May 13, 1941. E. V. SCHNEIDER 2,241,483

COMPENSATING TURNTABLE DRIVE

Filed Nov. 18, 1940 3 Sheets-Sheet 1

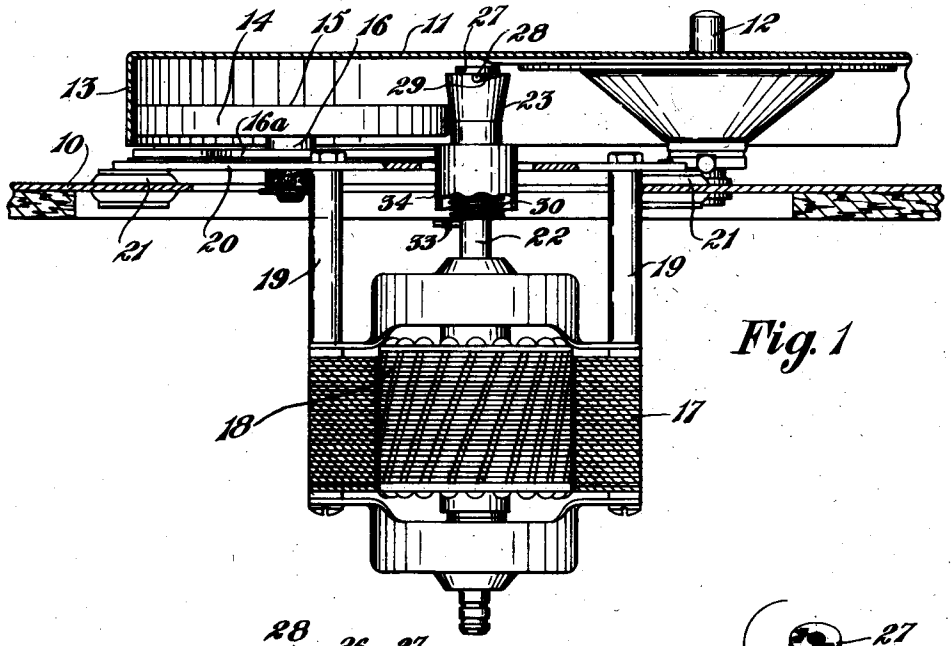


Fig. 1

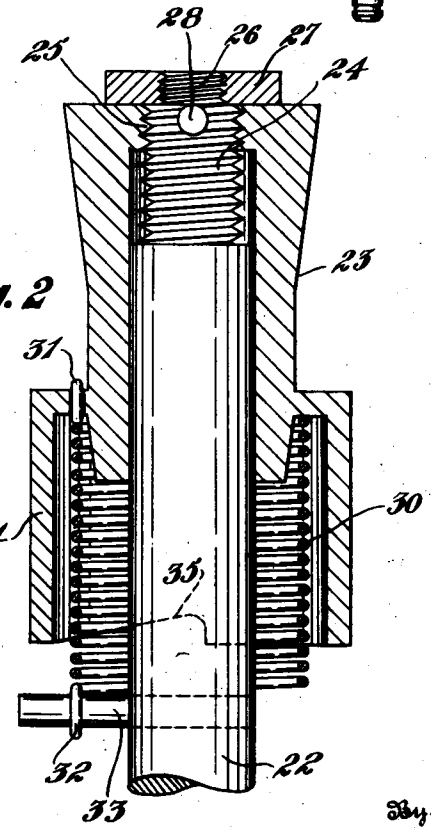


Fig. 2

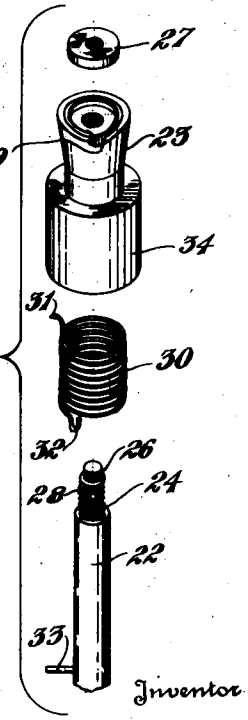


Fig. 3

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May 13, 1941. E. V. SCHNEIDER 2,241,483

COMPENSATING TURNTABLE DRIVE

Filed Nov. 18, 1940 3 Sheets-Sheet 2

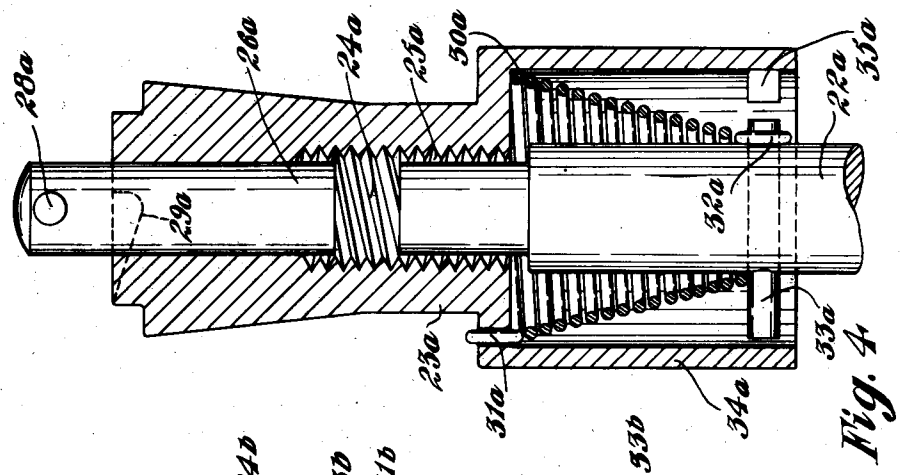


Fig. 4

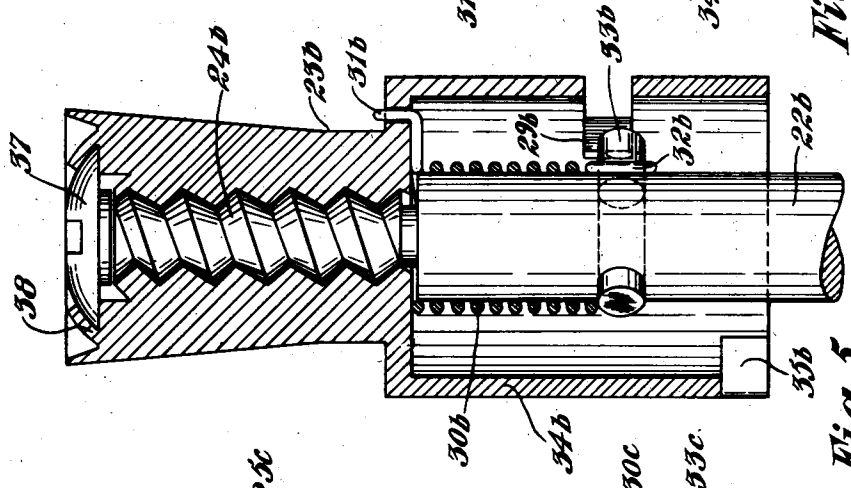


Fig. 5

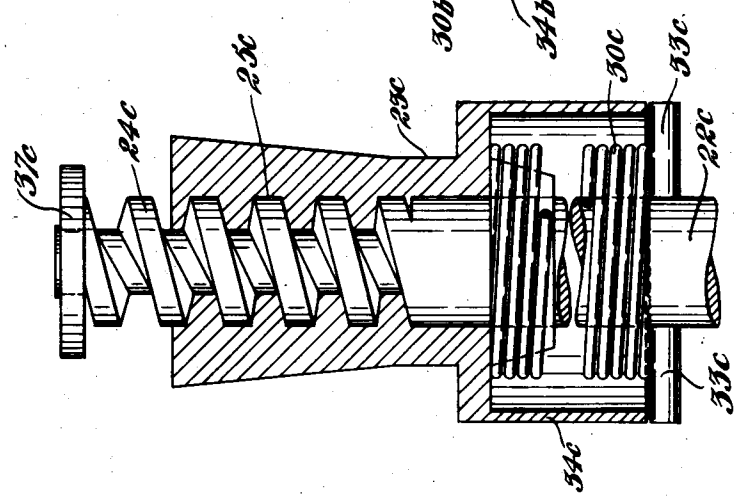


Fig. 6

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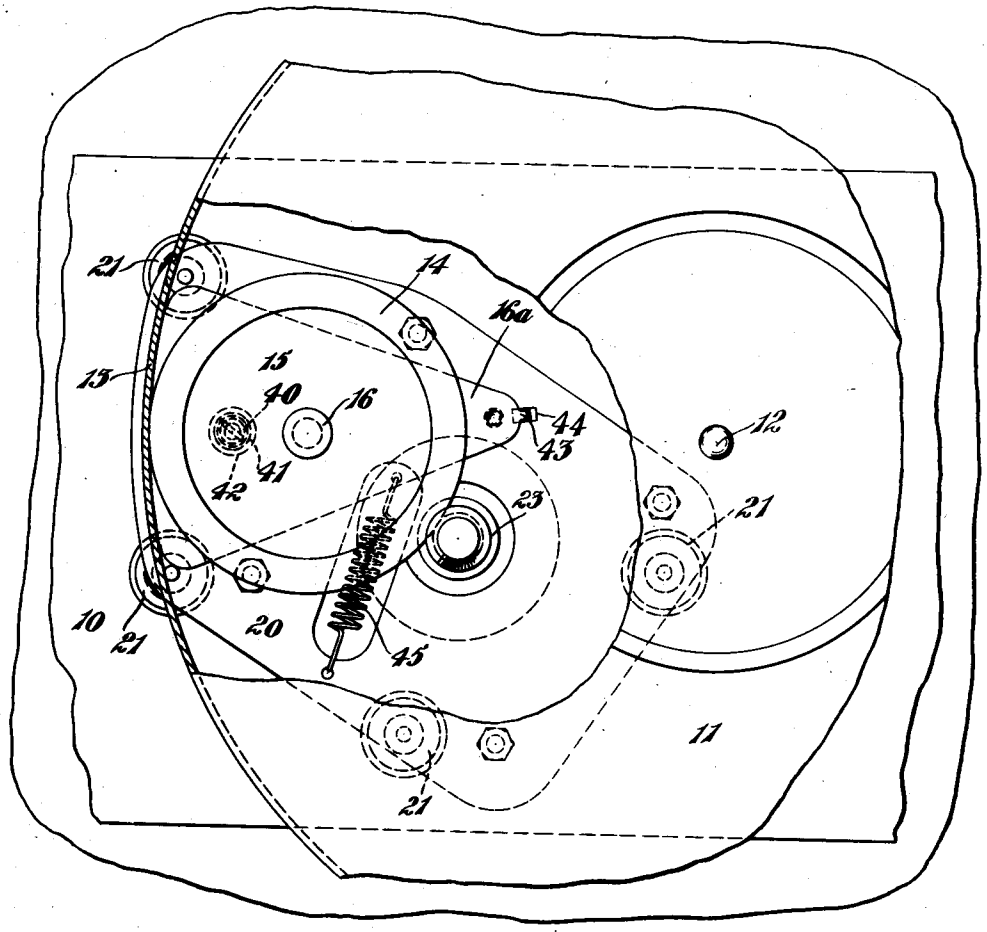
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May 13, 1941. E. V. SCHNEIDER 2,241,483

COMPENSATING TURNTABLE DRIVE

Filed Nov. 18, 1940 3 Sheets-Sheet 3

Fig. 7



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UNITED STATES PATENT OFFICE

2,241,483

COMPENSATING TURNTABLE DRIVE

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Application November 18, 1940, Serial No. 366,056

14 Claims. (Cl. 74—206)

The invention relates to phonographs and more particularly to a turntable drive so constructed that it will operate the turntable at a uniform speed throughout the entire recording or reproducing of a record.

Many people have become interested in making their own records and playing the same as well as the usual commercial records, and this has resulted in a growing demand for combination recording and reproducing phonographs for home use.

Such phonographs are relatively inexpensive, and, for this reason, are usually provided with an induction motor for driving the turntable, because such motors are economical in construction.

It has been found by experience, however, that turntable drives operated by such inexpensive motors are not entirely satisfactory because the motor does not have sufficient power to drive the turntable at a uniform speed from the start to the end of a record, especially in recording, and the turntable is driven more rapidly when reproducing than when recording.

Experience has shown that in recording upon such phonographs as are now in general use for home recording and reproducing, there is a differential of approximately eighteen inch ounces to six inch ounces between the start and the end of the record.

This results in noticeable variations in both the tempo and pitch of recordings made upon such phonographs.

It is also well known that there is a difference of approximately four revolutions per minute between the recording and the reproducing of a record upon inexpensive phonographs now in use.

Furthermore, due to the type of motor used for the turntable drive upon such phonographs, there is another objection to present practice phonographs of this type in the pulsations or vibrations of the motor which are reproduced to a greater or less degree in the record.

It is, therefore, the object of the present improvement to provide a compensating turntable drive which will overcome the above mentioned objections and provide for a uniform speed of recording and playing of records and minimize the pulsations or vibrations of the motor.

A further object of the invention is to provide a turntable drive in which the turntable is frictionally driven by a tapered pulley upon the motor shaft, said pulley being arranged to move vertically relative to the turntable to compensate for variations in the speed of the turntable between the start and the end of a recording, or between the recording and reproducing of a record.

Another object of the invention is the provision of such a turntable drive in which the tapered pulley is driven through a torsion spring whereby the pulsations and vibrations of the motor will not be reproduced in the recording or playing of a record.

Still another object is the provision of a turntable drive of the character mentioned in which the tapered pulley is moved vertically relative to the turntable by means of a continuous helical rib or thread having a sufficiently steep pitch to accomplish the desired result.

A further object of the invention is to provide a turntable drive of this general type in which the tapered pulley is mounted for relative longitudinal and rotary movement upon the motor shaft.

A still further object is the provision of such a turntable drive in which the tapered pulley is provided with a depending skirt which encloses and protects the spring.

Another object is the provision of stop means for limiting the movement of the tapered pulley in each direction.

The above objects together with others which will be apparent from the drawings and following description, or which may be later referred to, may be attained in various manners by which a tapered friction pulley is arranged to be driven by the motor and in turn to drive the turntable, with means for automatically moving the tapered pulley vertically, relative to the turntable; and for the purpose of illustration certain forms of the invention, wherein the tapered pulley is movable relative to the motor shaft, are shown in the accompanying drawings, in which

Figure 1 is a vertical sectional view through a phonograph turntable drive embodying the invention;

Fig. 2, an enlarged longitudinal sectional view through the tapered friction pulley forming an important part of the improved compensating turntable drive, showing the manner in which the pulley may be mounted upon and driven by the motor shaft;

Fig. 3, an exploded view of the tapered friction pulley and associated parts;

Fig. 4, an enlarged, longitudinal, sectional view of a slightly modified form of tapered pulley.

Fig. 5, a similar view of another modification of the tapered pulley;

Fig. 6, a similar view of a still further modification showing the pulley provided with a compression spring rather than the torsion springs shown in the other forms of the invention, and Fig. 7, a fragmentary top plan view of the improved compensating turntable drive, with parts of the turntable broken away for the purpose of illustration.

Similar numerals refer to similar parts throughout the several views.

In Fig. 1 is shown a portion of a phonograph provided with the improved turntable drive in which the platform of the phonograph cabinet is indicated generally at 10 and the turntable 11 is rotatably mounted upon the spindle 12 and provided with the usual depending peripheral flange 13 arranged to be driven by frictional contact with the rubber or similar rim 14 upon the wheel 15 which is in the nature of an idler pulley rotatably mounted upon the spindle 16, which is carried by a plate 16a slidable toward and from the flange 13 of the turntable and pulley 23.

The general assembly of the turntable drive is the same as disclosed in my co-pending application, Serial No. 294,938, filed September 14, 1939, and, as shown quite clearly in Fig. 7, the sliding plate 16a is mounted for sliding or swinging movement upon the motor mounting plate 20, by means of the screw 40 which is threaded into the motor mounting plate and located through an enlarged aperture 41 in the plate 16a, a flanged washer 42 spacing the head of the screw so as not to bind the plate 16a and at the same time covering the enlarged opening 41.

A downturned lug 43 is formed at the inner end of the sliding plate 16a for sliding movement within the slot 44 formed in the motor mounting plate 20, a spring 45 being connected to the sliding plate 16a and to the adjacent edge of the motor mounting plate to urge the tire 14 of the wheel 15 into frictional contact with the rim 13 of the turntable and the pulley 23.

The motor may be of the usual induction type comprising the field coil 17 and the squirrel cage type rotor 18, this motor being suspended as by the rods 19 from a plate 20 supported upon the platform 10 as by the rubber grommets 21.

The motor shaft 22, which is operatively connected to the rotor of the motor is usually provided with a friction pulley engaging the periphery of the friction wheel 15 for frictionally driving the turntable 11 through said friction wheel.

Under present practice the friction pulley is fixed upon the motor shaft which is concentrically fixed to the rotor.

In order to carry out the present invention the friction pulley is longitudinally and rotatably movable relative to the rotor and this may be accomplished by providing for relative longitudinal and rotatable movement between the shaft and the rotor or as illustrated and described in detail herein by providing for relative longitudinal and rotary movement between the pulley and the shaft.

Instead of the conventional straight or cylindric pulley as used in present practice the invention contemplates the provision of a tapered pulley indicated generally at 23 for frictionally driving the idler wheel 15.

The upper end of the motor shaft 22 may be provided with a thread or continuous helical rib of rather steep pitch as indicated at 24 and the pulley 23 may be hollow as shown in Fig. 2 and provided at its upper end with similar internal threads 25 providing for relative longitudinal and rotatable movement of the pulley upon the shaft.

As best shown in Figs. 2 and 3, the threaded portion 24 of the shaft 22 is reduced in diameter and the extreme upper end of the shaft is further reduced and threaded as at 26 to receive a nut 27.

A transversely disposed stop pin 28 is located through the upper end of the reduced threaded portion 25 of the shaft and a notch 29 is formed in the upper end portion of the pulley 23 for engaging therewith as best shown in Fig. 2 for limiting the upward movement of the pulley upon the shaft.

A helical torsion spring 30 flexibly connects the pulley to the shaft, the upper end of said spring being provided with a hooked portion 31 attached to the pulley while the lower end of the spring is provided with a hooked portion 32 attached to the transverse lower stop pin 33.

For the purpose of enclosing and protecting the spring, a skirt 34 may depend from the lower end portion of the pulley surrounding the spring and provided at its lower end with a notch 35 to receive the lower stop pin 33 of the shaft and limit the downward movement of the pulley.

In the normal position of the parts as shown in Figs. 1 and 2, the spring 30 holds the pulley 23 at the upper end of the shaft, the notch 29 receiving the upper stop pin 28 and preventing further movement of the pulley in this direction, the smaller end of the pulley being in frictional contact with the wheel 15.

In the operation of the phonograph, as the pressure of the needle upon the record offers resistance to the rotation of the turntable, the spring 30 will be wound up rotating the pulley upon the shaft in a direction whereby the screw threads cause the pulley to move downward bringing a larger diameter thereof into contact with the friction wheel 15.

Thus, the device compensates for changes in torque upon the turntable and provides for a smooth uniform rotation of the turntable throughout the entire recording or playing of a record.

Furthermore, the spring connection between the shaft and the pulley absorbs the pulsations or vibrations of the induction motor causing a smooth continuous rotation of the turntable.

In Fig. 4 is shown a slightly modified form of the invention in which the motor shaft 22a has its upper end portion reduced as at 26a and screw threaded intermediate the ends of the reduced portion as at 24a for engagement with the internal screw threads 25a upon the tapered pulley 23a.

An upper stop pin 28a is fixed upon the upper end of the reduced portion of the shaft and a lower stop pin 33a is fixed upon the shaft in position to contact with the inwardly disposed stop lug 35a upon the skirt 34a of the pulley.

The spring 30a may be tapered as shown, and provided with the upper hook 31a for engagement with the pulley and the lower hook 32a for engagement with the lower stop pin 33a.

The upper end of the pulley may be notched as shown at 29a for receiving the upper stop pin 28a.

The operation of this form of the invention will be the same as above described.

In Fig. 5, the shaft 22b has its upper end reduced and threaded with a large thread of very steep pitch as indicated at 24b and the pulley 23b has the depending skirt 34b having the upper and lower stop lugs 29b and 35b, respectively,

for engagement with the stop pin 33b upon the shaft.

The spring 30b has the upper hook 31b connected to the pulley and the lower hook 32b connected to the pin 33b.

A cap 37 may be connected to the top of the pulley to close the center bore thereof, the cap being held in place by a flange 38 which is spun over the edge of the cap.

The operation of this form of the invention will be the same as above described.

In Fig. 6 is shown another modification of the invention in which the coil spring 30c is a compression spring but not a torsion spring.

In this form of the invention the upper end of the shaft 22c is threaded with a steep pitched square thread or continuous helical rib 26c and provided with a cap 37c at its upper end.

The tapered pulley 23c is internally threaded as at 25c.

A depending skirt 34c surrounds the spring 30c and the stop pin 33c is adapted to contact the lower end of the skirt to limit the lower movement of the pulley while the cap 37c is provided to contact the upper end of the pulley to limit the upper movement thereof.

Otherwise, the operation of this form of the invention is as above described.

I claim:

1. A phonograph turntable drive including a turntable, a motor, a shaft upon the motor, a tapered friction pulley threaded upon the motor shaft, a friction wheel normally frictionally contacting the smaller end of the tapered pulley and the turntable, and torsion spring means for moving said tapered pulley longitudinally upon the motor shaft so as to bring a larger portion of the tapered pulley into contact with the friction wheel by variations in drag upon the turntable to compensate for resultant variations in speed of the turntable.

2. A phonograph turntable drive including a turntable, a motor, a shaft upon the motor, a tapered friction pulley upon the shaft, means frictionally associating said tapered pulley with the turntable, said means including a friction wheel normally frictionally contacting the smaller end of said tapered pulley, and torsion spring and screw means for producing relative movement between the tapered pulley and the friction wheel so as to bring a larger portion of the tapered pulley into contact with the friction wheel by variations in drag upon the turntable to compensate for resultant variations in speed of the turntable.

3. A phonograph turntable drive including a motor, a tapered friction pulley operatively connected to said motor, a turntable, means frictionally associating said pulley with the turntable and torsion spring and screw means for moving the tapered pulley axially relative to the turntable to compensate for variations in drag and resultant speed changes of the turntable.

4. A phonograph turntable drive including a motor, a tapered friction pulley operatively connected to said motor, a turntable, means frictionally associating said pulley with the turntable and torsion spring and screw means controlled by torque and resultant speed changes of the turntable for moving the tapered pulley axially relative to the turntable to compensate for variations in torque and speed of the turntable.

5. A phonograph turntable drive including a motor, a tapered friction pulley operatively connected to said motor, a turntable, means frictionally associating said pulley with the turntable and torsion spring and screw means controlled by drag upon the turntable for moving the tapered pulley axially relative to the turntable to compensate for resultant variations in speed of the turntable, and means for limiting the axial movement of the tapered pulley in each direction.

6. A phonograph turntable drive including a motor, a shaft upon the motor, a threaded portion upon the shaft, a tapered friction pulley threaded upon the shaft, stop means upon the shaft for limiting movement of the pulley in one direction, torsion spring means for urging the pulley toward said stop means, a turntable and means frictionally associating the pulley with the turntable whereby the tapered friction pulley is moved axially upon the shaft by variations in drag to compensate for resultant variations in speed of the turntable.

7. A phonograph turntable drive including a motor, a shaft upon the motor, a threaded portion upon the shaft, a tapered friction pulley threaded upon the shaft, stop means upon the shaft for limiting movement of the pulley in one direction, torsion spring means connected to the pulley and to the shaft for urging the pulley toward said stop means, a turntable and means frictionally associating the pulley with the turntable whereby the tapered friction pulley is moved axially upon the shaft by variations in drag to compensate for resultant variations in speed of the turntable.

8. A phonograph turntable drive including a motor, a shaft upon the motor, a threaded portion upon the shaft, a tapered friction pulley threaded upon the shaft, stop means upon the shaft for limiting movement of the pulley in one direction, torsion spring means for urging the pulley toward said stop means, a depending skirt upon the pulley, housing said spring means, a turntable and means frictionally associating the pulley with the turntable whereby the tapered friction pulley is moved axially upon the shaft by variations in drag to compensate for resultant variations in speed of the turntable.

9. A phonograph turntable drive including a motor, a shaft upon the motor, a threaded portion upon the shaft, a tapered friction pulley threaded upon the shaft, stop means upon the shaft for limiting movement of the pulley in one direction, torsion spring means for urging the pulley toward said stop means, a turntable and means frictionally associating the pulley with the turntable whereby the tapered friction pulley is moved axially upon the shaft by variations in drag on the turntable which otherwise would result in speed changes of the turntable, and means for limiting axial movement of the pulley upon the shaft in the opposite direction.

10. A phonograph turntable drive including a motor, a shaft upon the motor, a threaded portion upon the shaft, a tapered friction pulley threaded upon the shaft, stop means upon the shaft for limiting movement of the pulley in one direction, torsion spring means connected to the pulley and to the shaft for urging the pulley toward said stop means, a turntable having a peripheral flange, a slidable plate, a friction wheel journaled upon said slidable plate and frictionally connecting said peripheral flange and said tapered pulley whereby the tapered friction pulley

is moved axially upon the shaft by variations in drag to compensate for resultant variations in speed of the turntable.

11. A phonograph turntable drive including a motor, a shaft upon the motor, a threaded portion upon the shaft, a tapered friction pulley threaded upon the shaft, stop means upon the shaft for limiting movement of the pulley in one direction, torsion spring means for urging the pulley toward said stop means, a turntable having a peripheral flange, a slidable plate, a friction wheel journaled upon said slidable plate and frictionally connecting said peripheral flange and said tapered pulley whereby the tapered friction pulley is moved axially upon the shaft by variations in drag to compensate for resultant variations in speed of the turntable.

12. A phonograph turntable drive including a turntable, a motor, a tapered friction roller operatively connected to the motor, a friction wheel contacting the tapered friction roller and the turntable, and torsion spring and screw means for producing relative axial movement between the tapered friction roller and the friction wheel to compensate for variations in drag and resultant speed changes of the turntable.

13. A transmission including a driving means, a tapered friction roller operatively connected to said driving means, a friction wheel frictionally associated with the tapered roller, driven means operatively associated with the friction wheel, and torsion spring and screw means for moving the tapered roller axially relative to the friction wheel to compensate for variations in drag and resultant speed changes of the driven means.

14. A transmission including a driving means, a tapered friction roller operatively connected to said driving means, a friction wheel frictionally associated with the tapered roller, driven means operatively associated with the friction wheel, and torsion spring and screw means for producing relative axial movement between the tapered roller and the friction wheel to compensate for variations in drag and resultant speed changes of the driven means.

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