

J. H. DICKINSON AND L. G. COLLYER.

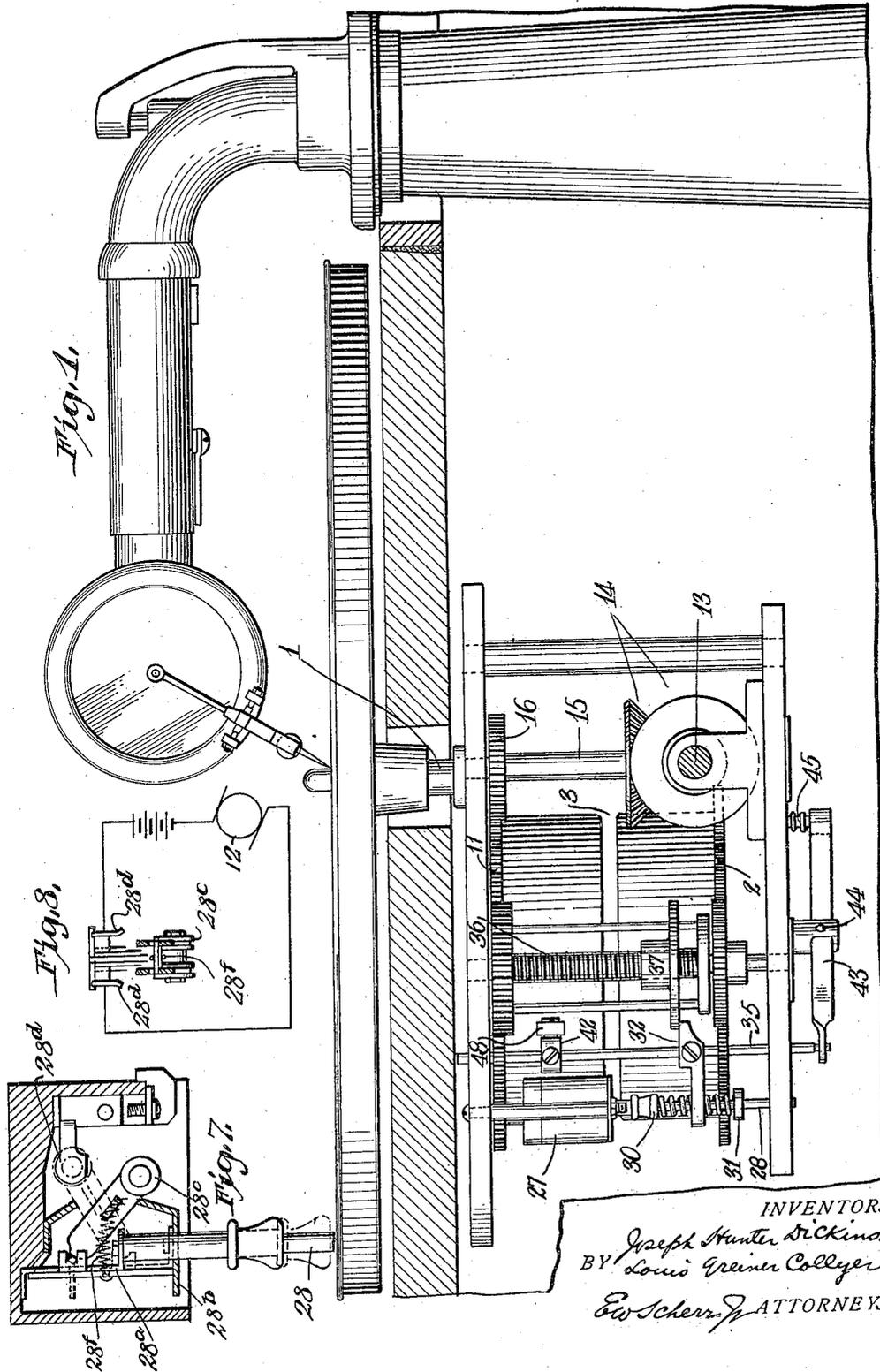
REWIND DEVICE FOR PHONOGRAPHS.

APPLICATION FILED JUNE 23, 1916.

Patented Nov. 1, 1921.

3 SHEETS—SHEET 1.

1,395,802.



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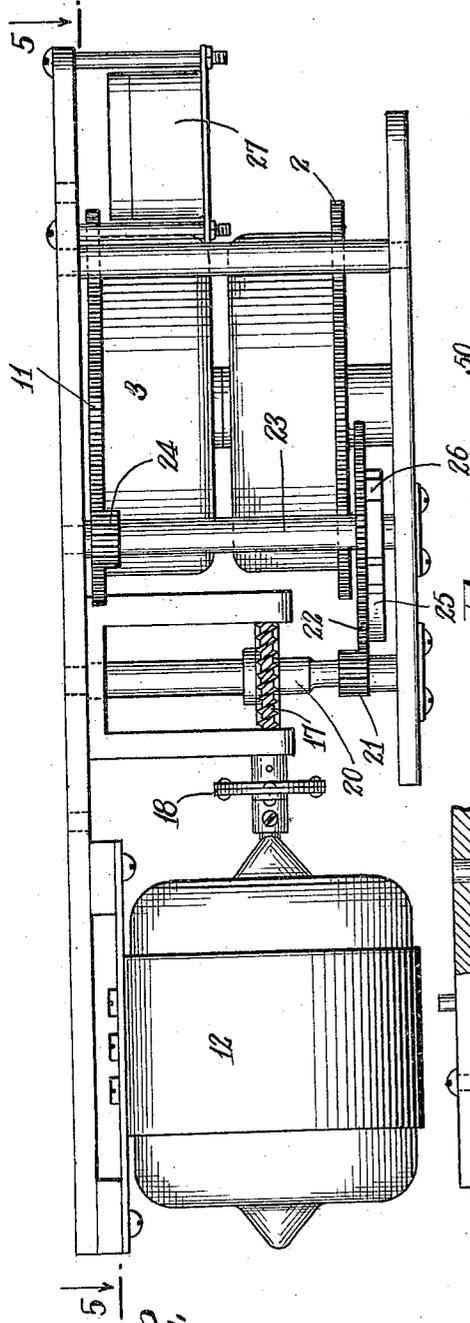


Fig. 2.

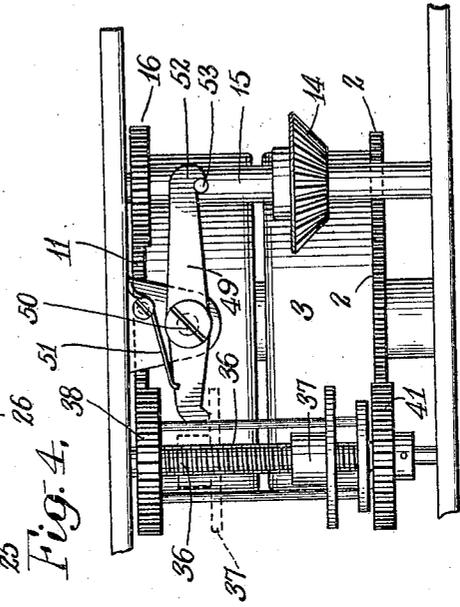


Fig. 4.

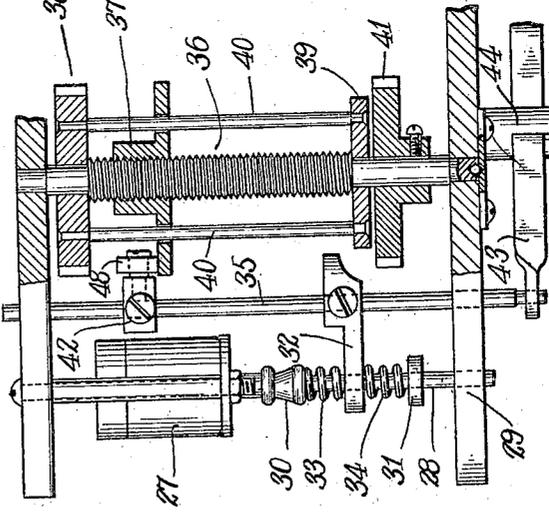


Fig. 3.

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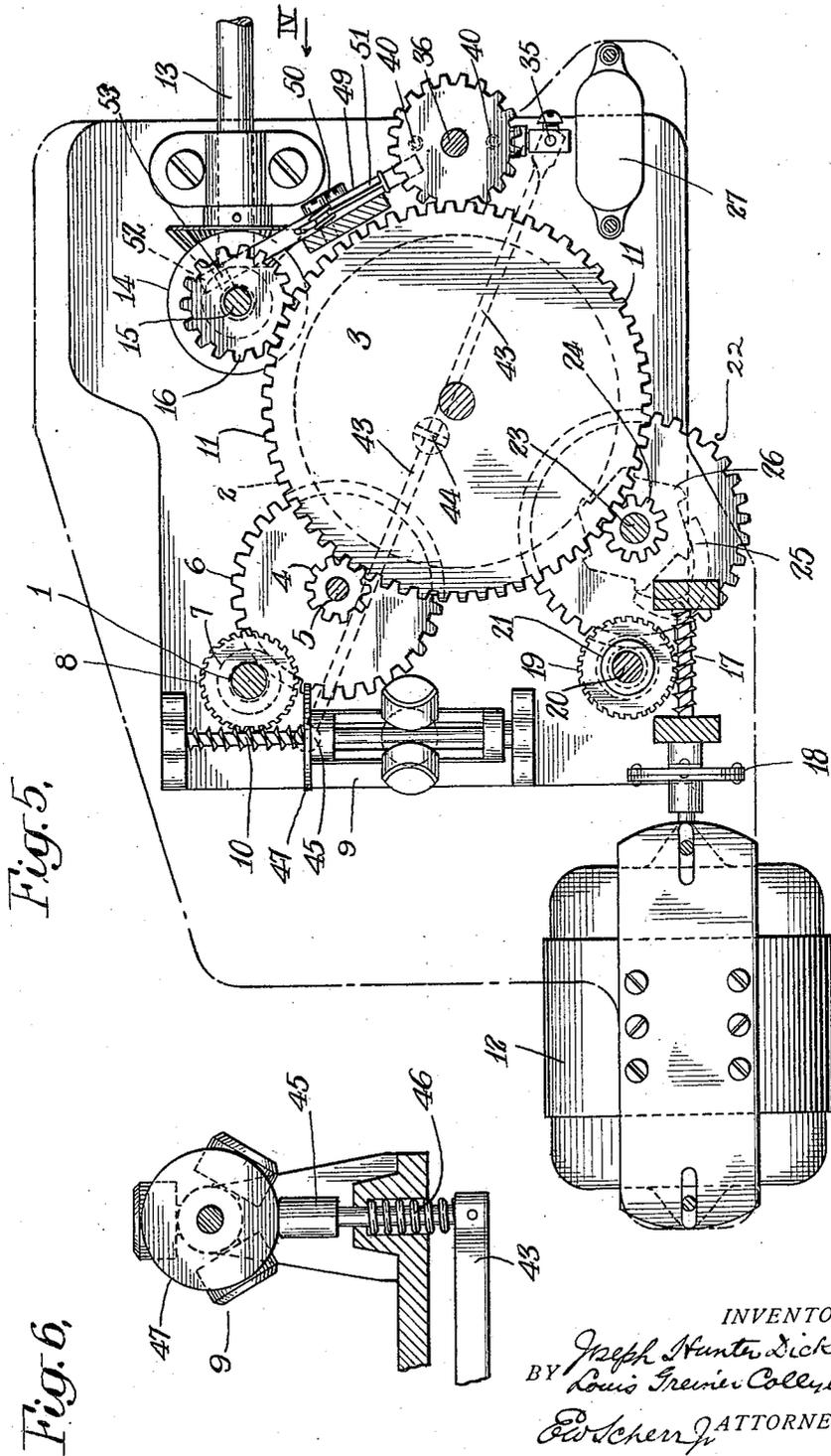


Fig. 5.

Fig. 6.

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UNITED STATES PATENT OFFICE.

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REWIND DEVICE FOR PHONOGRAPHS.

1,395,802.

Specification of Letters Patent.

Patented Nov. 1, 1921.

Application filed June 23, 1916. Serial No. 105,410.

To all whom it may concern:

Be it known that we, JOSEPH HUNTER DICKINSON and LOUIS GREINER COLLYER, citizens of the United States, residing at Cranford, in the county of Union, and Upper Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Rewind Devices for Phonographs, of which the following is a specification.

Our present invention relates to automatic rewind devices for spring-motors such as for example for the spring-motors of phonographs. The features and advantages of our invention will be apparent to those skilled in the art from an understanding of the following description in connection with the drawings showing one of the specific embodiments our invention is adapted to take.

In the drawings, Figure 1 is a side-elevation partly in vertical section of a phonograph embodying our invention; Fig. 2 is another side-elevation view showing the electric and spring-motors and the connection between them; Fig. 3 is an enlarged detail of Fig. 1 shown partly in elevation and partly in vertical section; Fig. 4 is a partial elevation from the view-point of the arrow IV in Fig. 5; Fig. 5 is a plan view from the line 5—5 in Fig. 2; Fig. 6 is an end view of the governor in Fig. 5 showing the operating-end of the automatic brake, and Figs. 7 and 8 are detailed sectional views of an electric switch for controlling the operation of the electric motor.

Describing now the specific devices of the drawings:—the phonograph-reproducer, tone-arm, and record-supporting turn-table are self-evident. 1 is the turn-table shaft (Fig. 5) driven from the lower drum-gear 2 of the spring-motor 3 (that shown happening to be of the usual double barrel type) through speed-increasing gearing comprising a pinion 4 meshing with the gear 2, said pinion being carried on a shaft 5 (Fig. 5) which also carries a gear 6 driving a pinion 7 on the turn-table shaft, the latter in turn carrying a worm-wheel 8 driving the governor 9 through the worm 10.

The spring-motor is wound through its upper drum-gear 11, the winding being either automatic derived from the electric motor 12 or manual through the crank-

shaft 13 (Figs. 1 and 5), bevel-gears 14, shaft 15 and pinion 16 on said shaft meshing with and driving in winding-direction the upper-drum of the spring-motor through its gear 11 aforesaid.

On the other hand, the electric motor does its winding on the same drum-gear 11 by first driving a worm-shaft 17 (Figs. 2 and 5) with which it is flexibly connected by a pair of riveted together leather-disks 18, said worm-shaft driving a worm-wheel 19 on a shaft 20 which in turn carries a pinion 21 meshing with a gear 22 loose on another shaft 23, said gear 22 carrying a pivoted pawl 25 adapted to drive a ratchet-wheel 26 fixed on said shaft 23, which latter at its upper end bears a pinion 24 which meshes with and winds the spring-motor through its upper drum-gear 11 aforesaid. The described pawl and ratchet-wheel permit the motor to be hand-wound as aforesaid without affecting and in spite of the worm 17 and worm-wheel 19; and also without affecting the electric motor 12.

27 is an electrical switch secured to the frame of the spring-motor and comprising electrical contacts in circuit with the electric motor 12, a reciprocating contact operating plunger 28, and automatic means which quickly and positively opens or closes said contacts as soon as the plunger has been partially moved in contact-opening or closing direction respectively. This switch may be of any suitable or well known type of snap switch, that shown comprising a slide 28^a fixed to the plunger 28 and reciprocated within the insulating casing 28^b, the slide carrying a pivoted switch member 28^c arranged to swing into and out of a position of engagement between the contacts 28^a, the latter being connected in the circuit 28^e of the motor 12. The switch member 28^c is snapped into position of engagement between the contacts 28^a to close the motor circuit when the plunger 28 is reciprocated in one direction, through the action of a tension spring 28^f, one end of which is attached to the casing 28^b and the other end of which is attached to the switch member 28^c toward the free end of the latter. Reciprocation of the plunger 28 in an opposite direction will reverse the position of the spring 28^f thus withdrawing the switch member from engagement with the contacts

28^d and thereby breaking the motor circuit. The free end of the plunger 28 is guided in a hole 29 (Fig. 3) in the motor-frame. 30 and 31 are a pair of spaced collars on the plunger which latter passes loosely through an eye in the end of the switch-operating piece 32. 32—34 are a pair of spiral springs surrounding the plunger between the respective collars 30, 31 and said switch-operating piece 32. When this piece, carried by the endwise-slidable rod 35, is raised or lowered, it first compresses one or the other of these springs 33 or 34 until that compression becomes sufficient to deliver a quick endwise partial motion to the plunger 28 of the switch whose automatic means then comes into play and continues the motion of the plunger to quickly and positively operate the contacts. The main reason however for the springs 33 and 34 is to permit the piece 32 to move on the plunger 28 after the latter is stationary in either of its fully operated positions in working the switch. The devices which call for this further movement of the piece 32 will be described later.

Means is provided for automatically operating this switch 27 consequent upon the winding and unwinding of the spring-motor so that after it has become unwound to a given or chosen extent due to playing the phonograph, the electric motor 12 will be automatically switched on through said switch 27 to rewind the spring-motor up to a given or chosen tension whereupon the contacts of said switch will be automatically opened and the electric-motor cut out of operation until again automatically cut into operation by the unwinding of the motor to the chosen extent as before. Forming part of this means is a rotary screw 36 journaled in the top and bottom motor-frame plates and resting on a single anti-friction ball bearing as best shown in Fig. 3. 37 is a flanged sleeve or nut traveling on this screw. 38 and 39 are a pair of disks turning freely on the shaft carrying said screw 36, said pair of disks being rigidly connected by rods 40 so as to turn together. These rods pass loosely through holes in the flanged nut 37; and the upper disk 38 is spur-toothed and in driven-mesh with the winding drum-gear 11 of the spring-motor. On the other hand the unwinding or power-delivering drum-gear 2 is in driving-mesh with a gear-wheel 41 fast on the shaft of the screw 36. Thus the screw 36 is driven simultaneously with the playing of the phonograph and the unwinding of the spring-motor; and this causes the nut 37 to travel downwardly on the screw until it abuts against and actuates the aforesaid piece 32 sufficiently to bring about the previously described operation of the switch 27 to cut into circuit the electric motor 12. This thereupon starts to wind up the spring-

motor which it rapidly does by rotating as above described, the upper-drum gear 11 which being also in mesh with gear 38 (Figs. 3 and 4) rapidly rotates the nut 37 so that it travels upwardly on the screw 36 in spite of the fact that the phonograph may still be playing and said screw may still be operating and tending to carry the nut downwardly on the screw. This winding by the electric motor continues until the nut 37 actuates the adjustable stop 42 and with it the rod 35 and piece 32 to operate the switch to cut the electric motor out of circuit. This automatically stops the rewind, but the playing and unwinding of the spring-motor may be still continuing; and if so, will result in the nut 37 traveling downwardly until it again actuates the piece 32 and the switch to cut in the electric motor and so on, indefinitely.

In case for any reason whatever the electric motor should fail to rewind the running spring-motor after the nut 37 has actuated the piece 32, a safety device is provided which automatically stops the spring motor and thereby prevents the nut from jamming on the screw 36 or against the disk 39 and so prevents injury to these and any other parts of the mechanism in said contingency of the failure of electric-motor to rewind. This safety-means consists of a tilting-lever 43 pivotally supported at 44 from the motor-frame, provided at one end with an eye loosely receiving the reduced end of the aforesaid slidable rod 35, and pivotally supporting at its other end a plunger 45 working through a hole in the motor-frame and surrounded by a compression spiral-spring 46 (Fig. 6). This spring normally prevents the upper end of the plunger from coming into braking contact with the disk 47. When, however, in the unwinding of the spring-motor, the nut 37 has forced the rod 35 downwardly beyond the position at which ordinarily the electric-motor would have been cut in, said rod will then press downwardly its end of the tilting lever 43 sufficiently to bring the plunger 45 (Figs. 5 and 6) into braking contact with the governor which in turn instantly stops further unwinding of the motor until it is rewound either electrically or by hand.

The parts 32 and 42 are adjustable on the rod 35 to varying distances apart to correspondingly adjust the desired times for starting and stopping the rewind of the motor. An anti-friction roller 48 is shown on the part 42 to roll on the flanged nut when the latter contacts therewith.

Finally automatic means is provided for preventing manual winding of the spring-motor through the described crank-shaft 13 from carrying the nut 37 so far upwardly on the screw 36 as to jam thereon against the gear-disk 38 to the injury of these and pos-

sibly other parts. This means comprises a tilting lever 49 (Figs. 4 and 5) pivoted at 50 to the motor-frame, at one end yieldingly pressed downwardly toward the nut by a
 5 spring 51, and at its other end having a hook 52. 53 is a pin on the manual winding-shaft 15 (Figs. 4 and 5). When the spring-motor has been wound-up manually to the extent that the nut 37 is near its upper
 10 limit on the screw 36, it will tilt the lever 49, bringing its hook 52 down so that the aforesaid pin 53 on the winding shaft strikes against it, thereby preventing any further winding up of the spring motor beyond this
 15 point.

Having thus described our invention, what we claim is:—

1. In combination with the spring-motor of a phonograph, an electric motor connected to wind said spring motor; switch-means comprising electrical contacts in circuit with the electric motor, a reciprocating plunger for operating said contacts, and automatic means associated with said
 20 plunger for shifting the same alternately in opening and closing direction to positively open and close said contacts respectively; and nut and screw means operatively related to each other and to the spring-motor for causing one of their members to travel in different
 25 directions consequent upon the winding and unwinding respectively of said motor; said member, after traveling a given distance upon the winding of the spring motor, being arranged to partially shift said plunger in contact-opening direction, and after traveling a given distance upon the unwinding of the spring motor, to partially operate the plunger in contact-closing direction.

2. In combination with the spring-motor of a phonograph, an electric motor connected to wind said spring motor; switch-means comprising electrical contacts in circuit with the electric motor; nut and screw means
 45 operatively related to each other and to the spring-motor for causing one of their members to travel in different directions consequent upon the winding and unwinding respectively of said motor; said member, after traveling a given distance upon the winding of the spring motor, being arranged to operate the switch means in contact-opening direction, and after traveling a given distance upon the unwinding of the spring motor, to operate the switch-means in contact-closing direction; means for manually winding said spring-motor; and means operated by the aforesaid traveling member, after traveling a given distance upon the manual winding
 55 of the spring motor, to prevent said motor from being over-wound.

3. In combination with the spring-motor of a phonograph, an electric motor connected to wind said spring motor; switch-means comprising electrical contacts in circuit with

the electric motor; nut and screw means operatively related to each other and to the spring-motor for causing one of their members to travel in different directions consequent upon the winding and unwinding respectively of said motor; said member, after traveling a given distance upon the winding of the spring motor, being arranged to operate the switch means in contact-opening direction, and after traveling a given distance
 70 upon the unwinding of the spring motor, to partially operate the switch-means in contact closing direction; and an automatic brake for said spring-motor which is normally released but which is applied by the aforesaid traveling member after it has traveled beyond the position wherein it operates the switch-means in contact-closing direction.

4. In combination with the spring-motor of a phonograph, an electric motor connected to wind said spring-motor; switch-means comprising electrical contacts in circuit with the electric motor; means operatively related to said spring motor having a member which travels in different directions consequent upon the winding and unwinding respectively of said motor; said member, after traveling a given distance upon the winding of the spring-motor, being arranged to operate the switch-means in contact-opening direction, and after traveling a given distance upon the unwinding of the spring-motor, to operate the switch-means in contact-closing direction; means for manually winding said spring-motor; and means operated by the aforesaid traveling member, after traveling a given distance upon the manual winding of the spring-motor, to prevent said motor from being wound to the extent of injuring the means that includes the traveling member.

5. In combination with the spring-motor of a phonograph, an electric motor connected to wind said spring-motor; switch-means comprising electrical contacts in circuit with the electric motor; means operatively related to said spring motor having a member which travels in different directions consequent upon the winding and unwinding respectively of said motor; said member, after traveling a given distance upon the winding of the spring-motor, being arranged to operate the switch-means in contact-opening direction, and after traveling a given distance upon the unwinding of the spring-motor, to operate the switch-means in contact-closing direction; and an automatic brake for said spring-motor which is normally released but which is applied by the aforesaid traveling member after it has traveled beyond the position wherein it operates the switch-means in contact-closing direction.

6. In combination with a spring motor, 130

- an electric motor connected to wind said spring motor; switch means comprising electrical contacts in circuit with said electric motor, a reciprocating contact-operating member, and automatic means which positively operates said contacts after said reciprocating member has been partially moved in contact opening or closing direction; screw and nut means operatively connected with the spring-motor to make the nut travel in opposite directions consequent upon the winding and unwinding respectively of the spring-motor; and an operating connection between said nut and the reciprocating switch-member adapted to partially actuate said member preliminary to its automatic actuation.
7. In combination with a spring motor, an electric motor connected to wind said spring motor; switch means comprising electrical contacts in circuit with said electric motor, a reciprocating contact-operating member, and automatic means which positively operates said contacts after said reciprocating member has been partially moved in contact opening or closing direction; screw and nut means operatively connected with the spring-motor to make the nut travel in opposite directions consequent upon the winding and unwinding respectively of the spring-motor; and a yielding operating connection between said nut and the reciprocating switch-member for partially actuating said member preliminary to its automatic actuation.
8. In combination with a spring motor, a winding shaft connected thereto and having a lateral projection; a rocking lever having a hooked end engageable with said projection to lock said shaft against rotation; and means acting automatically to rock said lever so as to effect such engagement, after said motor has been wound up to a predetermined extent by said shaft, thereby to prevent overwinding.
9. In combination with a spring motor, a winding shaft connected thereto and having a lateral projection; a rocking lever having a hooked end engageable with said projection to lock said shaft against rotation; means operatively related to said motor having a member which travels in different directions consequent upon the winding and unwinding respectively of said motor; and means operated by said traveling member, after traveling a predetermined distance upon the winding of said motor by said shaft, for rocking said lever so as to effect such engagement, thereby to prevent overwinding.
10. In combination with a spring motor, means operatively related to said spring motor having a member which travels in different directions consequent upon the winding and unwinding respectively of said motor; an electric motor connected to wind said spring motor; a switch in circuit with the electric motor and controlled by said traveling member; and means for automatically stopping said spring motor after said traveling member has passed beyond a position in which it closes said switch.
11. In combination with a spring motor, means operatively related to said spring motor having a member which travels in different directions consequent upon the winding and unwinding respectively of said motor; an electric motor connected to wind said spring motor; a switch in circuit with the electric motor and controlled by said traveling member; and means for automatically stopping said spring motor after said traveling member has passed beyond a position in which it closes said switch.
12. In combination with a spring motor, an electric motor connected to wind said spring motor; a switch in circuit with the electric motor and embodying a reciprocating controller having a pair of collars thereon; an operating piece for said controller connected thereto intermediate said collars; a pair of springs interposed between said operating piece and said collars; a carrier for said operating piece having a pair of stops thereon; and means operatively related to the spring motor having a member which travels forward and backward between said stops consequent upon the unwinding and winding of said spring motor, so as to alternately engage said stops and thereby shift said carrier, said operating piece and said controller first in one direction and then in the other to close and open said switch.
13. In combination with a spring motor, an electric motor connected to wind said spring motor; a switch in circuit with the electric motor and embodying an endwise-movable plunger for controlling its opening and closing actions; an operating piece connected to said plunger; a shiftable carrier for said operating piece having a pair of stops thereon; and means operatively related to the spring motor embodying a member which travels forward and backward between said stops consequent upon the unwinding and winding of said spring motor, so as to alternately engage said stops and thereby shift said carrier, said operating piece and said plunger first in one direction and then in the other to close and open said switch.
- In testimony whereof, we have signed our names to this specification, this 22d day of June, 1916.
- JOSEPH HUNTER DICKINSON.
LOUIS GREINER COLLYER,