C. H. KOLLING.

SPRING MOTOR.

APPLICATION FILED JULY 3, 1920.

1,403,039.

Patented Jan. 10, 1922.

2 SHEETS—SHEET 1.

Fig 1

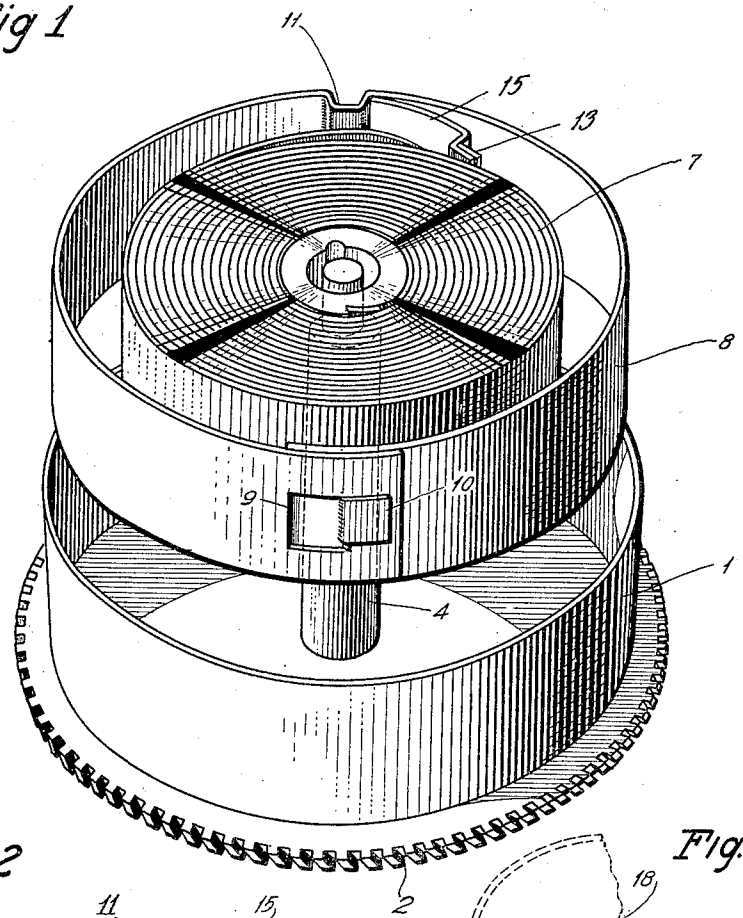


Fig. 2

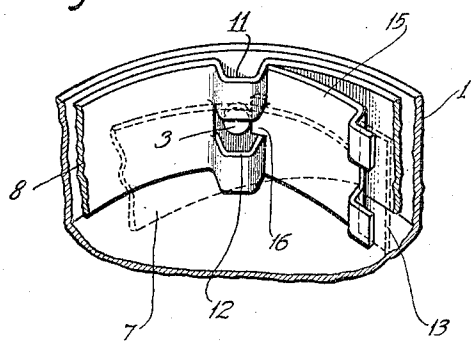


Fig. 3

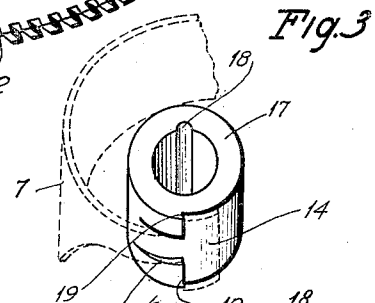
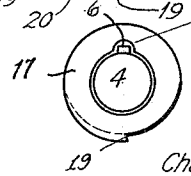


Fig 4



INVENTOR

Charles H. Kolling

BY Jas. H. Griffin

ATTORNEYS

C. H. KOLLING.

SPRING MOTOR.

APPLICATION FILED JULY 3, 1920.

1,403,039. Patented Jan. 10, 1922.

2 SHEETS—SHEET 2.

Fig. 5

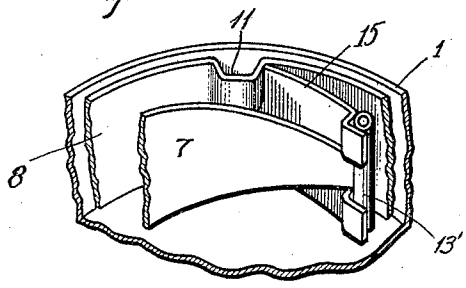


Fig. 6

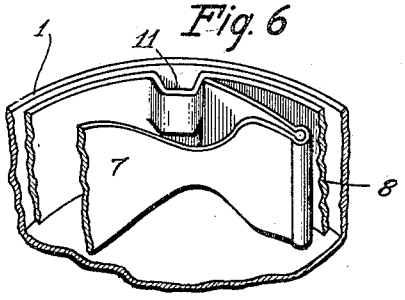


Fig. 8

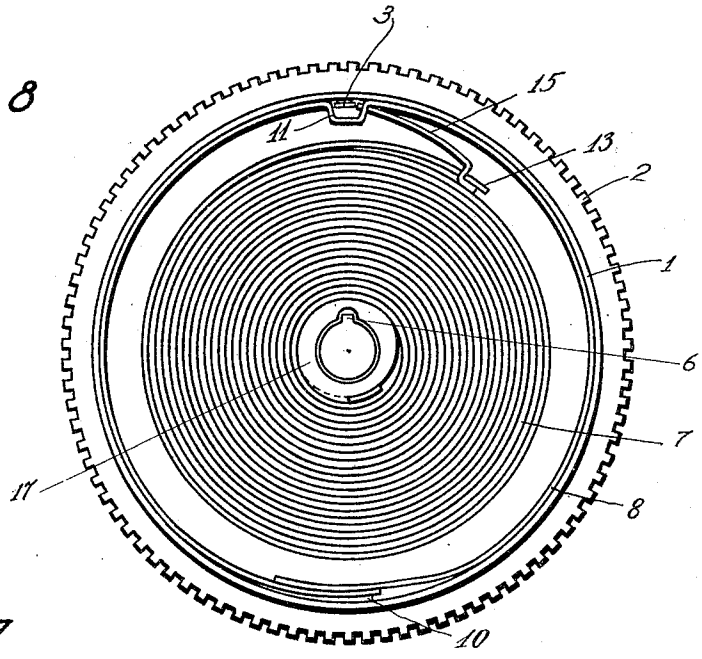
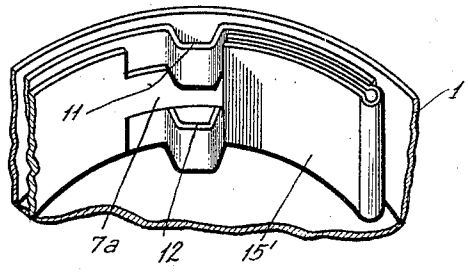


Fig. 7



INVENTOR

Charles H. Kolling

BY Jas. H. Griffin

ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES H. KOLLING, OF JERSEY CITY, NEW JERSEY, ASSIGNOR OF ONE-FOURTH TO OSCAR A. WEISSENBORN AND ONE-FOURTH TO REINHOLD PRIETZ, BOTH OF JERSEY CITY, NEW JERSEY.

SPRING MOTOR.

1,403,039. Specification of Letters Patent. Patented Jan. 10, 1922.

Application filed July 3, 1920. Serial No. 393,867.

To all whom it may concern:

Be it known that I, CHARLES H. KOLLING, a citizen of the United States, residing at Jersey City, county of Hudson, and State of New Jersey, have invented certain new and useful Improvements in Spring Motors, of which the following is a specification.

This invention relates to the spring motors of talking machines or phonographs, and is more particularly directed to improvements in the means for securing the ends of the convolute spring with which these motors are provided.

Spring motors for phonographs are usually housed within a cup which surrounds the stub shaft of the turn table, one end of the spring being secured to the cup and the other end to the shaft. The spring is wound by either a manually or mechanically rotating cup and exerts rotative force upon the shaft for the purpose of actuating the turn table. It is the usual practice to provide the opposite ends of the spring with holes, which are adapted to hook over and engage with rivets positioned on the cup and shaft, respectively, for the purpose of anchoring the opposite ends of the spring in place.

As the phonograph springs are, however, subjected to excessive strains, more particularly due to inexperienced persons winding the spring too tightly, there is a marked tendency of the springs to tear away from the rivets and become loose. Moreover, even though the springs do not immediately tear loose upon being wound too tightly, the rigid anchoring of its ends frequently causes the spring to break intermediate its ends when wound too tightly.

Numerous expedients have been resorted to to overcome the tearing of the springs at their ends, but in every instance, so far as I am aware, the anchorage at the ends of the spring was of a rigid nature and did not allow the spring to give in such manner as to preclude breakage when overwound.

When a phonograph spring breaks, it is the custom to supply a new spring and as these new springs are under more or less tension and are of a strong stiff character, they are usually sold in a coiled up or tensioned form, being maintained under tension by a strip of bale wire or a heavy clamp embracing the spring. It is very difficult to get one of these springs into the cup of the motor, since it must be very carefully positioned so as to project partially into the cup and the bale wire or clamp slipped off, so that when the spring suddenly expands, it will be positioned within the cup. Even when the spring is in the cup, it is a laborious and time consuming task to anchor the ends of the spring to the shaft and cup, since the holes in the ends of the spring must be brought into register with the rivets of the cup and shaft and thereafter forced thereover into place.

With these difficulties of prior practice in mind, the object of the present invention is to provide a spring motor so constituted that the spring is at all times housed within a retaining band removably positioned within the cup of the motor, so that it may be readily withdrawn in the event of breakage and a new retainer with a spring operatively associated therewith, readily inserted into the cup to take the place of the broken or damaged spring removed.

A further and very important feature of the present invention resides in the novel manner of anchoring the ends of the spring, through the employment of means which greatly minimizes the strain placed on the spring due to overwinding and enables the assembly of the present invention to be associated with standard motor cups in a simple and expeditious manner.

Features of the invention, other than those adverted to, will be apparent from the hereinafter detailed description and claims, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate different practical embodiments of the invention, but the constructions therein shown are to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a perspective view of spring motor structure embodying the present invention, showing a spring and its retainer as removed from the spring cup of the motor.

Figure 2 is a fragmental detail perspective of the spring retainer in position within the cup, and illustrating the manner in which the outer end of the spring is anchored to the retainer.

Figure 3 is a fragmental detail perspec-

tive showing the manner in which the inner end of the spring is anchored to a sleeve adapted to cooperate with the stub shaft of the turn table.

Figure 4 is a plan view of the sleeve and shaft.

Figures 5 and 6 are views corresponding to Fig. 2, but illustrating slightly modified forms of anchorage means for the outer end of the spring;

Figure 7 shows a further modified form of spring anchorage means; and,

Figure 8 is a plan view of the spring cup with the spring and retainer positioned therein, the structure shown in this figure being that disclosed in Figure 1.

In spring motors as now constructed, the motor embodies a spring cup 1 adapted to house the spring and provided with a gear 2 by means of which the spring may be placed under tension. The cup is provided on the interior of its side wall with a rivet or pin 3 and coaxially of the cup extends a stub shaft 4, the upper end of which is stepped down as shown to a smaller diameter to receive a bearing in which it rotates. The stub shaft 4 is provided with a pin or rivet 6 adapted, in the prior structures, to normally engage an aperture on the inner end of the spring while a similar aperture at the outer end of the spring is adapted for engagement with the pin 3 on the cup.

In accordance with the present invention, a spring 7 is not adapted for cooperation directly with either of the pins 3 or 6, but is associated with said pins through intermediate means, whereby the springs may be sold in compacted form and ready to be slipped into the cup and over the shaft without the need of expert, mechanical knowledge or ability.

In packaging the springs in accordance with this invention, I employ a retainer 8. This retainer may be in the form of a sheet metal strip of substantially the same width as the spring, said strip being bent into annular form as shown in Figure 1 with its ends locked together. This joining of the ends can be readily accomplished by punching a hole 9 in one end of the strip and stamping out a tongue 10 on the other end, so that the tongue may be hooked through the hole 9 in the manner clearly shown in Figure 1.

When the ends of the strip are joined together, an annular retainer is formed having an exterior diameter substantially the same as the interior diameter of the cup 1, and during the course of manufacture of these retainers, they are struck up at one point in their circumference to provide a reentrant portion 11 adapted, when the retainer 8 is dropped into the cup 1, to register with the pin 3 and lock the retainer against rotation relative to the cup. A portion of the struck up portion 11 is cut away at 12 for reasons hereinafter more clearly set forth.

The spring 7 of the present invention is made in general respects the same as the springs heretofore used except that its ends are differently shaped. Thus we find in the construction of Figures 1 and 2 that the outer end of the spring is provided with a T-end 13, while in Figure 3 the inner end of said spring is shown as provided with a correspondingly shaped T-end 14. The shaping of the outer end of the spring as described is to enable the same to properly cooperate with an anchor plate 15, one end of which is off set and bifurcated to interlock with the T-end 13, as shown in Figure 2, and the other end of which is provided with a projection 16 adapted to enter the cut away portion 12 of the struck up portion 11 of the retainer. By thus associating the parts, it will be apparent that the projection 16 will preclude the anchor plate 15 from slipping edgewise with respect to the retainer, while tension on the spring 7 will cause the anchor plate to be forced tightly against the struck up portion 11, so that the parts will partake of the position shown in Figures 1, 2 and 8. As the spring is placed under tension, the anchor plate will properly support the outer end 13 of the spring, but the bifurcated end of said plate will swing outwardly into engagement with the outermost coil of the spring and in this manner form an effective anchorage for the outer end of the spring.

In Figure 2, the outer end of the spring is shown as having a flat T-end, but, in practice, this flat T-end 13 may be rolled as shown at 13′ in Figure 5.

The anchorage means for the inner end of the spring is shown as embodying a sleeve 17, having an interior diameter enabling it to be readily passed over the stub shaft 4 and provided at its interior with a slot or keyway 18 adapted to cooperate with the pin 6 for the purpose of locking the sleeve against rotation on the shaft. The outer surface of the sleeve is formed on involute lines providing a shoulder 19, which is cut away for a short distance as at 20, to enable the inner T-end 14 of the spring to engage with the shoulder as clearly shown in Figure 3. In practice, I form the retainer 8, interlock the ends thereof as described, and position the spring within the retainer with its outer end associated with the anchor plate 15, and its inner end associated with the sleeve 17. The spring expands within the confines of the retainer and maintains itself and the anchor plate in position. The sleeve 17 is loose and is sold as a part of the attachment.

In applying this arrangement to a machine having a broken spring, it is only

necessary to remove the old spring, drop the spring retainer with its associated spring into the spring cup, press the sleeves 17 on to the shaft and put the motor back into the phonograph case, whereupon the winding up of the spring will automatically bring the inner end thereof into engagement with the shoulder 19 of the sleeve, while the outer end of the spring is anchored at all times by the anchor plate.

An obvious advantage of this construction is the absence of holes in the spring and the necessity of fitting such holes over the pins of the shaft and cup. By eliminating the attaching holes, greater strength is imparted to the spring and the T-ends referred to are not so apt to tear out or break away as are the holes hereinbefore referred to.

In the preferred embodiment of the invention, the anchor plate is shown as formed separate from the spring, but this plate may be made integral with the spring after the manner shown in Figure 6. In either event, this pivotal method of attachment will eliminate the disadvantages of a rigid anchorage such as the fitting of a hole in the spring over a rivet on the cup, since the anchorage means described will give more or less and bring the winding operation to a slow stop if the spring should be overwound.

The advantage inherent in the use of the sleeve, is that the spring will automatically anchor itself on the sleeve. That is to say, the T-end 14 will slide around the circumference of the sleeve until it engages with the shoulder and thereupon become locked thereto, whereas, in the prior structures it was necessary for the operator to draw out the spring edgewise and with a great deal of care hook the hole in the inner end of the spring over the pin on the shaft. Such care and manipulation is entirely unnecessary for the present invention.

In Figure 7, a modified form of anchoring means is shown. The outer end of the spring is formed substantially the same as shown in Fig. 6, but the anchor plate 15′ of Figure 7 is shown as positioned adjacent the inner face of the spring instead of adjacent the outer face thereof. The free end of the anchor plate 15′ rests against the upset portion 11 of the spring retainer as in Figure 6, but the adjacent reduced portion 7^a of the spring passes between the anchor plate and the interior surface of the retainer and through the cut out portion 12 of the stepped up part 11. In the construction of Figure 7, the advantage of the swinging or tilting of the anchor plate, when the spring is wound tight is not present, but several advantages of the anchor plate broadly are still availed of.

All of the illustrated forms of the invention have the advantage of minimizing the wear and tear on the spring and when the spring is housed within a retainer, the same may be readily positioned within the cup to replace a broken spring in a simple, efficient and economical manner and without the requirement of any mechanical skill whatsoever.

It will be apparent from the foregoing detailed description, that the present invention embodies several novel features, some of which may be employed in spring motor construction without necessarily employing all. Accordingly, the present invention is not limited to the specific combination of parts described, but it is to be understood as broadly novel as is commensurate with the appended claims.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent is:

1. A spring retainer for a motor spring embodying an annular band adapted to embrace the spring and provided with a reentrant portion on its outer circumference, said retainer being of a diameter to be readily received within the cup of a spring motor and the reentrant portion being so positioned as to engage with the projection on the interior of said cup and lock the retainer against rotation relative to the cup.

2. A spring retainer for a motor spring embodying an annular band adapted to embrace the spring and provided with a reentrant portion on its outer circumference, said retainer being of a diameter to be readily received within the cup of a spring motor and the reentrant portion being so positioned as to engage with the projection on the interior of said cup and lock the retainer against rotation relative to the cup, and means associated with the reentrant portion of the retainer for anchoring the outer end of the spring thereto.

3. A spring retainer for a motor spring embodying an annular band of substantially the same exterior diameter as the interior diameter of the motor car, said band being provided on its outer periphery with a channel extending parallel to the axis of the band, whereby, when the retainer is introduced into the cup, the channel of said retainer is adapted to cooperate with means on the interior of the cup to lock the retainer and cup against relative rotation.

4. A spring retainer for a motor spring embodying an annular band of substantially the same exterior diameter as the interior diameter of the motor cup, said band being provided on its outer periphery with a channel extending parallel to the axis of the band, whereby, when the retainer is introduced into the cup, the channel of said retainer is adapted to cooperate with means on the interior of the cup to lock the retainer and cup against relative rotation,

and means for anchoring the outer end of the spring to the retainer.

5. A construction of the class described embodying a retainer adapted to embrace a motor spring and proportioned to seat in a cup of a spring motor, a member, separate of the spring pivotally associated with the retainer and also pivotally associated with the outer end of the spring for pivotally anchoring the outer end of the spring to the retainer, means for precluding rotation between the retainer and the motor cup, and means for operatively connecting the inner end of the spring to the motor shaft.

6. In a construction of the class described, a motor embodying a cup, a projection on the interior of said cup, and a motor shaft positioned coaxially of the cup, in combination with a spring retainer adapted to seat in said cup and provided with a peripheral channel extending in a direction parallel to the axis of the retainer and adapted to cooperate with the projection on the cup, when the retainer is positioned therein, to lock the retainer against rotation relative to the cup.

7. In a construction of the class described, a motor embodying a cup, a projection on the interior of said cup, and a motor shaft positioned coaxially of the cup, in combination with a spring retainer adapted to seat in said cup and provided with a peripheral channel extending in a direction parallel to the axis of the retainer and adapted to cooperate with the projection on the cup, when the retainer is positioned therein, to lock the retainer against rotation relative to the cup, a spring positioned within the retainer, means for anchoring the inner end of the spring to the shaft, and means for anchoring the outer end of the spring against a shoulder formed on the interior of the retainer.

8. A spring retainer embodying an annular band provided on its interior with a shoulder, a spring positioned within said retainer, and an anchor plate associated with the outer end of the spring and with the shoulder of the retainer for anchoring the outer end of the spring to the retainer.

9. A spring retainer embodying an annular band provided on its interior with a shoulder, a spring positioned within said retainer, a pivotally movable anchor plate, and an anchor plate associated with the outer end of the spring and with the shoulder of the retainer for anchoring the outer end of the spring to the retainer.

10. A spring retainer embodying an annular band provided on its interior with a shoulder, a spring positioned within said retainer, and a compression member, one end of which is associated with the outer end of the spring and the other end of which is adapted, when the spring is placed under tension, to bear against the shoulder of the retainer, for the purpose of anchoring the outer end of the spring to the retainer.

11. A spring retainer embodying an annular band provided on its interior with a shoulder, an anchoring member engaging with the shoulder and pivotal with respect thereto, and a spring positioned within the retainer and pivotally associated with the anchoring member.

12. A spring retainer embodying an annular band provided on its interior with a shoulder, a spring positioned within said retainer, and a compression member, one end of which is associated with the outer end of the spring and the other end of which is adapted, when the spring is placed under tension, to bear against the shoulder of the retainer, for the purpose of anchoring the outer end of the spring to the retainer, and means associated with the compression member and the shoulder of the retainer for precluding edgewise displacement of the compression member.

13. A spring retainer embodying an annular band provided with an interior shoulder, a spring positioned within the band and provided with an outer T-shaped end, and a compression member, one end of which is bifurcated to interlock with the T-shaped end of the spring and the other end of which is shaped to engage with the shoulder of the retainer.

14. A spring retainer embodying an annular band provided with an interior rib extending transversely of the band and the central portion of which is cut away, a spring positioned within the retainer and the other end of which spring is provided with an interlocking portion, a compression member provided at one end with an interlocking portion adapted to interlock with the interlocking portion on the end of the spring, and the other end of which is adapted to seat against the rib and is provided with a projection extending into the cut away portion thereof.

15. A spring retainer embodying an annular band provided with an interior transverse rib, a spring positioned within the retainer and provided on its outer end with an interlocking portion, and a compression member provided at one end with an interlocking portion adapted to engage with the interlocking portion of the spring and the other end of which compression member is adapted to seat against the rib of the retainer.

16. A spring retainer embodying an annular band, a spring positioned interiorly of said band, and having a T-shaped inner end, means for anchoring the outer end of the spring to the band, a pair of alined shoulders associated with the central shaft of the motor with which the retainer is adapted for cooperation, said shoulders

being adapted to be engaged by the T-shaped end of the spring to operatively connect the inner end of the spring to the motor shaft.

17. In an assembly of the class described, a motor cup, provided with an interior projection, and a shaft coaxial with said cup and also provided with a projection, in combination with a spring retainer adapted to seat in the cup and provided at its outer periphery with a transverse channel, a spring positioned within the retainer, means for anchoring the outer end of the spring to the retainer, a sleeve positioned within the spring, and provided with an interior longitudinal channel, and means for anchoring the interior end of the spring to the exterior end of the sleeve, whereby the spring with its retainer and sleeve may be introduced into the cup to bring the channel of the retainer into cooperative relation with the projection on the cup and the channel of the sleeve into cooperative engagement with the projection on the shaft, for the purpose of simultaneously locking the retainer against rotation relative to the cup and the sleeve against rotation relative to the shaft.

In testimony whereof, I have signed my name to this specification.

CHARLES H. KOLLING.