

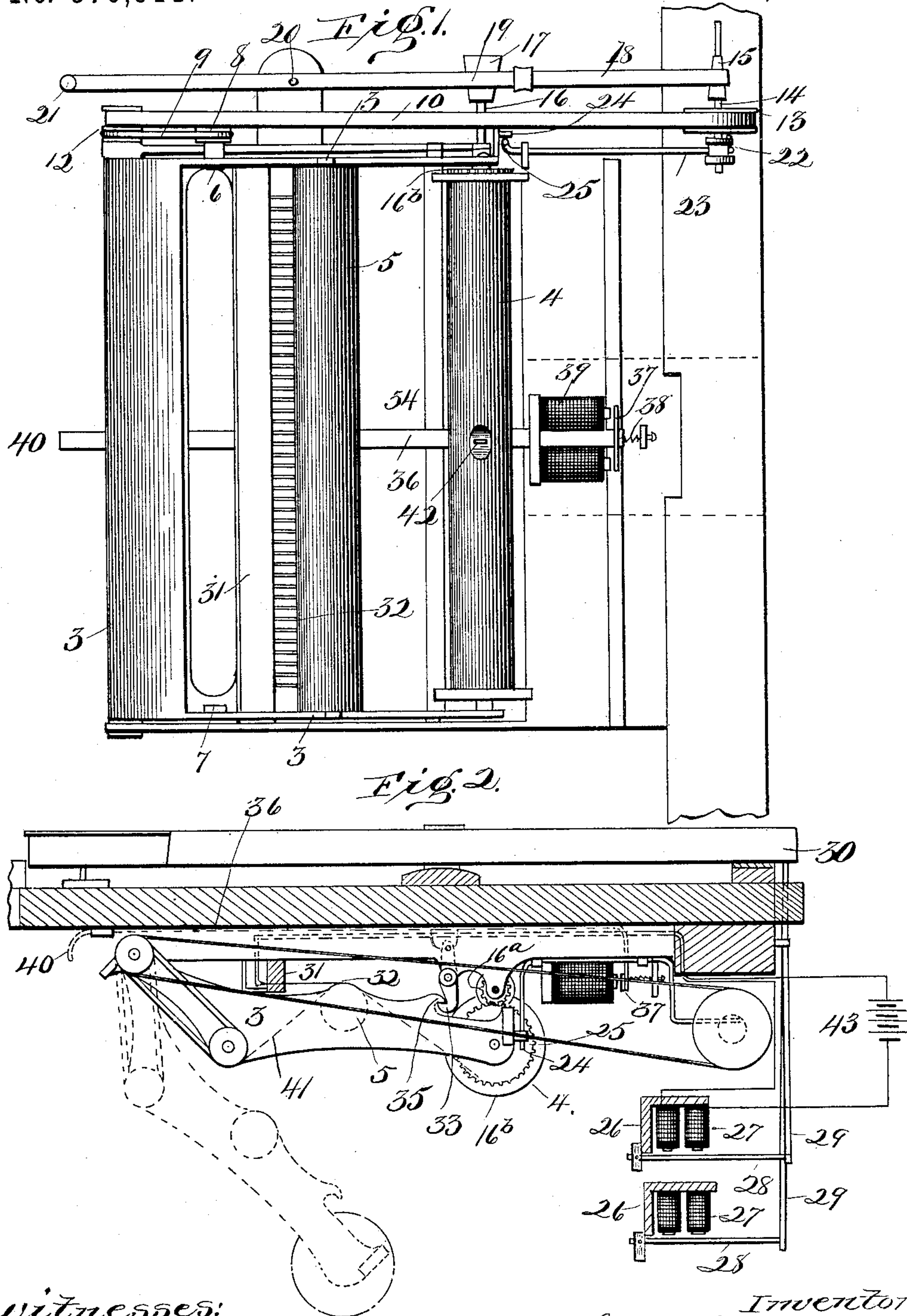
(No Model.)

2 Sheets—Sheet 1.

G. H. DAVIS.  
ELECTRICAL SELF PLAYING PIANO.

No. 570,911.

Patented Nov. 10, 1896.



witnesses:  
J. M. Fowler Jr.  
J. G. Meyers Jr.

Inventor  
George Hawlett Davis,  
by - Davis & Co  
Attorneys.

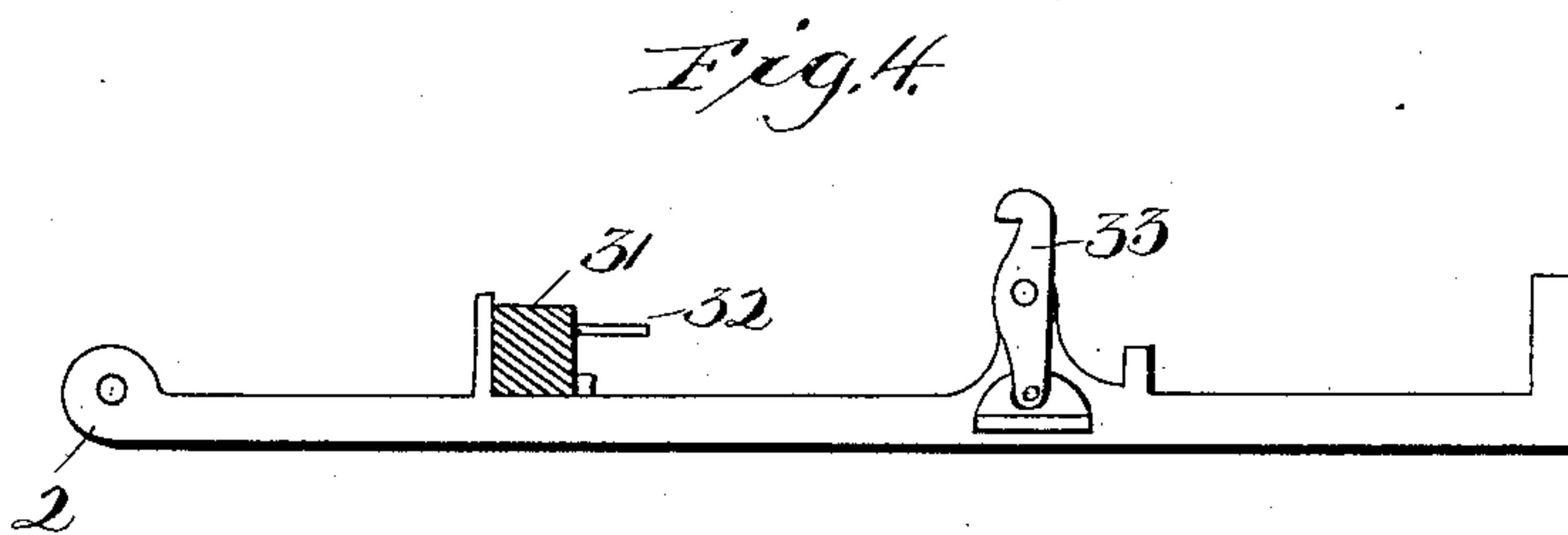
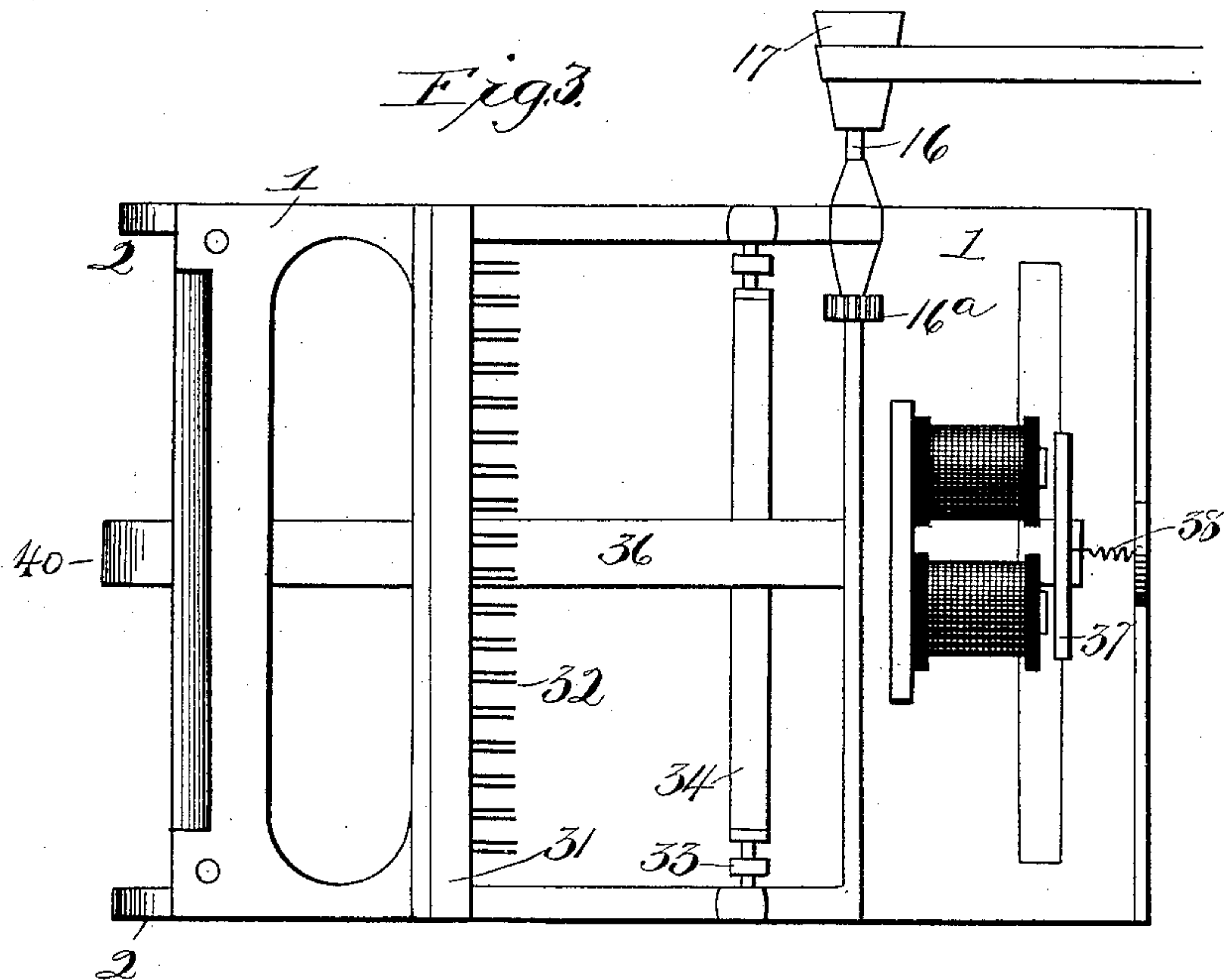
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# UNITED STATES PATENT OFFICE.

GEORGE HOWLETT DAVIS, OF NEW YORK, N. Y.

## ELECTRICAL SELF-PLAYING PIANO.

SPECIFICATION forming part of Letters Patent No. 570,911, dated November 10, 1896.

Application filed September 14, 1895. Serial No. 562,477. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE HOWLETT DAVIS, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new, useful, and valuable Improvement in Electrical Self-Playing Pianos, of which the following is a full, clear, and exact description.

This invention relates to improvements in electrical self-playing pianos such as described in an application for patent filed by G. H. Davis, dated June 17, 1895, Serial No. 553,162.

It is the purpose of my invention to provide an instrument of this character which will be extremely simple in construction, durable in operation, and inexpensive in its manufacture.

My invention relates more particularly to the music-sheet holder, which is, in this instance, arranged and attached to the under side of the piano-keyboard in such a manner as to be easy of access and at the same time out of the way.

It is a further purpose of my invention to arrange the music-sheet holder in such manner that when the end of a piece has been reached the holder will be automatically released or unlatched, thereby allowing the same to drop downward in position for the music-sheet to be rewound; and the invention also relates to means for automatically throwing into gear the rewinding mechanism as soon as the music-holder drops into its downward position.

To these and other ends the invention relates to the novel features of construction and combinations of parts hereinafter described, and finally pointed out in the claims.

In order to enable others skilled in the art to make, use, and construct my invention, I will now describe the same in detail, reference being had for this purpose to the accompanying drawings, in which—

Figure 1 is a plan view of the music-sheet holder complete. Fig. 2 is a side view of the music-sheet holder, showing its connection to the under side of the piano-keyboard, also showing the means for operating the piano-keys. Fig. 3 is a plan view of the bottom or base plate to which the music-sheet holder is

hinged and latched, and Fig. 4 is a side view of the same.

Referring now to the drawings, the reference-numeral 1 indicates the base or bottom plate of the music-sheet holder, which is connected in any suitable manner to the under side of the piano-keyboard, as represented in Fig. 2, said plate being preferably of cast metal. The forward portion of this base-plate is provided at each side with projecting lugs 2, to which is hinged the music-sheet holder, which consists of the frame 3, carrying a loosely-journaled receiving-roller 4 at its rear or free end and upon which the music-sheet is to be wound, as will presently appear. Said receiving-roller is provided at one end with a gear-wheel 16<sup>b</sup>, for a purpose presently to be explained. About midway of the frame 3 is journaled a second roller 5, preferably of copper or brass and adapted to act as a ground for the electrical fingers hereinafter described. The front or hinged end of the music-holder frame is provided with sockets 6 7 to receive the music-roll, which consists of a sheet of thin perforated paper wound upon a spool or core, which is readily attached to and detached from the sockets in an instant, so that when one piece has been played a second music-roll can be quickly applied.

The socket 6 is loosely journaled in the frame 3 and has attached to its outer end a pulley 8, over which a belt 9 passes, said belt 9 receiving its motion through the belt 10, which passes over double pulley 12, and the belt 10 receiving its motion from pulley 13, mounted upon shaft 14, said shaft being actuated in any suitable manner. Upon the shaft 14 is mounted a small cone-pulley 15, and upon the shaft 16 of the base-plate is mounted a large cone-pulley 17, and over these pulleys a belt 18 passes, said belt being adapted to impart motion to the cone-pulley 17, thus revolving the gear 16<sup>a</sup> on end of shaft 16, and as this gear is in mesh with the gear-wheel 16<sup>b</sup> on the roller 4 the note-sheet is drawn from its core or spool and wound upon said roller.

In order that the speed of the receiving-roller 4 may be varied, I have made the pulleys 15 and 17 of cone shape and the one larger than the other, so that by shifting the belt 18 upon said pulleys, as will be readily



understood, the receiving-roller may be made to travel fast or slow, as desired, and in this manner the piece of music being played will be under the absolute control of the person  
5 having charge of the instrument.

In order that the belt 18 may be easily shifted upon the cone-pulleys, I have provided a belt-shifter 19, which is pivoted at 20 to the  
10 base-plate 1 or to the under side of the piano-keyboard, or otherwise, as desired, and its outer end terminates in a handle 21, whereby the shifter may be moved from right to left, and vice versa, with the consequent shifting of the belt 18 upon the cone-pulleys 15 and 17.

15 When a piece of music has been played, it is necessary that the note-sheet be rewound upon its core or spool, and this rewinding operation takes place as follows: The music-holder is unlatched at its rear, as will be presently explained, and automatically swung  
20 down into the position shown by dotted lines, Fig. 2, and the belt 9 placed over pulleys 8 and 12. Motion now being applied to shaft 14 will be communicated to pulley 12 through belt 10 and from pulley 12 to pulley 8 through spring-  
25 belt 9, thereby rewinding the note-sheet. In order that this latter-named operation will not take place when the hinged frame is in its latched or operative position, I have provided  
30 a clutch 22 upon the shaft 14, said clutch being adapted to be moved laterally and engaged with and disengaged from the pulley 13 by means of a rocking rod 23, said rod being actuated by means of an arm 24, carried by the  
35 hinged frame, so that when said frame is swung upward into operative position the arm 24 will engage with the end or bent portion 25 of the rocking rod and rock the same, whereby the clutch 22 will be disengaged from the pulley 13, allowing the latter to run free, but as  
40 soon as the hinged frame is brought downward to the position shown in dotted lines, Fig. 2, the rocking rod will spring back to its normal position, throwing the clutch 22 into engagement with pulley 13, and the operation of re-  
45 winding the note-sheet will immediately and automatically take place.

The manner of operating the piano-keys according to this invention is as follows: I place  
50 one, two, or more rows or tiers of angle-irons 26 within the piano-frame, as seen in Fig. 2, and to these angle-irons are invertedly secured a series of electromagnets 27, having their armature-levers 28 pivoted to the angle-  
55 irons, and to the free ends of which are secured reciprocating rods 29, which lie directly beneath the rear ends of the piano-keys 30, so that when the electromagnets are energized their armature-levers will be attracted, there-  
60 by imparting a quick upward motion to the rods 29, which motion is communicated to the rear ends of the piano-keys, as will be readily understood, thereby actuating the same, and accordingly the strikers or hammers.

65 Upon the base-plate 1 is mounted an insulated block 31, carrying a series of electric fingers or contact-points 32, corresponding to

the number of keys on the piano, and one additional finger to actuate the hinged frame presently to be described. These fingers or  
70 contact-points normally lie directly over and in contact with the brass roller 5, and each preferably made of two strands of thin or fine wire, so as to insure the perfect working of the instrument.

75 An important feature of this invention is the arrangement made for automatically unlocking or unlatching the hinged frame or music-sheet holder when the end of a piece of music has been reached, and this mechanism  
80 is as follows: To each side of the base-plate 1 is pivoted a latch 33, which are connected to each other by means of a transverse rod 34, so that both will be actuated together, and upon the hinged frame are formed or mounted  
85 a pair of keepers 35, which automatically engage with the latches when the hinged frame is swung upward to its operative position and are retained thereby until the latches are operated, which is as follows: To the transverse  
90 latch-rod 34 is secured a reciprocating rod 36, to the rear end of which is secured an armature 37, which is normally drawn backward by means of a spring 38. This armature is attracted by the magnets 39, when the latter  
95 are energized, and the latch-rod 34 is automatically moved forward, thereby disengaging the latches from their keepers 35 and allowing the hinged frame to drop downward. In order that the magnets 39 shall be auto-  
100 matically energized and the latches accordingly actuated, it is only necessary to cut a small aperture in the note-sheet at the end of the piece of music and in line with the extra  
105 contact-finger, heretofore referred to, so that when the piece has been played this finger will register with the aperture in the note-sheet, make an electrical connection with the roller 5, and energize magnet 39, with the consequent attraction of armature 37 and opera-  
110 tion of latches 33, thereby allowing the hinged frame to automatically drop downward into the position shown by dotted lines, Fig. 2, and immediately upon dropping the clutch 22 is actuated and the rewinding of the note-sheet  
115 automatically begun. The reciprocating latch-rod 36 is also provided with a forward extension and hooked end 40, so that the latches may be operated by hand, if desired.

120 The operation of my self-playing piano will be obvious from the foregoing description and the following brief statement: The perforated note-sheet 41, which is furnished ready-wound upon a core or spool, is fitted within the sockets 6 and 7 and its end is pro-  
125 vided with an eye or loop that engages a hook 42 upon roller 4 after the sheet has been placed over the roller 5 and beneath the contact-fingers 32. It is to be noted that the ground roller 5 is loosely journaled within the  
130 frame 3, so as to readily turn therein as the note-sheet is drawn over the same, thereby always presenting a clean surface to the contact-fingers. The roller 4 is now set in motion



as previously explained, the note-sheet drawn over the brass or copper roller 5, and the contact-fingers 32, finding their way through the perforations in said note-sheet, make electrical connections through the roller 5, battery 43, and electromagnets 27, attracting the armatures 28 and operating the piano-keys through the medium of the rods 29.

Various details and modifications of my device may be readily made without departing from the spirit of my invention, and I therefore do not wish to be understood as limiting myself to the precise construction herein shown and described.

It will be obvious that my music-holder may be located at a distance from the piano as well as attached directly to the piano itself, and can be operated equally as well in this manner, it being only necessary in this event to make the wires longer and extend them to the point where the music-holder is located.

What I claim, and desire to secure by Letters Patent, is—

1. In a self-playing musical instrument or the like, a music-sheet holder normally acting to move out of operative position, suitable latches for retaining said music-sheet holder in operative position, and electromagnets arranged to operate the latches to release them from engagement with the music-sheet holder, whereby the latter is allowed to move out of operative position, substantially as described.

2. In an electrical self-playing musical instrument or the like, the combination with a music-sheet holder retained in operative position by means of suitable latches, of a rotary contact-roller journaled upon the music-sheet holder, and an electromagnet arranged to operate the latches to release them from their engagement with the music-sheet holder whereby the latter is free to move automatically out of operative position, substantially as described.

3. In an electrical self-playing piano, the combination with the hinged note-sheet holder normally acting to move out of operative position and means for advancing the note-sheet, of latches for retaining said holder in operative position, and means thrown into operation by the movement of the note-sheet holder for automatically rewinding the note-sheet, substantially as described.

4. In an electrical self-playing piano, the combination with a hinged note-sheet holder adapted to be swung downward out of operative position, of a music-sheet spool and a receiving-roller carried by the note-sheet holder, a driving shaft and pulley, gearing intermediate the pulley and music-sheet spool for rewinding the note-sheet, a clutch on the driving-shaft, and means actuated by the movement of the note-sheet holder to throw the clutch into and out of engagement with the driving-pulley, as and for the purpose described.

5. In a self-playing musical instrument, the combination with a hinged note-sheet

holder adapted to be swung downward out of operative position, of a music-sheet spool and receiving-roller carried by the note-sheet holder, a driving shaft and pulley, gearing intermediate the pulley and music-sheet spool for rewinding the note-sheet, a sliding clutch on the drive-shaft, a rocking rod engaging the sliding clutch, and an arm or projection carried by the note-sheet holder, said arm engaging with the rocking rod when the note-sheet holder is moved, as and for the purpose described.

6. In a music-sheet holder for electrical self-playing pianos, the combination with a base-plate having a latch or latches pivoted thereto, of a note-sheet holder hinged to the base-plate and acting normally to drop downward out of operative position, keepers carried by the note-sheet holder and adapted to be engaged by the latches, an electromagnet carried by the base-plate, and an armature having a connection with the latches and adapted when attracted to release the music-sheet holder and allow the same to drop downward out of operative position, substantially as described.

7. In a note-sheet holder for self-playing musical instruments, the combination with a base-plate, of a note-sheet holder hinged to the base-plate and carrying a delivering and a receiving roller, a gear-wheel mounted on the receiving-roller, and a pinion mounted upon a shaft carried by the base-plate, said gear-wheel being thrown into and out of mesh with the pinion by the upward and downward movement of the music-sheet holder, substantially as described.

8. In a note-sheet holder for self-playing musical instruments, the combination with a base-plate, of a note-sheet holder hinged to the base-plate and carrying a delivery and a receiving roller, a gear-wheel mounted upon the receiving-roller, a pinion mounted upon a shaft carried by the base-plate and meshing with the gear-wheel, a large cone-pulley also mounted upon said shaft, a drive-shaft, a small cone-pulley mounted upon the drive-shaft, a belt passing over said cone-pulleys, and a belt-shifter adapted to move said belt upon the pulleys to regulate the speed of the receiving-roller, substantially as described.

9. In a music-sheet holder, for electrical self-playing pianos, the combination with a base-plate secured to the piano and provided at each side with a pivoted latch, of a note-sheet holder hinged at one end to said base-plate and adapted to be swung downward out of operative position, keepers mounted upon the hinged holder and adapted to be engaged by said latches, an electromagnet carried by the base-plate in rear of the latches, and an armature having a connection with the latches and adapted, when attracted by its electromagnet, to release said music-sheet holder and allow the same to drop downward out of operative position, substantially as described.

10. In an electrical self-playing piano, the



combination with a suitable music-sheet holder, of keepers carried by said holder, latches adapted to engage with the keepers to retain the holder in operative position, and  
5 an electromagnet connected in circuit and controlled by the music-sheet and adapted to automatically operate the latches to release the same from the keepers whereby the music-sheet holder is allowed to move out of  
10 operative position, substantially as described.

11. In an electrical self-playing piano, the combination with a suitable music-sheet holder normally acting to move out of operative position, means for retaining said holder  
15 in operative position, and mechanism thrown into operation by the movement of the note-sheet holder for automatically rewinding the note-sheet, substantially as described.

12. In a note-sheet holder for self-playing

musical instruments, the combination with a  
20 suitable base-plate carrying a plurality of electrical contact-fingers, of a note-sheet holder hinged to the base-plate and carrying delivery and receiving rollers and a contact-  
25 roller which bears against the contact-fingers when the said holder is in operative position, a gear-wheel mounted on the receiving-roller, a pinion mounted upon a shaft carried by the  
30 base-plate, said gear-wheel being thrown into and out of mesh with the pinion by the upward and downward movement of the music-sheet holder, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE HOWLETT DAVIS.

Witnesses:

J. F. MACCARGAN,  
W. H. WEICK.