May 31, 1932. S. REES 1,861,066

SPRING MOTOR FOR GRAMOPHONES AND OTHER PURPOSES

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FIG. 1

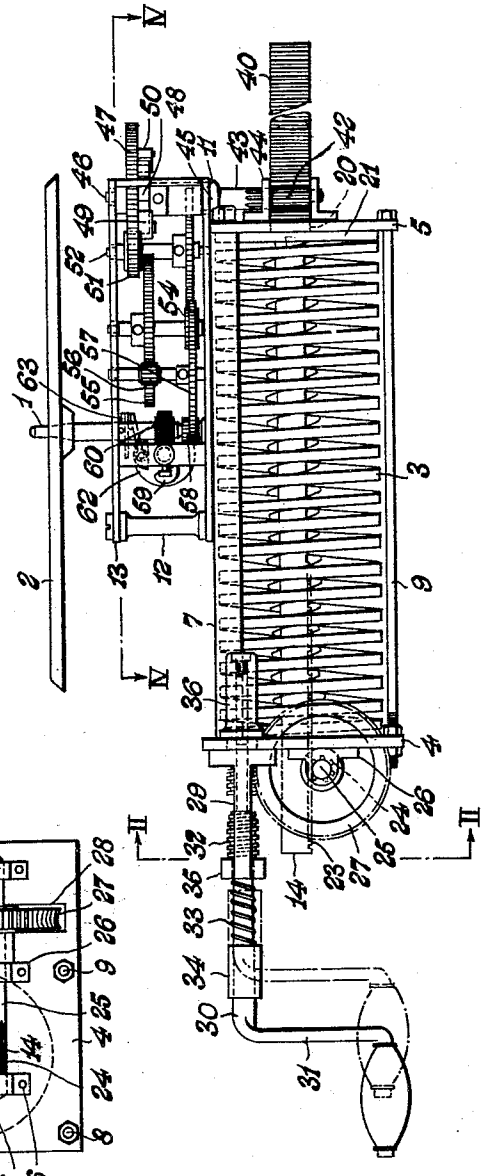
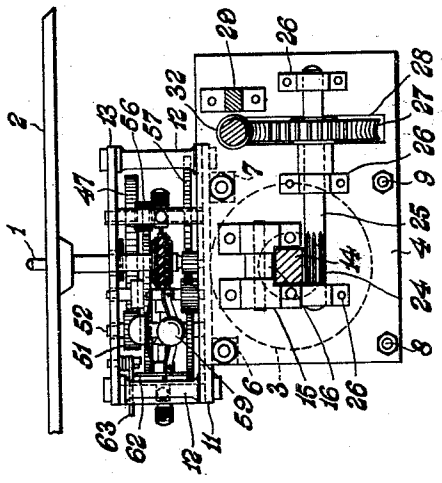


FIG. 2



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FIG. 4.

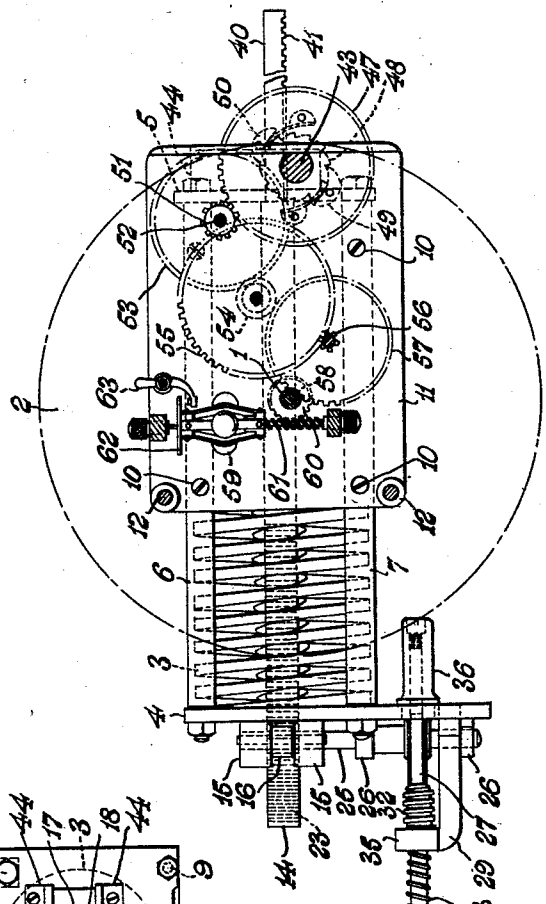
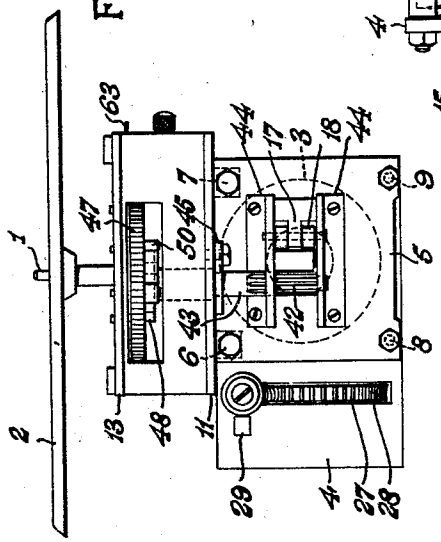


FIG. 3.



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Patented May 31, 1932

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UNITED STATES PATENT OFFICE

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SPRING MOTOR FOR GRAMOPHONES AND OTHER PURPOSES

Application filed October 1, 1930, Serial No. 485,732, and in Great Britain October 3, 1929.

This invention relates to spring motors, and has more especial reference to the motors employed for the purpose of rotating the turntables of gramophones.

Hitherto it has been the practice to employ a flat spring of considerable length wound around a shaft or spindle in a fashion similar to the customary spring, but it has been found impracticable with such arrangements to store up sufficient power to play more than four records consecutively.

The present invention has for its object to provide an improved construction of spring motor, which when applied to a gramophone will be capable of playing a large number, e. g. twelve, records at a single winding, while at the same time being durable and of an extremely robust construction and free from the liability of damage due to mishandling and in which the spring may be readily locked in the winding position without the necessity of providing separate locking means therefor.

To this end, the winding means for the motor also constitutes a locking device therefor.

Reference will now be made to the accompanying drawings which illustrate by way of example a preferred embodiment according to the invention.

Fig. 1 is a side elevation illustrating the embodiment fitted with a gramophone turntable;

Fig. 2 is a section looking from the left on the line II—II of Fig. 1;

Fig. 3 is an end view looking from the right of Fig. 1; and

Fig. 4 is a sectional plan on the line IV—IV of Fig. 1.

Referring now to the drawings, 1 is the driven spindle shown carrying a record turntable 2 as customarily employed in a gramophone, 3 representing the main spring which according to the invention is of a helical nature and of great strength, and which is shown mounted between two main side plates 4 and 5 secured together by robust tie bars 6 and 7 at their upper edge, and by adjustable tie rods 8 and 9 at their lower edge.

Mounted on the upper tie bars 6 and 7 and secured thereto by bolts 10 is a rectangular horizontal plate 11 forming the base of the clockwork mechanism which is provided with four upstanding corner posts 12 carrying a top plate 13 the gear drive for the spindle 1 being located between the plates 11 and 13.

14 is a rectangular section bar located axially of the spring 3 and sliding in slots in the main plates 4 and 5, the end plate 4 being provided with a bearing 15 for a roller 16 bearing on the upper surface of the bar 14 and the end plate 5 being provided with a bearing 17 for a guide roller 18, the bar 14 being of reduced section where it passes through the spring 3 thus providing a flange 20 against which is located a rigid disc 21 forming a thrust face for the right hand end of the helical spring 3. The other end of the spring abuts against the end wall 4 and may be secured thereto in any suitable manner, say by rivets if desired.

In the example illustrated the helical spring 3 is arranged to function under compression, although by suitable modification a tension spring may be readily employed.

The left hand end of the bar 14 is arranged on its underside with rack teeth 23 engaged by spur teeth 24 formed on a transverse shaft 25 mounted in bearings 26 in the end plate 4 and carrying a worm wheel 27 for the accommodation of which a slot 28 is provided in the end plate 4.

29 is a bracket projecting from the end plate 4 and provided with bushings carrying the shaft 30 of a winding crank 31, the worm 32 being fixed to the shaft 30 for engagement with the worm wheel 27 to effect the winding operation.

Normally, however, the worm 32 is maintained out of engagement with the worm wheel 27 by a spring 33 which engages a boss 34 on the crank handle shaft 30 and forces it outwardly from the end bushing 35 of the bracket 29.

When it is required to compress the spring 3 the handle 31 is pressed inwardly to overcome the tension of the spring 33 and the handle rotated so that the worm 32 is threaded into engagement with the worm wheel 27.

At the position of proper engagement the worm abuts with a thrust bearing 36 provided in the end plate 4 and suitably lubricated, further rotation of the handle 31 being transmitted through the worm reduction gear to the shaft 25 and thence through the pinion 24 and the rack teeth 23 into linear motion of the bar 14 which is thus moved slowly to the left, while effecting compression of the helical spring 3 by reason of the thrust plate 21 engaging the right hand end thereof.

The teeth 23 extend along the underside of the bar 14 for a distance commensurate with the maximum compression desired for the spring, and it will be seen that with the worm reduction gear illustrated only a comparatively small winding effort is necessary in spite of the heavy resistance of the helical spring 3.

When the worm 32 is engaged with the wheel 27 it will be seen that the power stored in the spring 3 will tend to draw the bar 14 to the right and through the shaft and gear 24 and 27 cause the worm 32 to abut the plate 4; consequently the movement of the bar to the right is prevented and a positive lock for the spring in its wound position provided. This spring is released, when desired, by withdrawing the worm out of engagement with the wheel 27 by reverse rotary movement. By this arrangement adequate control of the strong spring 3 is obtained and the load on the gear train driven by the spring, (which train, will usually include an auxiliary braking disc, as hereinafter described) is removed.

The portion 40 of the bar 14 projecting through the right hand plate 5 is also arranged with rack teeth, these being identified by the numeral 41 and being located on the front face of the bar which is shown of flattened section at this point, the teeth 41 engaging on the spur teeth 42 formed on a vertical spindle 43 carried in bearings 44 on the end plate 5, and the spindle 43 projecting upwardly through the top and bottom plates 11 and 13 of the clockwork mechanism, being carried in bearings 45 and 46 therein, these bearings being preferably of phosphor bronze or other bearing material.

47 is a large spur wheel loosely mounted on the spindle 43 but connected thereto for rotation in one direction, i. e. the driving direction, by a one-way ratchet device 48 which, owing to the large force available in the spring 3, is preferably provided with duplicate pawls 49 and 50 spring pressed into engagement with said ratchet wheel 48.

A large mechanical advantage is obtained for the turntable spindle 1 by the spur wheel 47 driving a small spur pinion 51 mounted on a vertical shaft 52 carrying a second spur wheel 53 engaging a second spur pinion 54, the train being completed through the spur wheel 55, spur pinion 56, spur wheel 57 and spur pinion 58, thus obtaining a mechanical advantage in the neighbourhood of 300.

To maintain the speed of the turntable 2 substantially constant over the whole range a centrifugal governor 59 is provided of usual type driven from the turntable shaft 1 by helical gears 60 and 61, the governor shaft being also provided with a brake disc 62 with which a shoe on a brake lever 63 of customary form may co-operate to effect stoppage of the motor when required.

In operation compression of the helical spring 3 is effected by engaging the worm 32 with the worm wheel 27 and rotating the handle 31, thus effecting movement of the bar 14 to the left, the ratchet device 48 permitting the rotation of the vertical shaft 43 consequent on this operation without the movement being transmitted to the spur wheel 47 in the turntable train.

After the spring has been fully compressed or compressed so much as required, the handle 31 is rotated in a reverse direction to disengage the worm 32 from the worm wheel 27 when the spring 33 projects the handle to the position shown in Figs. 1 and 2, the motor being then ready for operation as soon as the brake lever 63 is released.

With the arrangement of spring motor according to the present invention applied to a gramophone a dozen records can be played consecutively for a single winding operation while the motor noises often present in gramophones are substantially eliminated owing to the longitudinal expansion of the helical spring in place of the spiral expansion of the customary clock spring.

It will be understood that the embodiment illustrated is shown by way of example, and that the general configuration can be altered to suit individual requirements, while the invention is readily applicable to other mechanism requiring a source of power such, for instance, as time records or toy vehicles.

In order to lighten the motor the end plates and framework may be formed from sheet aluminium or other suitable alloy, while the winding handle is conveniently made detachable to facilitate assembly.

What I claim is:—

A spring motor for driving gear wheel trains comprising in combination a spring of great strength, a toothed rack disposed longitudinally of said spring, means for connecting said spring and said rack so that the force of the spring is imparted to said rack, means for winding up the spring to its position for giving out the said force and for locking said spring in said position when desired, comprising shaft and gear mounted in the frame of the motor, teeth on said shaft and gear engaging with said rack, further teeth on said shaft and gear, a slidable winding crank, a worm wheel carried by the shaft of said crank and adapted to be slidden by rotary

movement into engagement with said further teeth on said shaft and gear for winding the spring, and a stop against which said worm wheel is adapted to abut under the force in said spring whereby the latter is locked in the wound position and may be released when desired, by withdrawing the worm from said further teeth by reverse rotary movement.

In testimony whereof I affix my signature.

SILAS REES.