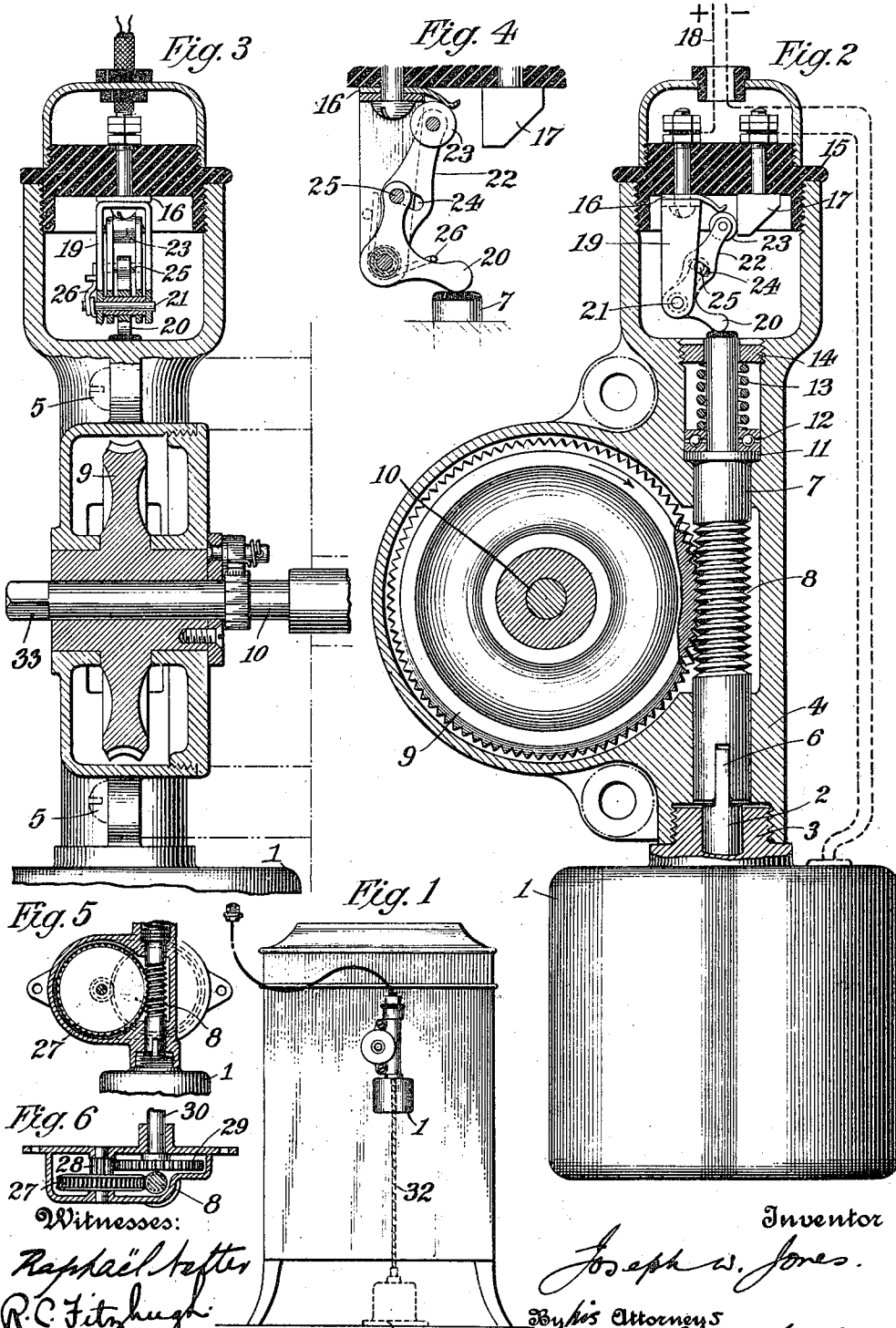


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WINDING DEVICE FOR SPRING MOTORS.
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UNITED STATES PATENT OFFICE.

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WINDING DEVICE FOR SPRING-MOTORS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOSEPH W. JONES, a citizen of the United States, and a resident of Pelham, Westchester county, New York, have invented a new and useful Improvement in Winding Devices for Spring-Motors, which invention is fully set forth in the following specification.

This invention is directed to the provision of means whereby a spring-motor is maintained under operative tension at all times.

The invention consists primarily in the combination with a spring-motor of an electric-motor and means whereby the latter automatically winds the spring-motor under pre-determined conditions and ceases when wound to a predetermined condition, thus maintaining the spring-motor in constant condition for use. One feature of the invention consists of means for automatically stopping the winding operation when the spring has been sufficiently "wound up"; another feature consists of means for re-starting the winding operation when the spring has "run down" to a point where rewinding may be deemed desirable. Other features of the invention are hereinafter set forth and claimed.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings, but it is to be expressly understood that such drawings are for the purpose of illustration only and are not meant to define the limits of the invention, reference being had to the appended claims for that purpose.

In the drawings—

Figure 1 is a side view of a graphophone cabinet having the new winding-device attached thereto;

Fig. 2 is an elevation, on a larger scale, and partly in vertical section, of the winding-device itself;

Fig. 3 is a side view, partly in vertical section, viewed from the left of Fig. 2;

Fig. 4 indicates, on a larger scale, another position of the switch at the top of Figs. 2 and 3;

Fig. 5 is a vertical section, and Fig. 6 a transverse section, on a smaller scale, of a modification.

Referring to the drawings, in which like reference-numerals designate like parts in the several figures, 1 represents the casing of a rotary electric-motor whose armature shaft 2 is journaled in the bearing 3 carried by a suitable frame 4. Frame 4 is secured in suitable position by means of screws 5 that pass through spacing-collars, indicated in dotted lines in Fig. 3. The outer end of armature shaft 2 terminates in a tongue 6 which is slidably engaged in a groove presented by the lower end of the shaft 7. Shaft 7 is suitably journaled in the frame 4, and is threaded, at 8, to operate as a worm to drive the worm-gear 9 which is connected to shaft 10 by a pawl and ratchet. The end of shaft 10 is adapted to engage and rotate the shaft of the spring-motor of the graphophone.

Around the upper end of shaft 7 the opening in the frame is enlarged to receive the flange 11, on the shaft 7, and the thrust-bearing 12, which latter is held yieldingly in position by the spring 13. The other end of the spring 13 is kept in place by the screw-ring 14 at the top of the enlargement.

At the upper end of frame 4 is an enlarged chamber to receive the switch, and into the top of the frame is secured a closure or cap 15 which serves as a support for the two binding-posts and their respective terminals 16 and 17. 18 represents the wires leading to these terminals, and having any suitable connection with the electric-motor, for example, as shown in Fig. 2. Depending from the terminal 16 is a bracket 19. 20 is an elbow pivoted at 21 to the lower end of the bracket 19. 22 is a contact-piece journaled at its lower end on pivot 21. The upper end of piece 22 is at all times in contact with terminal 16, preferably through a roller-bearing 23 to permit of greater ease in operation. The center of piece 22 presents a slot or cam 24 which engages a stud 25 carried by the upper end of the elbow 20. 26 is a spring with sufficient tension to hold elbow 20 at all times in contact with the upper end of shaft 7.

The operation of the device is as follows: Assuming the spring-motor to be in need of winding and the parts in position as shown in Fig. 2, the current is turned on through the wires 18, the electric motor is energized, the shaft 7 is made to revolve in

accordance with the revolutions of the motor, and through the worm and worm-gear 8—9 the winding of the spring of the spring-motor is begun. As soon as the spring is wound to a point where its resistance on the gear 8—9 is greater than the force exerted by the spring 13, then the shaft 7 begins to climb up, and thereby compresses the spring 13. The winding of the spring of the spring-motor continues until such time as its resistance on the gear is sufficient to overcome the force of spring 13 to such a degree that shaft 7 is raised sufficiently to throw the elbow 20 and thereby force the piece 22 out of contact with terminal 17 (from the position shown in Fig. 2 to that shown in Fig. 4), thus breaking the circuit and cutting off the current from the motor. The parts are so proportioned and adjusted that even when shaft 7 is raised to its uppermost position and sufficiently to throw the switch, the groove at its lower end is still in engagement with the tongue 6.

When the spring-motor has been used sufficiently to unwind its spring to a point where its resistance on the gear 8—9 is less than the force exerted by the (then) compressed spring 13, then the spring 13 gradually forces the shaft 7 downward. The elbow 20, because of its spring 26, follows the shaft; and, as the shaft continues to descend, the piece 22 is engaged with the terminal 17. When the contact is made the circuit is completed and current is again admitted to the motor. Thereupon, the electric-motor being put in operation, the spring-motor is again wound, through the gear 8—9, and so on.

The slot 24 in the piece 22 is not necessary, but it is a preferred form of construction; by its use the shaft 7 may be slightly raised and the elbow 20 moved in proportion before the elbow, through its stud 25, begins to throw the piece 22 out of contact with the terminal 17,—this insures the tight winding of the spring-motor before the shaft 7 reaches the uppermost point of its travel when the circuit is broken, and it also permits the operation of the parts to be less abrupt. The use of slot 24 also permits the shaft 7 to descend to approximately its lowermost position before the circuit is completed and the electric motor started.

There are three phases of operation: (1) when the spring-motor is being wound, the parts 8—9 act as an ordinary worm and worm-gear; (2) when the spring-motor is wound sufficiently tight, the parts 8—9 act as a screw and a stationary partial nut; and (3) when the shaft 7 is returning to its winding position, the parts 8—9 act as a rack and pinion.

Owing to the speed of revolution of shaft 7, it is preferable to make the worm-gear 9 of a considerable diameter in order that the

spring-motor may not be wound too rapidly. When it is desired to have the device more compact than would be permitted by the use of a large worm-gear 9, or if it is desired to have the spring-motor wound even more slowly, reduction-gearing may be used, such as shown in Figs. 5 and 6. In this last-named construction the worm-gear 27 carries a pinion 28 in mesh with a larger gear 29 keyed on the winding-shaft 30.

In Fig. 1 the winding-device is shown in connection with a graphophone. It is obvious that the device may be built into the graphophone in the first instance; or it may be used in connection with a machine carrying a manually-wound spring-motor by securing to the shaft of the spring (in place of the usual crank-handle) a second shaft carrying a worm-gear suitable for meshing with the worm 8. If the device be put to this last-named use, it may be preferable to have the electric-motor rest on the floor, in which case the armature shaft of said motor may be connected to the shaft 7 by means of a flexible shaft. This latter construction is indicated by dotted lines in Fig. 1 where the motor is designated 31 and the flexible shaft 32.

If desired, the end of shaft 10 of the spring-motor may be squared, as at 33 in Fig. 3, to receive a crank-handle by which the spring-motor may be manually wound when desired.

The frame 4 is reversible so that the shaft 7 may occupy a position upon either side of the shaft 10 and may be secured in its position by inserting the screws 5 through the frame in either direction, thus accommodating the device to spring motors wound in either direction.

The invention has been described with some detail, but only for the sake of clearness, and it is to be expressly understood that it is not limited to the precise construction, arrangement and materials set forth, but is susceptible to a variety of embodiments. Furthermore, parts of the invention can be used to the exclusion of other parts, and certain of the parts can be transposed, without departing from the spirit of the invention defined. For example, although the foregoing description names specifically an electric-motor, yet it is manifest any prime motor would be the equivalent therefor.

The following is claimed:

1. A winding attachment for the spring motor of a talking machine comprising a casing adapted to be mounted on the talking machine, a shaft carried thereby and adapted to be connected with the winding arbor of said motor, a winding motor in said casing, gearing between said winding motor and said shaft including a worm gear and a longitudinally movable worm, and means operated by the longitudinal movement of

said worm for starting and stopping said winding motor.

2. A winding attachment for the spring motor of a talking machine comprising a casing adapted to be mounted on the talking machine, a shaft carried thereby and adapted to be connected with the winding arbor of said motor, an electric motor in said casing, a switch for starting and stopping said motor, and gearing between said electric motor and said shaft including a worm and a worm gear, said worm being longitudinally movable under different tensions of the spring-motor spring to open and close said switch.

3. A winding attachment for the spring motor of a talking machine comprising a casing adapted to be mounted on the talking machine, a shaft carried thereby and adapted to be connected with the winding arbor of said motor, an electric motor in said casing connected with said shaft and adapted to rotate the same, a switch for starting and stopping said motor, and means operated by predetermined changes of tension of the spring-motor spring for opening and closing said switch.

4. A winding attachment for the spring motor of a talking machine comprising a casing adapted to be mounted on the talking machine, a shaft carried thereby and adapted to be connected with the winding arbor of said motor, a winding motor in said casing connected with said shaft and adapted to rotate the same, and means operated by predetermined changes in tension of the spring-motor spring to start and stop said winding motor.

5. A winding attachment for the spring motor of a talking machine comprising a casing adapted to be mounted on the talking machine, a shaft carried thereby and adapted to be connected with the winding arbor of said motor, a winding motor in said casing, gearing between said winding motor and said shaft including a worm gear and a worm adapted to be moved longitudinally, means opposing movement of said worm, and means for stopping said winding motor operated by the movement of said worm as the opposition of said last-named means is overcome.

6. A winding attachment for the spring motor of a talking machine comprising a casing adapted to be mounted on the talking machine, a shaft carried thereby and adapted to be connected with the winding arbor of said motor, a winding motor in said casing, gearing between said winding motor and said shaft including a worm gear and a worm urged in one direction by the tension of the spring-motor spring, means for moving said worm in the opposite direction, and means for starting said winding motor operated by the movement of said

worm as the tension of the spring-motor spring is overcome by said last-named means.

7. A winding attachment for the spring motor of a talking machine comprising a casing adapted to be mounted on the talking machine, a shaft carried thereby and adapted to be connected with the winding arbor of said motor, an electric motor in said casing, a switch for starting and stopping said motor, gearing between said electric motor and said shaft including a worm gear and a worm adapted to be moved longitudinally by the tension of the spring-motor spring, and means opposing movement of said worm, said worm moving longitudinally to open and close said switch as the tension of the spring-motor spring exceeds or is less than the opposition of said last-named means to the movement of said worm.

8. A winding attachment for the spring-motor of a talking machine comprising a casing adapted to be mounted on the talking machine, a shaft carried thereby and adapted to be connected with the winding arbor of said motor, a winding motor in said casing connected with said shaft and adapted to rotate the same, and means operated by a decrease in tension of the spring-motor spring to start said winding motor.

9. A winding attachment for the spring-motor of a talking machine comprising a casing adapted to be mounted on the talking machine, a shaft carried thereby and adapted to be connected with the winding arbor of said motor, a winding motor in said casing connected with said shaft and adapted to rotate the same, and means operated by an increase in tension of the spring-motor spring to stop said winding motor.

10. A winding attachment for the spring motor of a talking machine comprising a casing adapted to be mounted on the talking machine, a shaft carried thereby and adapted to be connected with the winding arbor of said motor, a winding motor in said casing connected with said shaft and adapted to rotate the same, an element adapted to be moved in one direction by the tension of the spring-motor spring, means for moving said element in the opposite direction, and means operated by the movement of said element for starting and stopping said winding motor.

11. A winding attachment for the spring motor of a talking machine comprising a casing adapted to be mounted on the talking machine, a shaft carried thereby and adapted to be connected with the winding arbor of said motor, an electric motor in said casing connected with said shaft and adapted to rotate the same, an element adapted to be moved in one direction by the tension of the spring-motor spring, means for moving said element in the opposite direction, and a

switch in the circuit of said electric motor opened and closed by the movement of said element.

12. A winding attachment for the spring motor of a talking machine comprising a casing adapted to be mounted on the talking machine adjacent the winding arbor of the spring motor, a shaft carried by said casing and adapted to be directly connected to said winding arbor, a winding motor in said casing connected with said shaft and adapted to rotate the same, and means carried by said casing to start and stop said winding motor.

13. A winding device for spring motors comprising a winding motor, gearing between said winding motor and the winding arbor of the spring motor including a longitudinally movable worm and a worm wheel, means operated by the longitudinal movement of said worm for starting and stopping the winding motor, and means whereby a predetermined change in the tension of the spring-motor spring will occur before said starting and stopping means is operated.

14. A winding device for spring motors comprising an electric motor, gearing between said electric motor and the winding arbor of the spring motor including a worm wheel and a worm longitudinally movable under different tensions of the spring-motor spring, a switch in the circuit of said electric motor adapted to be opened and closed by the longitudinal movement of said worm, and means whereby a predetermined change in the tension of the spring-motor spring will occur before said switch is operated.

15. A winding device for spring motors comprising an electric motor, connections between said electric motor and the winding arbor of the spring motor, a switch in the circuit of said electric motor, means operated by a change in the tension of the spring-motor spring for opening and closing said switch, and means whereby a predetermined change in the tension of said spring will occur before said switch is operated.

16. A winding device for spring motors comprising a winding motor, connections between said winding motor and the winding arbor of the spring motor, means operated by a change in the tension of the spring-motor spring for starting and stopping said winding motor, and means whereby a predetermined change in the tension of said spring will occur before said last-named means is operated to start or stop said winding motor.

17. A winding device for spring motors comprising a winding motor, gearing between said winding motor and the winding arbor of the spring motor including a worm wheel and a worm adapted to be moved longitudinally, means opposing movement

of said worm, means for stopping said winding motor as the opposition of said last-named means is overcome, and means whereby a predetermined change in the tension of the spring-motor spring will occur before said stopping means is operated.

18. A winding device for spring motors comprising a winding motor, gearing between said winding motor and the winding arbor of the spring motor including a worm wheel and a worm urged in one direction by the tension of the spring-motor spring, means for moving said worm in the opposite direction, means for starting said winding motor operated by the movement of said worm as the tension of the spring-motor spring is overcome by said last-named means, and means whereby a predetermined change in the tension of the spring-motor spring will occur before said starting means is operated.

19. A winding device for spring motors comprising an electric motor, gearing between said electric motor and the winding arbor of the spring motor including a worm wheel and a worm adapted to be moved longitudinally by the tension of the spring-motor spring, a spring opposing movement of said worm, a switch in the circuit of said electric motor opened and closed by the movement of said worm as the tension of the spring-motor spring is greater or less than the tension of said last-named spring, and means whereby a predetermined change in the tension of the spring-motor spring will occur before said switch is operated.

20. A winding device for spring motors comprising an electric motor connected to the winding arbor of the spring motor, an element adapted to be moved by the tension of the spring-motor spring, means opposing movement of said element, a switch in the circuit of said electric motor opened and closed by the movement of said element as the tension of the spring-motor spring is greater or less than the opposition of said last-named means, and means whereby a predetermined change in the tension of the spring-motor spring will occur before said switch is operated.

21. A winding device for spring motors comprising a winding motor connected to the winding arbor of the spring motor, an element adapted to be moved by the tension of the spring-motor spring, means opposing movement of said element, means for stopping said winding motor operated by the movement of said element as the tension of the spring-motor spring overcomes the opposition of said last-named means, and means whereby a predetermined change in the tension of the spring-motor spring will occur before said winding motor is stopped.

22. A winding device for spring motors

comprising a winding motor connected to the winding arbor of the spring motor, an element urged in one direction by the tension of the spring-motor spring, means for moving said element in the opposite direction, means for starting said winding motor operated by the movement of said element as the tension of the spring-motor spring is overcome by said last-named means, and means whereby a predetermined change in the tension of the spring-motor spring will occur before said winding motor is started.

23. A winding device for spring motors comprising a winding motor, connections between said motor and the winding arbor of the spring motor, means for stopping the winding motor operated by the tension of the spring-motor spring, means for starting said winding motor, and means whereby a predetermined change in the tension of the spring-motor spring will occur before said winding motor is stopped.

24. A winding device for spring motors comprising an electric motor, a switch in the circuit of said electric motor, connections between said electric motor and the winding arbor of the spring motor, means operated by the tension of the spring-motor spring to operate said switch, and means whereby a predetermined change in the tension of the spring-motor spring will occur before said switch is operated.

25. A winding device for spring motors comprising a winding motor adapted to be connected to the winding arbor of the spring motor, an element adapted to be moved by the tension of the spring-motor spring, means for opposing movement of said element, means operated by said element for starting and stopping the winding operation as the tension of the spring-motor spring is less or greater than the opposition of said last-named means, and means

whereby a predetermined change in the tension of the spring-motor spring will occur before the winding operation is started or stopped.

26. A winding device for spring motors comprising an electric motor having a rotary-armature shaft, gearing between said shaft and the winding arbor of the spring motor including a worm wheel and a worm coaxial with said shaft and adapted to be moved longitudinally by the tension of the spring-motor spring, and a switch in the circuit of the electric motor operated by the movement of said worm.

27. A winding device for spring motors comprising an electric motor having a rotary-armature shaft, gearing between said shaft and the winding arbor of the spring motor including a worm wheel and a worm adapted to be moved longitudinally by the tension of the spring-motor spring, means opposing movement of said worm, and a switch in the circuit of said electric motor opened and closed by the movement of said worm as the tension of the spring motor spring is greater or less than the opposition of said last-named means.

28. A winding device for spring motors comprising an electric motor having a rotary-armature shaft connected to the winding arbor of the spring motor, an element adapted to be moved by the tension of the spring-motor spring, means for moving said element in the opposite direction, and a switch in the circuit of said electric motor opened and closed by the movement of said element.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOSEPH W. JONES.

Witnesses:

C. A. L. MASSIE,
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