft is turned by the handle 67 to cause the cam 64 to lower the hooked end of the latch out of engagement with the notch 66, to permit the lower member 48 of the holder to be slid out from beneath the upper member 47, the cam 62 will lower the cradle carrying the contact roller, and hence the lower member cannot be drawn out without first lowering the contact roller, and, on the other hand, when the two members are locked together the contact roller will be raised up into operative position. The purpose of such construction and arrangement will be hereinafter explained.

As shown, the music sheet 52, in its passage from the delivery roll to the take-up roller passes over and in contact with the contact roller 57, and said music sheet is wound upon the take-up roller and caused to travel over the contact roller by means of the following mechanism. Journaled in the hangers 2, pendent from the frame is a shaft

68 on one end of which is fixed a cone pulley 69, which is connected by a belt 70 to a corresponding cone pulley 71, carried by the upper member of the music holder. On the axis of said last mentioned pulley is fixed a gear wheel 72 which meshes with a relatively large gear wheel 73 fixed on the shaft of the take-up roller 51. The shaft 68 is belted to the motor shaft and receives its motion therefrom, this being the usual arrangement in devices of this kind and is not therefore shown in detail. It will be readily seen that as the motor rotates to rotate the drum 1, it will also through the medium of the shaft 68 and the cone pulleys and gearing described, rotate the take up roller and unwind the music sheet from the delivery roller and wind it upon the take up roller, the music sheet in the meanwhile traveling over the contact roller 57.

Fixed transversely between the opposite sides of the upper member 47 of the music holder is a hollow frame 74, preferably rectangular in cross section, and having disposed therein an endwise movable bar 75, carrying a series of contact fingers 76, which are denominated by me for the sake of description "selector fingers." The free ends of these fingers rest upon the music sheet directly above the contact roller, and in practice are adapted to make contact with said roller through the perforations in the music sheet, there being one such selector finger for each key of the piano and an additional one for a purpose hereafter to be explained. As the take up roller draws the music sheet over the contact roller, said selector fingers are in their proper order brought into electrical contact with the contact roller by projecting through the perforations in the music sheet, and the electrical circuit may then be traced as follows, referring to Fig. 15, of the drawings; From the battery B the current passes wires 77 and 78 to the motor 79, and from the motor by wire 80 to the particular electro-magnet 9 that may have been selected, thence by wire 81 to its terminal 82, which is in the form of a loop carried by a bar 83, said bar being fixed to the fixed frame 45 hereinbefore referred to. The loops 82, when the device is in operative position are in electrical contact with spring fingers 85, and the latter are electrically connected with the selector fingers 76 hereinabove described. It will be readily apparent, therefore, that when any one of said selector fingers is permitted, by the traveling perforated music sheet, to come in contact with the contact roller 57, that an electric circuit will be completed from the battery through the motor, through one of the electro-magnets, thence through the selector finger to the contact roller and from the latter back to the battery. This will cause the magnet included in said circuit to attract its armature and throw the corresponding shoe into engagement with the drum and actuate the corresponding key of the piano. The selector fingers 76 are each electrically connected by a suitable wire to a spring contact finger 85, said fingers being all connected to a cross-bar 86 in Figs. 1 and 15 of the drawings. As shown said bar is attached to the upper member 47 of the roll holder, so that when the latter is pushed back beneath the key-board of the piano, all the key circuits will be broken, and when the roll holder is drawn out into operative position, the spring contacts 85 will be automatically placed in engagement with the terminals 82 and all the key circuits will thereby be automatically placed in position to be closed whenever their respective selector fingers engage the contact roller 57.

Arranged upon one side of the holder is a handle 87 pivoted near one end as at 88, to a graduated dial 89, the pivoted end of said lever being provided with a pin 90, which engages the forked end 91 of a lever 92, which is pivoted intermediate its ends as at 93 to the roll holder frame. To the other end of said lever is pivotally connected a link 94, which at its other end, as at 95 is pivoted to a belt shifter 96. The belt shifter 96 is provided at one end with two rollers 97, which engage the opposite sides of the belt 70, and as the handle 87 is turned in one direction or the other, said belt is shifted back and forth on the cone pulleys and thereby regulate the speed of travel of the music sheet. The said belt shifter may also be operated independently of the means just described. Extending forward from the shifter 96, is an arm 96^a having its front end forked like the end 91, of the lever 92, and in said forked end projects a pin carried by the tempo lever 96^b. By turning the said tempo lever in the proper direction the belt shifter may move over the face of the cone pulley 71, as desired in order to vary the speed of travel of the music sheet.

Fixed on the endwise movable bar 75 is a rack 98, which is engaged by a relatively small pinion 99, mounted on a rotatable shaft 100, which is fixed in bearings on the roll holder frame, and is provided with a knurled wheel 101, by means of which said shaft may be rotated and through the medium of the said rack and pinion may be caused to shift the bar 75 endwise. As has been before explained said bar carries the selector fingers, and it will be manifest to those skilled in the art as said bar is moved longitudinally the selector fingers will be moved to shift them so as to cause said fingers to select notes of different keys. That is to say, for example, it being assumed that the bar carrying said contact fingers is in the position to cause the fingers to register with the perforations in the music sheet that

will cause the keys of the piano to be struck in the key of D sharp, by moving said bar longitudinally all the selector fingers will be simultaneously shifted laterally so as to cause said fingers, as they project through the perforations in the music sheet to play an air as G. flat for example.

As an auxiliary to the transposing device I provide a chart 102, which graphically represents the key-board of the piano as shown most clearly in Fig. 14 of the drawings, this chart is affixed opposite to the chart 103 which is carried by the transposing bar and which latter has marked thereon characters indicating different scales. The key-board chart 102 is immovably fixed in place, while as has been before described the scale 103 is movable with the transposing bar, and it will, therefore, be readily understood by those familiar with reading music that the particular key in which the air is being played may be readily ascertained and also that the transposing bar may be shifted to adjust the device to any particular key desired, it being borne in mind that while the device is in action the roll holder is drawn from beneath the key board of the piano with the charts plainly exhibited to view.

When it becomes necessary to change the music sheet, the handle 67 is operated to rotate the shaft 63 and the turning of the shaft 63 unlocks the lower member 48 from the upper member 47 of the roll holder, thus enabling the lower member to be drawn from beneath the upper member of the holder, and at the latter part of said operation a pivoted hook 105 carried by the upper member 47 engages a stop 108 see Fig. 2 fastened to the lower member of the holder and prevents said lower member from being entirely withdrawn from the holder. The pivoted hook 105 is adapted to play between two pins 107 and 108 by means of which it is prevented from being accidentally thrown out of position.

It is very desirable in instruments of this class that the feed of the music sheet be automatically stopped at the end of each piece of music played, and to accomplish this end I provide an electric switch in the motor circuit that is automatically actuated to break the circuit, through the medium of the armature of an electromagnet, the circuit to said magnet being completed by an extra selector finger which is adapted to pass through an extra perforation made in the music sheet at the end thereof removed from the note perforations.

Referring to Figs. 3, 4, 5, 6, 14 and 15, the reference numeral 109, designates an electromagnet carried by the upper member of the music holder, said magnet being in the battery and motor circuits 77 and 78, as shown more clearly in Fig. 15. An extra selector finger 110, and extra terminals 111, and 112, carried by the bars 83 and 86, respectively, complete the circuit to the magnet 109, the said extra selector finger 110, being arranged to contact with the contact roller 57, whenever a single perforation at the end of the music sheet is encountered, the other part of the circuit passing through the contact roller 57, and wires 113, and 114 to battery B. Arranged adjacent to the magnet 109, and included in the motor circuit 115, is an electric circuit maker and breaker of an electric switch comprising in part a pair of spring contact blades 116 and 117, between which a circuit-making and-breaking pin 118, is arranged to operate, said pin being carried by the armature 119, of the magnet 109. The said armature 119, is provided with a rearward extension 120, the end of which is flanged at 121, Fig. 6, and between these flanges is pivoted a dog 122, the lower or free end of which is V-shaped as shown. The purpose of said dog will presently appear. From the contact blade 117, a wire 123, leads to the starting lever 87, said lever being arranged to make contact with a segment shaped plate 124, forming one terminal of the battery circuit 114. The plate 124, is carried by the underside of the dial 89, and is arranged so that when the lever 87, is shifted to the extreme left, the circuit will be broken, but when moved to the right, the circuit will be completed and remain complete throughout the entire range of movement of said lever in this direction.

When the circuit making and breaking pin 118, is in the position shown in Figs. 3 and 15, the circuit will be complete through the motor, and the music playing and sheet feeding mechanism will be in operation, but as soon as the magnet 109 is energized in the manner already described, the armature will be attracted and thus withdraw the said pin from between the contact blades 116, 117, and the motor circuit will then be automatically broken, stopping the motor and the sheet feeding mechanism.

In order to again bring the circuit making and breaking pin 118 in position to complete the circuit I provide the following means which is automatically operated by the inward movement of the lower member of the music holder, it being understood that said member is drawn well forward beyond the upper member whenever a new music roll is to be placed in position. On the rear end of the said lower member of the music holder, at the side thereof adjacent to the dog 122, is a laterally projecting pin 125. This pin projects in the path of the said dog and when the lower member of the music holder is drawn forward, the pin will ride under the dog as shown in Fig. 5, simply turning the same on its pivot. When however the said lower member is pushed back

again in position for playing, the said pin 125, will abut the front side of the dog, as shown in Fig. 4, and rock the armature on its pivot 126, thus throwing the circuit making and breaking pin 118, forward between the contact blades 116 and 117, in which position it will remain until the magnet 109 is again energized. By this arrangement it will be seen that I provide simple and effective means for automatically making and breaking the motor circuit so that the motor cannot be accidentally started while the music sheets are being placed in position.

The lower member of the music-holder is limited in its inward or backward movement by means of a stop 127, which abuts a similar stop 128 carried by the upper member, see Fig. 3. The upper member of the music holder is locked in position to bring the selector fingers and contact roller in alinement, by means of a spring operated latch 129, see Figs. 3, and 14, said latch engaging a notch 130, in one edge of the base frame 45, see Fig. 9. The latch 129, is operated by a handle 131, pivoted at 132, to a boss 133, carried by the said upper member.

The music sheet is rewound upon the delivery roll through the medium of a relatively large gear 134, meshing with a pinion 135, fixed to the shaft of said roll 50, (see Fig. 3) said gear 134, being provided with a suitable handle 136, by which it may be rotated. A spring 137, bears against a flange 138, on the gear 134, to prevent the same from racing or running too free.

While I have herein shown and described the various features of my invention as applied to an electrically operated musical instrument, I do not wish to be understood as limiting myself to this specific application of said features, as it will be obvious that the same may be applied to instruments operated otherwise than through electrical means. Likewise I do not wish to be understood as limiting myself to the specific details of construction herein shown and described as various changes may be made without departing from the spirit of the invention as expressed in the following claims.

I do not claim herein the mechanism shown and described for varying the action of the friction shoes to obtain variations in expression, as this mechanism forms the subject matter of another application filed by me on the 30th day of January, 1904, Serial No. 191,387.

What I claim is:—

1. In an electrically operated musical instrument, a note-selecting device comprising a longitudinally movable bar carrying a plurality of selector fingers and a contact member common to all said fingers and with which they are adapted to make contact, and means for moving said bar longitudinally relatively to said contact member.

2. In an electrically operated musical instrument, a note-selecting device comprising a longitudinally movable bar carrying a plurality of selector fingers and a member common to all said fingers with which the latter are adapted to make contact, a fixed chart bearing the representation of a key-board arranged parallel with and adjacent the free ends of said fingers, and means for shifting the position of said bar and fingers longitudinally relatively to the chart.

3. In music playing mechanism, a plurality of note-selecting devices, a laterally movable support upon which said devices are mounted, a chart bearing the representation of a key-board carried by said support, a second chart bearing the representation of a key-board arranged adjacent to the note-selecting devices, and means for moving the said note selecting devices and first named chart relatively to the second named chart.

4. In a self-playing musical instrument, the combination with the sound producing devices and means for actuating said devices, of a plurality of fixed electric terminals, a series of selector fingers for controlling the action of the sound producing mechanism, and a bodily movable frame carrying a plurality of terminals arranged to make contact with the said fixed terminals when the frame is in one position and to be out of contact with the same when the frame is in another position.

5. In a self-playing musical instrument, the combination with the sound-producing devices and means for actuating said devices, of a plurality of fixed electric terminals, conductors leading from said terminals to the actuating means, a slidable music roll holder, a plurality of selector fingers, and a plurality of electric terminals carried by said roll holder, the said terminals on the roll holder being arranged to be brought into contact with the fixed terminals when the holder is in operative position and to be out of contact with the fixed terminals when the holder is in inoperative position.

6. A self-playing musical instrument having a keyboard, electrically controlled means for actuating the sound-producing devices of the instrument, a plurality of fixed terminals carried by the under side of the keyboard, a slidable music-roll holder, a plurality of selector fingers and a plurality of electric terminals carried by the music holder to engage the fixed terminals, a contact device upon which the selector fingers may bear, spools for the music sheet carried by the music holder, and means for winding and re-winding the music sheet.

7. In combination with a piano, a plurality of fixed electric terminals carried by the underside of the piano-key-board, a music holder slidably connected to the key-

board, and adapted to be drawn out beyond the forward edge thereof and to be moved back under the keyboard, a plurality of selector fingers and a plurality of electric terminals carried by the said holder, the latter named terminals being arranged to make contact with the fixed terminals when the music holder is in its drawn-out position and to break contact therewith when the music holder is moved back under the keyboard.

8. A music roll holder comprising two members movable relatively to each other, a plurality of selector fingers carried by one member, a swinging contact device carried by the other member, a rock shaft journaled in said last named member, and a cam carried by said rock shaft and adapted to engage the contact device and move the same into contact with the selector fingers.

9. A music roll holder comprising two members movable relative to each other, a locking device carried by one of said members and adapted to engage the other member, a rock shaft also carried by one member, a movable contact device carried by the other member, separate cams on said rock shaft, one of which is adapted to actuate the locking device and the other the contact device, and a plurality of selector fingers arranged to coöperate with said contact device.

10. A music roll holder comprising two members movable relatively to each other, a locking device carried by one member and adapted to engage the other member, a swinging contact device, a rock shaft, and cams carried by said rock shaft adapted to simultaneously actuate both the locking device and the contact device.

11. In automatic music playing mechanism, the combination with an electric circuit, of a drawer-like music-roll-holder comprising two slidable members, one of which is slidable upon the other, a circuit-maker and breaker for said circuit carried by one member and means carried by the other member for actuating said circuit-maker and breaker to complete the circuit.

12. In automatic music playing mechanism, the combination with an electric circuit of a drawer-like music roll holder comprising two slidable members, one of which is slidable upon the other, a circuit maker and breaker for said circuit carried by one member and means operated by the movement of the other member for actuating said circuit maker and breaker to complete the circuit.

13. In an automatic music playing mechanism, the combination with an electric circuit, of a drawer-like music roll holder comprising two slidable members, one of which is slidable upon the other, a pivoted circuit maker and breaker carried by one member, and means operated by the movement of the other member for actuating said circuit maker and breaker to complete the circuit.

14. In automatic music playing mechanism, the combination with an electric circuit, of a drawer-like music roll holder, comprising two slidable members, one of which is slidable upon the other, a circuit maker and breaker for said circuit carried by one member and means carried by the other member for actuating the circuit maker and breaker to complete the circuit when said second-named member is moved from inoperative to operative position.

15. In automatic music playing mechanism, the combination with an electric circuit, of a drawer-like music roll holder comprising two slidable members, one of which is slidable upon the other, a pivoted circuit maker and breaker for said circuit carried by one member and means carried by the other member for controlling the circuit maker and breaker to complete the circuit when said second-named member is moved from inoperative to operative position.

16. A self-playing musical instrument having a keyboard, an electric circuit and a circuit breaker, a music roll holder slidably connected to the under-side of the keyboard of the musical instrument, and adapted to be moved out into operative position to expose the music sheet and to be moved back under the keyboard to conceal the same, and means operable by the inward movement of the roll holder for actuating the circuit breaker to complete the circuit.

17. A self-playing musical instrument having a keyboard, a music holder slidably connected to the underside of the keyboard and adapted to be drawn out in view so as to expose the music sheet and to be moved back under the key-board to conceal the same, means carried by the music holder for supporting a music-sheet, means for actuating the sound producing devices of the musical instrument, electric selecting means cooperating with the music-sheet for controlling the action of the said actuating means, and means for breaking the circuits leading to said electric selecting means when the music holder is moved back under the keyboard.

18. A self-playing musical instrument having a keyboard, a music holder movable connected to the underside of the key-board and adapted to be moved out in view so as to expose the music sheet and to be moved back under the key-board to conceal the same, means carried by the music holder for supporting a music-sheet, means for actuating the sound producing devices of the musical instrument, electric selecting means cooperating with the music-sheet for controlling the action of the said actuating means, and means for breaking the circuits leading

to said electric selecting means when the music holder is moved back under the keyboard.

19. In automatic music playing mechanism controlled by a perforated sheet, the combination with a music roll holder comprising two slidable members, one of which is movable upon the other, a series of selector fingers and a contact device carried respectively by said members, means for feeding a music sheet over said contact device, key-operating mechanism electrically operated mechanism controlled by said music sheet for selecting the key-operating mechanism to be actuated an electric switch carried by one of the sliding members comprising, two contacts insulated from each other and forming terminals of the electric circuits for said electrically operated mechanism and a circuit-making-and-breaking pin cooperating with said contacts, means mounted upon and actuated by the movement of the other one of said members in one direction for bringing the pin between the contacts to complete the circuit, and electric means controlled by the music sheet for shifting said pin to break the circuit.

20. In automatic music playing mechanism controlled by a perforated music sheet, the combination with a music roll holder comprising two slidable members, one of which is movable upon the other, a series of selector fingers and a contact device carried respectively by said members, means for feeding a music sheet over said contact device, key-operating mechanism electrically operated mechanism controlled by said music sheet for selecting the key operating mechanism to be actuated an electric switch carried by one of the sliding members comprising, two contacts insulated from each other and forming terminals of the electric circuits for said electrically operated mechanism and a circuit making and breaking pin coöperating with said contacts, means mounted upon and actuated by the movement of the other one of said members in one direction for bringing the pin between the contacts to complete the circuit, and an electric magnet controlled by the music sheet for shifting said pin to break the circuit.

21. In automatic music playing mechanism, the combination with a music roll holder comprisingtwo slidable members, one of which is movable upon the other, a series of selector fingers and a contact device carried respectively carried by said members, means for feeding a music sheet over said contact device, key-operating mechanism electrically operated mechanism controlled by said music sheet for selecting the key-operated mechanism to be actuated, two contacts insulated from each other and forming terminals of the electric circuit for said operating mechanism, a pivoted circuit-making-and-breaking pin carried by one member and coöperating with said contacts, means mounted upon the other member and positioned thereon to shift said pin between the contacts when said member is moved in one direction whereby to complete the circuit, and means controlled by the music sheet for shifting said pin to break the circuit.

22. In automatic music-playing mechanism, the combination with a music roll holder comprising an upper slidable member and a lower member slidable thereon, a series of selector fingers carried by the upper member, a contact device carried by the lower member, mechanism for feeding the music sheet over said contact device, key-operating mechanism electrically controlled means controlled by said music sheet for selecting the key-operating mechanism to be actuated, two insulated contacts carried by the upper member and forming the terminals of the electric circuit for said operating mechanism, a pivoted circuit-making-and-breaking pin coöperating with said contacts to make and break the circuit, means carried by the lower member for moving the pin into engagement with said contacts when the said lower member is moved relatively to the upper member, and an electro-magnet for moving said pin out of engagement with the contacts.

23. In automatic music playing mechanism, the combination with a music roll holder comprising an upper slidable member and a lower member slidable thereon, a series of selector fingers carried by the upper member, a contact device carried by the lower member, mechanism for feeding the music sheet over said contact device, key-operating mechanism electrically controlled means controlled by said music sheet for selecting the key-operating mechanism to be actuated, two insulated contacts carried by the upper member and forming the terminals of the electric circuit for said operating mechanism, an electromagnet having a pivoted armature, a circuit making and breaking pin carried by said armature and cooperating with said contacts, and means carried by the lower member for engaging the said armature to move the same and the pin into engagement with the said contacts, said means being operated when the lower member is moved relatively to the upper member.

24. In automatic music playing mechanism, the combination with a music roll holder comprising an upper slidable member and a lower member slidable thereon, a series of selector fingers carried by the upper member, a contact device carried by the lower member, mechanism for feeding the music sheet over said contact device, key-operating mechanism electrically controlled means controlled by said music sheet for selecting the key-operating mechanism to be

actuated, two insulated contacts carried by the upper member and forming the terminals of the electric circuit for said operating mechanism, an electromagnet having a pivoted armature, a circuit making and breaking pin coöperating with said contacts, a projection on said armature, and a projection on the lower member adapted to engage the first named projection when the lower member is moved relatively to the upper member to bring the pin into engagement with the contacts to complete the circuit.

25. In automatic music playing mechanism, the combination with a music roll holder comprising an upper slidable member and a lower member slidable thereon, a series of selector fingers carried by the upper member, a contact device carried by the lower member, mechanism for feeding the music sheet over said contact device, key-operating mechanism electrically controlled means controlled by said music sheet for selecting the key-operating mechanism to be actuated, two insulated contacts carried by the upper member and forming the terminals of the electric circuit for said operating mechanism, an electromagnet having a pivoted armature, a circuit-making-and-breaking pin carried by said armature and coöperating with said contacts, a pivoted dog carried by the armature, and a projection carried by the lower member and adapted to engage the said dog when the lower member is moved into operative position to shift the contact pin into engagement with the said contacts.

26. In an electric selecting mechanism constructed and arranged to be controlled by a traveling perforated sheet, the combination with a contact bar or roll having a continuous conducting face and a traveling sheet, of mechanism for causing the sheet to travel over the bar or roll, a plurality of selector fingers arranged to bear on said bar or roll, a longitudinally movable rail upon which said fingers are mounted, a rack carried by said rail, and a pinion engaging said rack and operating to shift the rail laterally to cause the selector fingers to register accurately with the perforations in the traveling sheet.

27. In an electric selecting mechanism constructed and arranged to be controlled by a traveling sheet or web, the combination with a contact roll or bar having an unbroken conducting surface and a traveling sheet, of mechanism for causing the sheet to travel over the roll or bar, a plurality of selector fingers located above and arranged to bear on said roll or bar, means for adjusting said fingers at will transversely with respect to the direction of travel of the sheet and a chart representing a keyboard located above the path of travel of the sheet and having its key representations in line with the fingers, the arrangement being such that the chart and fingers are always in view during the passage of the sheet over the bar or roll.

28. In an electric selecting mechanism constructed and arranged to be controlled by a traveling sheet or web, the combination with a contact roll or bar having an unbroken conducting surface and a traveling sheet or web, of mechanism for causing the sheet or web to travel over the bar or roll, a plurality of selector fingers located above and arranged to bear on the bar or roll, and a chart representing a keyboard located above the path of travel of the sheet and having its key representations in line with the fingers, the arrangement being such that the chart and fingers are always in full view during the passage of the sheet over the roll or bar.

29. In an electric selecting mechanism constructed and arranged to be controlled by a traveling sheet, the combination with a contact roll or bar and a traveling sheet, of mechanism for causing the sheet to travel over the roll or bar, a plurality of readers located above and adapted to bear on the roll or bar, a chart representing a keyboard located above the path of travel of the sheet and having its individual key-representations in line with the individual readers, means for adjusting the said readers and chart transversely with respect to the direction of travel of the sheet, and a second chart similar to that first named fixed opposite the free ends of the readers, the arrangement being such that both the charts and the readers are always in full view during the passage of the sheet over the bar or roll.

In testimony whereof I have signed my name to this specification in presence of two witnesses.

G. HOWLETT DAVIS.

Witnesses:
ESTELLE JORALEMON,
J. FRED BERSKCHER, JR.