

E. E. WELTE.
 AUTOMATIC WINDING ATTACHMENT FOR MECHANICAL MUSICAL INSTRUMENTS.
 APPLICATION FILED JAN. 7, 1909.

962,871.

Patented June 28, 1910.

4 SHEETS—SHEET 1.

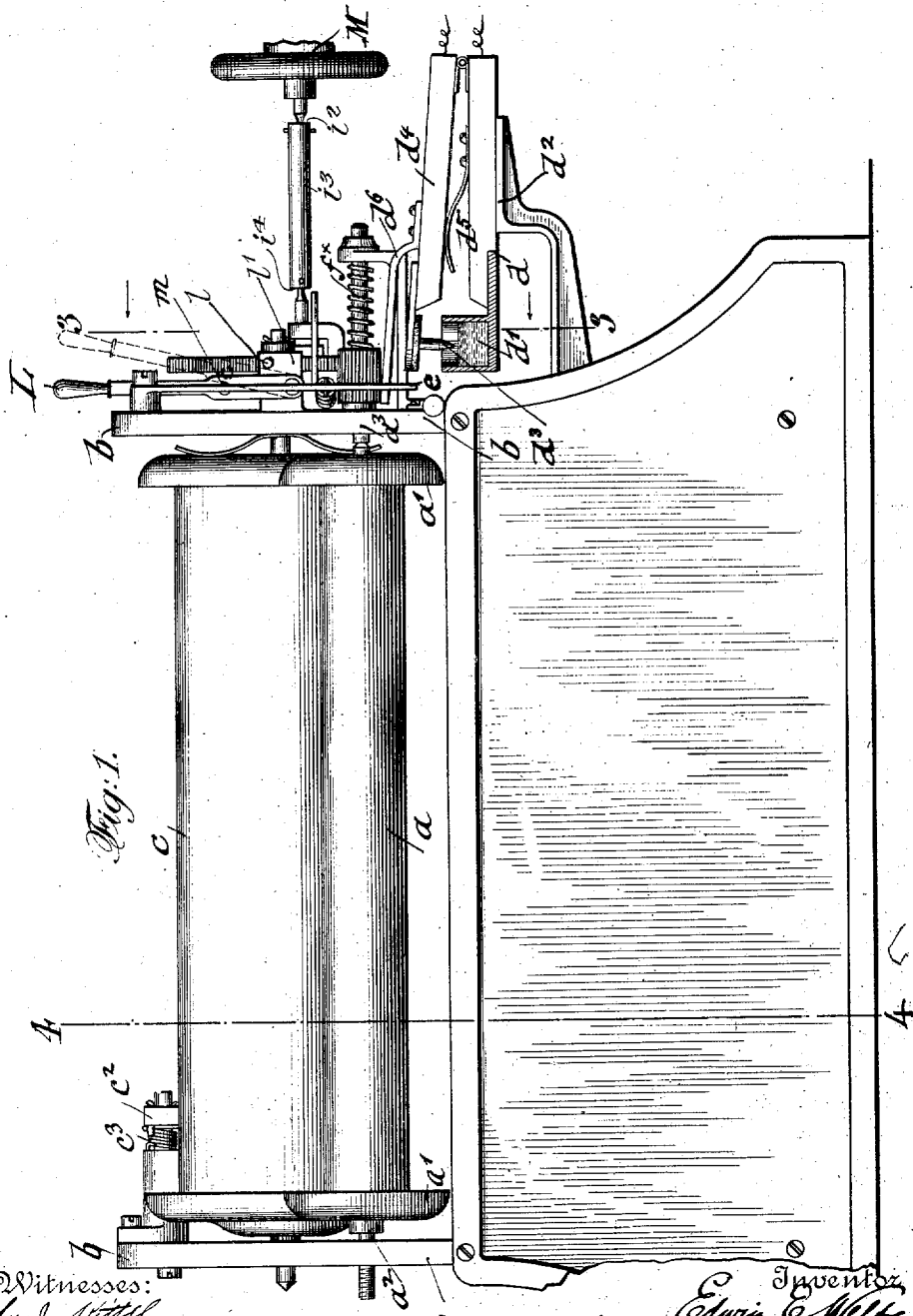


Fig. 1.

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 By his Attorney
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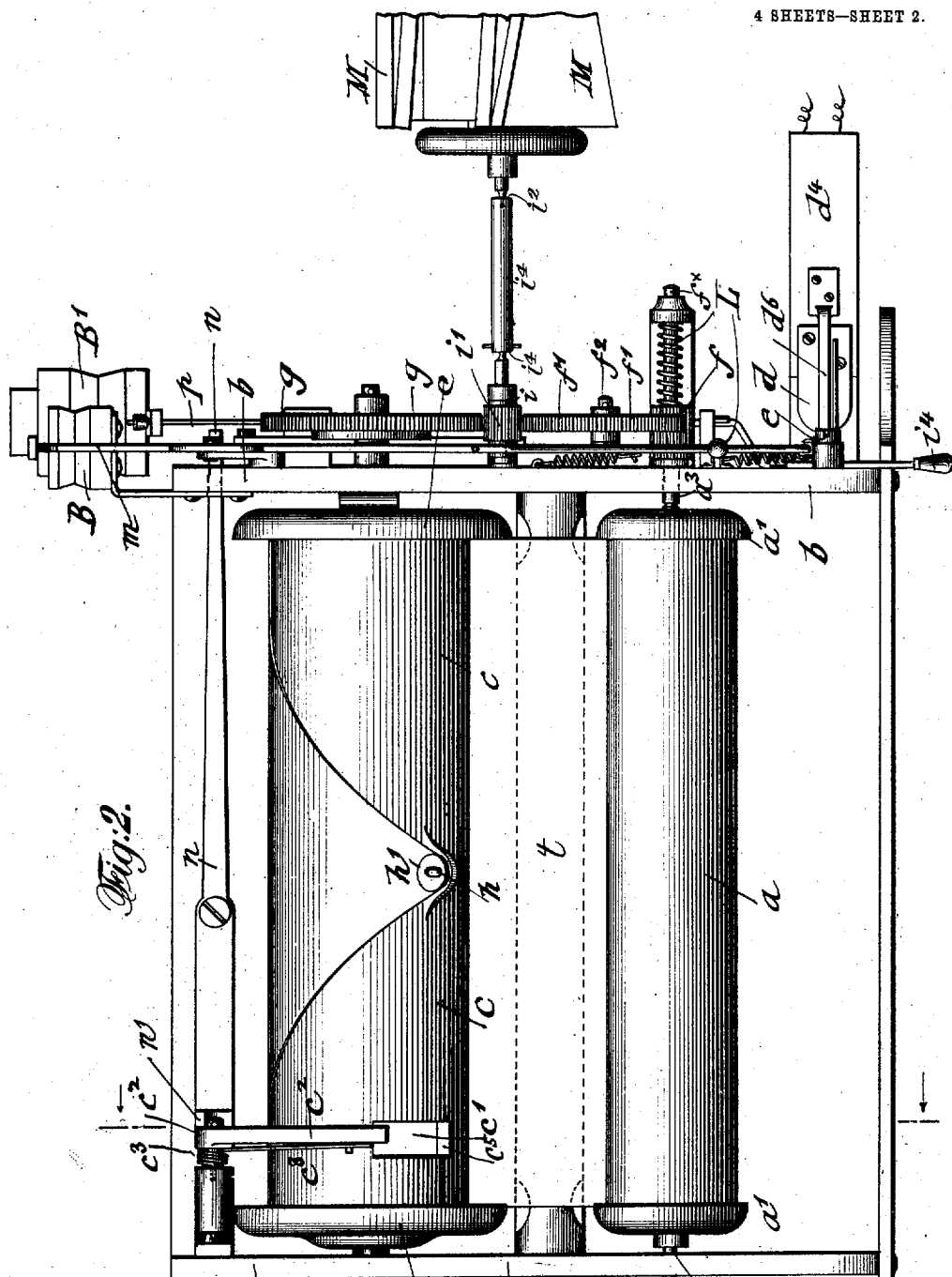


Fig. 2.

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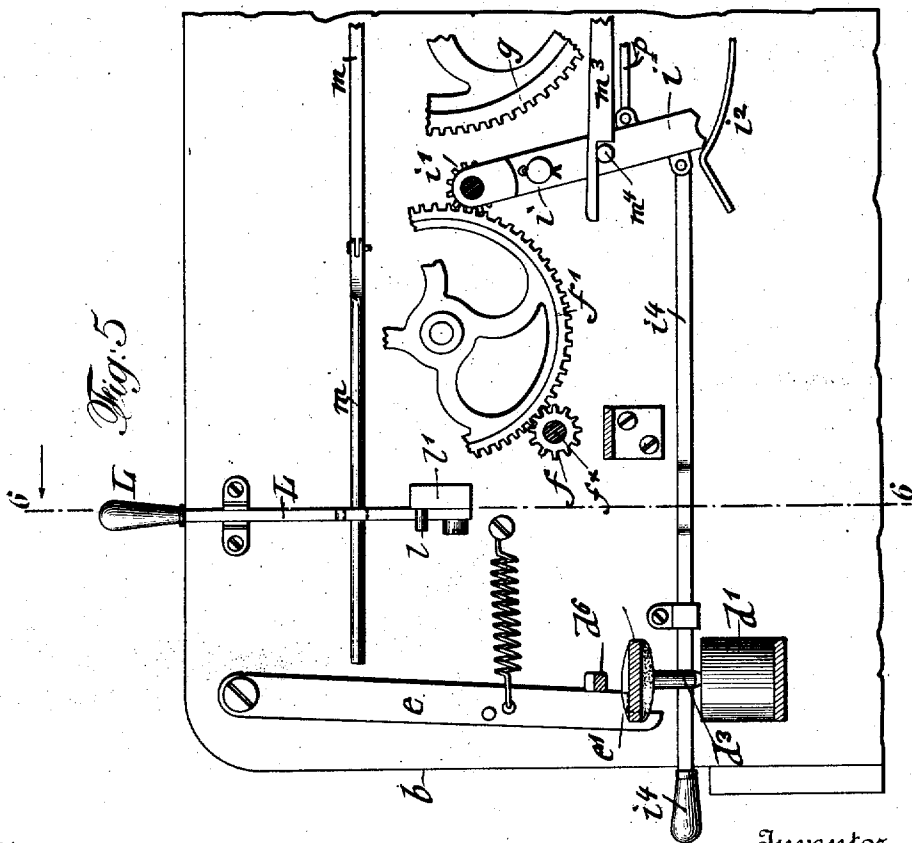
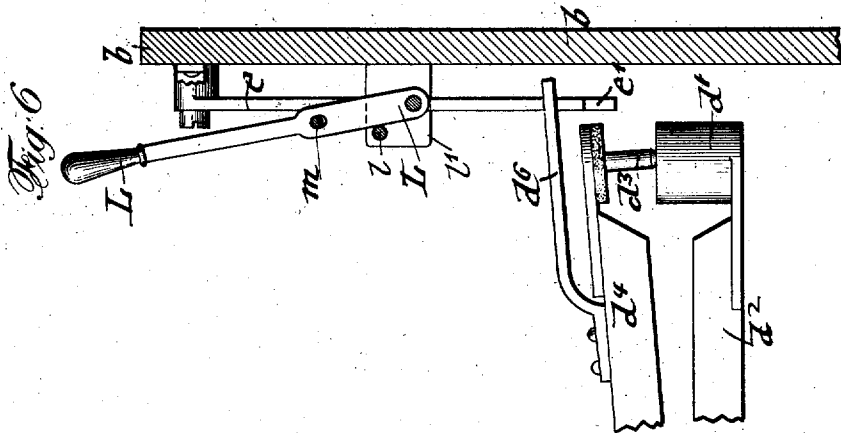
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4 SHEETS—SHEET 4.



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AUTOMATIC WINDING ATTACHMENT FOR MECHANICAL MUSICAL INSTRUMENTS.

962,871.

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To all whom it may concern:

Be it known that I, EDWIN E. WELTE, a citizen of the Empire of Germany, residing in Freiburg, in the Grand Duchy of Baden, in said Empire of Germany, have invented certain new and useful Improvements in Automatic Winding Attachments for Mechanical Musical Instruments, of which the following is a specification.

This invention relates to an improved automatic winding attachment for mechanical musical instruments, by which a piece of music can be played in the regular manner and the perforated music sheet be rewound after playing for inserting a new music-roll, or that the same piece of music can be repeatedly played by automatically rewinding the music-sheet, and replaying the piece of music whenever it is desired to continue the playing for some time without placing a new music-roll into the instrument.

In many cases, such as in the playing of orchestrons in public halls, or the playing of an automatic piano, it is desirable to continue the playing of the mechanical musical instrument for some time, without taking out the music-roll and placing a new one in the instrument, so that the playing of the piece of music can be kept up without attempt at a special artistic performance and varied playing of the same.

The object of this invention is to provide a mechanism in connection with orchestrons, player-pianos and other mechanical musical instruments, by which one piece of music after another can be played and the music rolls removed in the regular manner, or by which the same piece can be replayed indefinitely as long as desired; and for this purpose the invention consists of an automatic winding attachment for mechanical musical instruments by which different pieces of music contained on perforated music-sheets can be played one after another, or by which by means of automatically operated mechanism one and the same piece of music be rewound and replayed for any desired length of time, as will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a front-elevation of my improved automatic unwinding and rewinding attachment for mechanical musical instruments, Fig. 2 is a plan-view of the same,

Fig. 3 is a side-elevation, partly in section on line 3, 3, Fig. 1, of the automatically operated unwinding and rewinding attachment for the music-roll, shown in position for playing one piece at a time, Fig. 4 is a vertical transverse section on line 4, 4, Fig. 1, Fig. 5 is a detail side-elevation of the unwinding and rewinding attachment set for automatically replaying successively the same piece of music represented by a music-roll, and Fig. 6 is a vertical transverse section on line 6, 6, Fig. 5.

Similar letters of reference indicate corresponding parts throughout the several figures.

Referring to the drawings, *a* represents a music-roll on which is wound a perforated music-sheet in the usual manner. The music-roll *a* is provided with heads *a'* having gudgeons which are inserted in suitable bearings *a''* *a'''* located on the upright side-standards *b* in the usual well-known manner. The end of the perforated music-sheet is passed from the music-roll over a tracker *t* of the well-known construction, the channels of which are connected by flexible tubes *t'* with the pneumatic valve-actions by which the different instruments of an orchestron, keys or actions of a player-piano, organ or other mechanical musical instrument, are actuated. The perforated music-sheet is then passed around the winding-up roll *c*, and attached to a hook *h* on the same by means of an eye *h'* at the ingoing or starting end of the music-sheet, as shown in Fig. 2.

The winding-up roll *c* is preferably made of larger diameter than the music-roll *a*, so as to permit the winding-up of the entire perforated music-sheet on the same without a large number of windings. The winding-up roll *c* is provided at a suitable point on its circumference with a recess *c'* which serves in connection with a pivoted stop-lever *c''* for arresting the unwinding motion whenever the music-sheet is unwound from the music-roll. The stop-lever *c''* is made of bell-crank shape and actuated by a spring *c'''* so that its angular end *c'''* enters into the recess *c'* and slides along the inclined portion of the same up to a straight shoulder *c''''* at the end of the recess so as to arrest the rotating motion of the winding-up roll *c*. The arresting-motion can only be accomplished when the entire music-sheet is un-

wound from the winding-up roll, so that the recess c^1 is not covered by the music-sheet and permits the entering of the pivoted and spring-actuated stop-lever c^2 into the same.

Between the music-roll a and the winding-up roll c is arranged the tracker t in the usual manner. The right-hand bearing a^3 of the music-roll is provided with a short spring-cushioned shaft f^* on which is mounted a pinion f , which meshes with a gear-wheel f^1 that is supported on a stud-shaft f^2 of the right-hand upright standard b . On the shaft of the winding-up roll c is mounted a gear-wheel g , and between the gear-wheels f^1 and g is interposed a fulcrumed change-lever i which carries in bearings at its upper forked end a pinion i^1 . The lower end of the lever i is notched and acted upon by the free end of a flat spring i^2 , the opposite end of which is attached to a stationary bracket i^3 , as shown in Fig. 3. The spring i^2 serves for holding the fulcrumed lever i either in a position in which the pinion i^1 meshes with the gear-wheel g , or with the gear-wheel f^1 , as shown respectively in Figs. 3 and 5. The spring i^2 also serves to hold the pinion out of engagement with either of the gear-wheels g , f^1 when the spring engages in the notch in the lower end of the lever i .

The power-bellows of the mechanical musical instrument is driven by an electric motor which is arranged in any suitable position in the case of the instrument.

For starting the motor, a mercury switch d is used, which is clearly shown in Figs. 1 and 3, and which consists of a mercury-cup d^1 which is supported on a suitable bracket-plate d^2 , and of a platinum-point d^3 which is supported at the end of a second plate d^4 that is hinged to the bracket-plate d^2 and held normally above the mercury-cup by a flat spring d^5 acting on the second plate d^4 . To the second plate d^4 is attached an arm d^6 which extends over the platinum-point into the path of a spring-actuated lever e which is pivoted at its upper end to the right-hand standard b , and which is provided with a recessed lower end e^1 that serves to engage the end of the arm d^6 and hold the platinum contact-point of the switch in lowered position in the mercury of the cup when the switch is closed. When a music-roll is inserted into its bearings, and the playing of the instrument is to be started, the lower end of the fulcrumed pinion-carrying lever i is moved by a lever-rod i^4 , connected with the lower part of the lever i , in forward direction so that its pinion i^1 is placed into mesh with the gear-wheel g . The switch-arm d^6 is then manually depressed so that the platinum-point d^3 is inserted into the mercury and the switch closed. The supporting plates for the mercury-cup and platinum-point are connected

by conducting-wires with the electric motor. When the motor is set in motion, it operates the power-bellows and a pneumatic motor M is driven thereby, the crank-shaft of the motor M being coupled by a universal-joint connection i^2 with the intermediate shaft i^3 in turn connected by the universal-joint connection i^4 with the shaft i^5 of the pinion i^1 so as to rotate the latter and the winding-up roll by the gear-wheel g in mesh with the pinion i^1 . By the motion of the winding-up roll, the music-sheet is gradually unwound from the music-roll a and wound on the winding-up roll, so as to play the piece of music in the well-known manner. While the instrument is playing, the switch is held in closed position by the shoulder of the lever e , engaging the arm d^6 , as shown in Fig. 3, the playing being continued as long as the switch is held in closed position. When the perforated music-sheet is nearly at its end on the music-roll, an opening in the same actuates a pneumatic B^1 , the collapse of which actuates a horizontal rod p that is connected with the lower end of the change-lever i , so as to move the latter on its fulcrum and shift the pinion i^1 over into mesh with the gear-wheel f^1 . The rotation of the gear-wheel f^1 and pinion f turns the music-roll a in opposite direction and unwinds the music-sheet from the winding-up roll and rewinds it on the music-roll a .

When the music-sheet is entirely unwound from the winding-up roll c , the stop-lever c^2 enters into the recess c^1 of the roll c , and arrests the latter by the contact of the end c^4 of its upper arm with the shoulder c^5 . The stop-lever c^2 is thereby turned on its fulcrum so that the end of its lower arm engages a lug n^1 at the rear-end of a fulcrumed lever n , which extends alongside of the winding-up roll c and through an opening o in the side-wall b to the outside of the same so as to strike against a lever-arm m^2 which is pivoted at its lower end to the side-wall and connected at its upper end with a slotted portion m^1 of a pusher-rod m . The pusher-rod m pushes the pivot-lever e sideways against the tension of its spring e^2 , and releases the switch-arm d^6 of the switch so as to instantly open the same and interrupt the motion of the electric motor and pneumatic motor M . Simultaneously a rod m^3 connected with the lever m^2 pushes against a pin m^4 on the change-lever i and moves the pinion i^1 of the latter out of mesh with the gear-wheel f^1 and into mesh with the gear-wheel g , ready for the insertion of another music-roll and the playing of the piece of music on the same on the next closing of the switch.

When several pieces of music are arranged on one note-sheet, the latter is provided at the end of the first piece of music with an opening which operates, when it passes over

the tracker *t*, a bellows *B* that on its collapse actuates the pusher-rod *m*, which is guided on the standard *b* and formed of two pivotally connected sections. The pusher-rod *m* is located in the plane of the pivot-lever *e* by which the switch-arm *d*⁶ is held in depressed position when the switch is closed. As soon as the bellows *B* is actuated, the pusher-rod *m* is moved forward and releases the pivot-lever *e* from the switch-arm *d*⁶, so that the platinum-point is raised out of the mercury and the switch opened. For playing the next piece on the same music-sheet, the switch has to be closed again, which is accomplished by lowering the plate *d*⁴ so that the platinum-point enters into the mercury and closes the switch while the switch-arm *d*⁶ is reengaged by the shoulder *e*¹ of the pivot-lever *e*. The playing of the next piece is then continued as the pinion *i*¹ on the change-lever *i* has not been moved out of mesh with the gear-wheel *g*.

Whenever it is desired that the musical instrument is to play the same piece in succession for any desired length of time, a lever *L*, which is pivoted to a bracket *l*¹ of the side-standard *b*, is moved sidewise into the position shown in dotted lines in Fig. 1 and in full lines in Fig. 6. The lever *L* takes along the pusher-rod *m* which is guided in a slot of the shank of the lever *L* so that it is thereby moved out of the plane of the pivot-lever *e* for clearing the same.

The pivot-lever *L* is arrested by a fixed stop-pin *l* which is supported on a bracket *l*¹ on the side-standard *b*. The lever *L* prevents the pivot-lever *e* from being released by the pusher-rod *m* from the arm *d*⁶ which keeps thereby the switch in closed position. The switch being closed, the change-lever *i* is moved backward by the rod *i*⁴ so that the pinion *i*¹ is placed in mesh with the gear-wheel *g*. The piece of music on the music-roll *a* is then played until it is entirely transferred to the winding-up roll *c*. An opening in the music-sheet and a tracker channel produces the collapse of the bellows *B*¹ and the shifting of the change-lever *i* so that the pinion *i*¹ is placed in mesh with the gear-wheel *g*¹. Simultaneously therewith the bellows *B* is actuated by another opening in the music sheet and the pusher-rod *m* actuated, but as it passes sidewise of the pivot-lever *e*, it has no effect on the same. The intermeshing of the pinion *i*¹ with the gear-wheel *g*¹ produces the quick rewinding of the music-sheet on the music-roll *a* by the gear-wheel *g*¹ and pinion *i*¹ until it is entirely unwound from the winding-up roll *c*. The stop-lever *e*² drops then by its end *e*⁴ into the recess *e*¹ and arrests the motion of the winding-up roll *c* by its contact with the shoulder *e*³. The lower arm of the stop-lever *e*² then actuates the fulcrumed lever *n* which latter pushes by its outer end the

pivot-arm *m*² over so that the rod *m*³ pushes by contact with the pin *m*⁴ the change-lever *i* from its position in mesh with the gear-wheel *g*¹, shown in Fig. 5 into mesh with the gear-wheel *g*, shown in Fig. 5 so that the winding-up roll is rotated, the music-sheet wound up on the same and the same piece of music played over again.

After the piece of music is played, the rewinding on the music-roll *a* and the re-playing of the same is repeated by the automatic operation of the parts as before described and so on as long as it is desired to keep up the playing of the same piece of music. As the lever *e* is not moved away from the switch-arm *d*⁶, the switch is held in closed position, so that the motor continues to rotate the pinion *i*¹ and keep the winding-up roll and the music roll alternately in rotary motion until the playing of the instrument is to be discontinued by returning the hand-lever *L* into vertical position, whereby the switch is opened at the end of the rewinding motion of the music-sheet on the music-roll. By the simple shifting of the hand-lever *L*, the musical instrument can be played either in the ordinary manner one piece after another by inserting a new roll playing the piece of music on the same, rewinding the music-sheet on the music-roll, removing the same, placing a new music-roll in position, playing the next piece of music, rewinding the music-sheet on the music-roll and so on, opening the switch after the playing of a piece of music by the automatic action of the bellows *B*, *B*¹ and restarting the motion by the closing of the switch and pulling forward of the rod *i*⁴. When the successive replaying of the same piece of music is desired, then the lever *L* is placed into sidewise inclined position so that the pusher-rod *m* being out of the plane of the pivot-lever *e* cannot actuate the latter and open the switch, so that the same piece of music is replayed by the automatic unwinding from and rewinding of the music-sheet on the music-roll, due to the automatic shifting of the change-lever whereby its pinion is placed alternately in mesh with the gear-wheel of the winding-up roll or the rewinding gear of the music-roll so that the same piece of music is played over again, as long as desired.

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

1. The combination with a music-roll and a winding-up roll, of an engaging mechanism adapted to rotate either the music roll or the winding-up roll, a motor for imparting motion to the engaging mechanism, air operated means for automatically shifting the engaging mechanism from operative relation with the winding-up roll to operative relation with the music-roll when the music-

roll is unwound, additional air operated means for stopping the motor when the music-sheet is unwound from the winding-up roll and manually operated means for moving the additional air operated mechanical means into inoperative position.

2. The combination with a music-roll and a winding-up roll for the music-sheet, engaging mechanism for imparting positive motion to the winding-up roll or the music-roll, electric means for imparting continuous rotary motion to said engaging mechanism, a normally open electric-switch for starting or arresting the motion imparting means, releasable means for holding the electric switch in closed position, switch opening means for moving the releasable means to permit the switch to open, a lever for moving the switch-opening means into inoperative position, means for automatically moving the engaging mechanism into operative relation with the music-roll for rewinding the music-sheet after it is played, and means for automatically moving the engaging mechanism into operative relation with the winding-up roll so as to permit the automatic replaying of the same piece of music.

3. The combination with a music-roll and means for rotating the same, a winding-up roll, and means for rotating the same, of a fulcrumed change-lever provided with a pinion for engaging with either the means for rotating of the winding-up roll or the means for rotating the music-roll, driving means for rotating said pinion, a switch for starting the driving-means, a spring for yieldably holding said switch open, a lever for holding said switch in closed position, means for shifting the change-lever from a position in mesh with the driving-means of the winding-up roll to a position in mesh with the driving means of the music-roll, means for reversing the position of the change-lever, means for automatically removing the switch holding lever to release said switch, and a hand lever for moving the lever moving means out of operative engagement with the switch holding lever for automatically successively repeating the playing of the same piece of music.

4. The combination with a music-roll and winding-up roll, of a gear-wheel transmission for rotating the music-roll and a gear-wheel for rotating the winding-up roll, a fulcrumed change-lever provided with a pinion adapted to be moved into engagement with the driving gears of either the winding-up roll or music roll, means for imparting driving motion to the pinion of the change-lever, means for shifting the driving pinion into engagement with the gear-wheel of the winding-up roll or the gear-wheel of the music-roll so as to produce the winding up of the music-sheet on the winding-up roll or the rewinding of the same on the music-

roll, means for returning the change-lever from engagement with the gear-wheel of the music-roll into engagement with the gear of the winding-up roll, a switch for controlling the driving means, a switch-lever for holding the switch in closed position, means for automatically releasing the switch-lever from the switch, means for placing the releasing means of the switch-lever out of operative relation with the same, a stop-lever for the winding-up roll, and means interposed between the stop-lever and the change-lever for shifting the change-lever to cause the pinion to move from the gear of the winding-up roll into mesh with the gear of the music-roll.

5. The combination with a music-roll and means for rotating the same, and a winding-up means for rotating the same, of engaging means adapted to engage the means for rotating the music-roll or the means for rotating the winding-up roll, a motor to impart motion to said engaging means, changing means for moving the engaging means from engagement with one to the other of the means for rotating the music-roll or the means for rotating the winding-up roll, automatic means for shifting said changing-means to cause said engaging means to move from engagement with the means for rotating the winding-up roll when the music-sheet is nearly unwound therefrom, into engagement with the means for rotating the music roll, automatic means for causing said changing means to move said engaging means from engagement with the means for rotating the music-roll into engagement with the means for rotating the winding-up roll when the music-sheet is nearly unwound from the winding-up roll, means for automatically stopping the motor when the music is nearly unwound from the winding-up roll, and means for moving said last named means into inoperative position.

6. The combination, with the music-roll and the winding-up roll, of an engaging means adapted to rotate either of said rolls, a motor for operating the engaging means, entirely mechanical means operated by the winding-up roll for changing the engaging means from operative relation with the music-roll when the sheet of music is unwound from the winding-up roll, releasing means operated by said mechanical means for automatically stopping said motor, air-operated means also adapted to operate said releasing means, and manually operated means for rendering said releasing means inoperative.

7. The combination, with the music-roll and the winding-up roll, of engaging means adapted to rotate either of said rolls, a motor for rotating said engaging means, a pivoted change lever carrying said engaging means, a lever-rod having a handle for shifting said

change lever in either direction, a bellows, a link connecting said bellows and said change lever for shifting said change lever to cause said engaging means to operate said music-roll, and automatic means for shifting said change lever to cause said engaging means to operate said winding-up roll.

8. The combination, with the music-roll and the winding-up roll, of engaging means adapted to rotate either of said rolls, a motor for rotating said engaging means, a pivoted change lever carrying said engaging means, a lever-rod having a handle for shifting said change lever in either direction, a bel-

lows, a link connecting said bellows and said change lever for shifting said change lever to cause said engaging means to operate said music-roll, means for automatically stopping the motor, and manually operated means for rendering said last-named means inoperative.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

EDWIN E. WELTE.

Witnesses:

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HENRY J. SUHRBIER.