May 23, 1950 C. C. DAVIS 2,509,054

PHONOGRAPHIC APPARATUS

Filed Aug. 15, 1947

FIG. 1

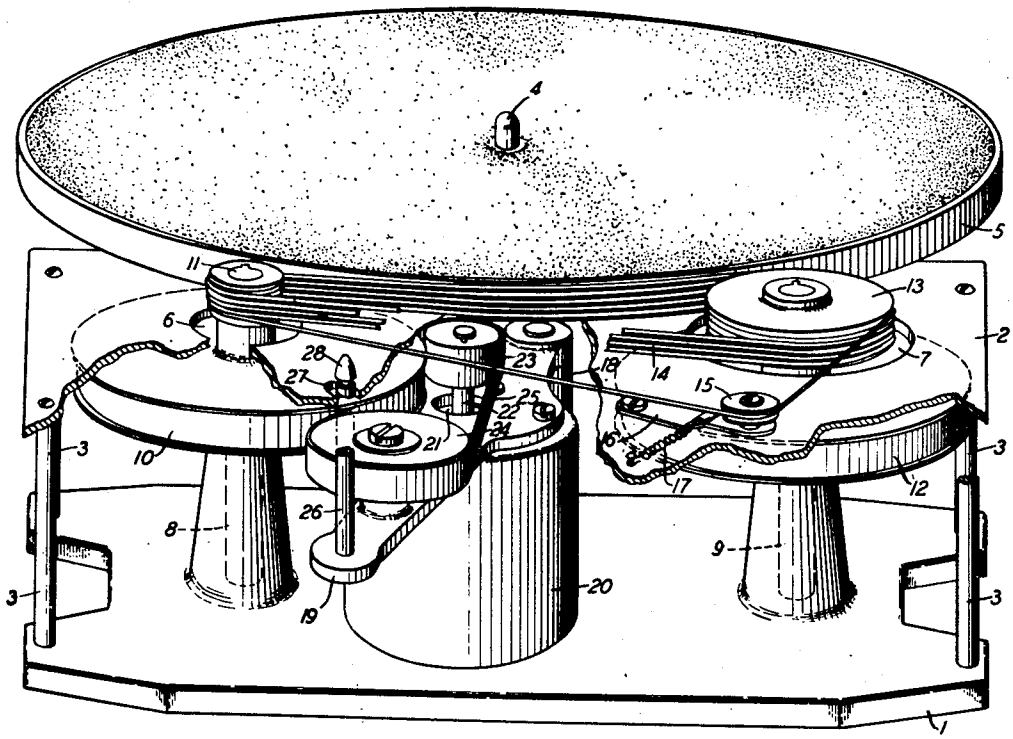
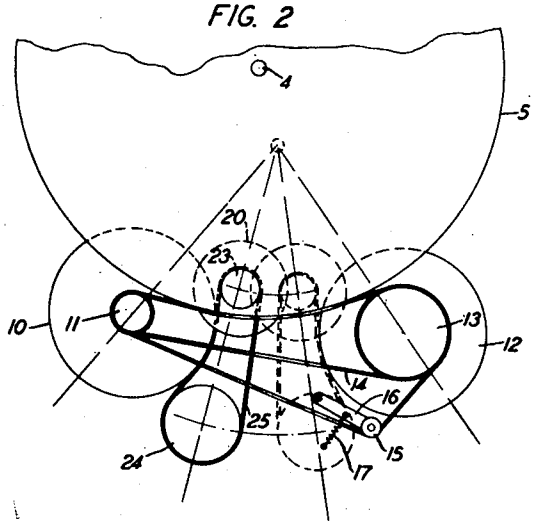


FIG. 2



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PHONOGRAPHIC APPARATUS

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This invention relates to phonograph apparatus, and more particularly to improvements in the driving mechanism for the turntable employed in such apparatus.

The object of this invention is to provide a driving mechanism for the turntable by means of which it may be driven at any one of several desirable speeds.

A further object is to provide a simple, inexpensive, turntable drive which is substantially free from irregularities due to velocity variations in the driving source.

With the development of large size, slow speed, phonograph records, it has become desirable in transcription work to provide a phonograph with a two-speed driving mechanism whereby either large, slow speed, records or standard, high speed, records may be played.

In accordance with this invention, a multiple belt, connecting in a closed loop two driving pulleys capable of being driven at differing relative peripheral speeds, is in frictional engagement with the rim of a turntable, which is located on the outside of the loop. The pulleys are mounted on separate shafts each of which carries a driven pulley. A motor-driven belt is arranged to be moved into frictional engagement with either one or the other of the driven pulleys to drive the turntable at either one of two speeds by reason of the difference in the peripheral speeds of the driving pulleys.

One advantage obtained by the use of this form of rim belt drive lies in the fact that the pulleys can be placed close to the turntable thus decreasing to a minimum the length of free belt between the point of belt-turntable contact and belt-pulley contact. This feature reduces the driving compliance to a minimum thus eliminating the necessity for filtering. The use of a multiple belt in this form of rim drive has the further advantage in that the belt operates at a sufficiently small tension per belt loop as to average out in the belt any irregularities in the motor speed without transmitting them to the driven pulley or the turntable.

Another advantage in this form of rim drive is that it eliminates a long belt encircling the turntable and thus permits the drive assembly to be mounted in a compact and removable unit.

The invention will best be understood from the

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following description, when read in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view of the driving mechanism with the motor-driven pulley belt in position to drive the turntable at a relatively slow speed, for example, 33⅓ revolutions per minute; and

Fig. 2 is a diagrammatic view illustrating the motor-driven pulley belt, as shown by the full lines, in position to drive the turntable at, for example, 33⅓ revolutions per minute or, as shown by the dotted lines, in position to drive the turntable at 78 revolutions per minute.

Referring to Fig. 1 there is shown a removable unit driving means comprising a base 1 on which a plate 2 is supported by standards 3. The base 1 may be attached by any suitable means to the phonograph apparatus (not shown). A spindle 4 is journaled in suitable bearings in the phonograph apparatus. A turntable 5 is mounted on the spindle 4 for rotation therewith.

The plate 2 is provided with two openings 6 and 7. Shafts 8 and 9, journaled in bearings on base 1, extend through the openings 6 and 7, respectively. Pulleys 10 and 11 are mounted on shaft 8 for rotation therewith. Mounted on shaft 9 for rotation therewith are pulleys 12 and 13. Pulleys 11 and 13 are of different diameters and pulleys 10 and 12 are equal in diameter. As shown in Fig. 1, pulleys 10 and 12 are mounted below plate 2 while pulleys 11 and 13 are mounted above plate 2.

An endless multiple belt 14 is used to connect pulleys 11 and 13 by winding the belt in the form of a plurality of loops so as to be guided in suitable grooves in the pulleys. The parallel lengths of belt between the two pulleys on one side are tensioned against the outer rim of turntable 5 and are in contact therewith over an arc of about 30 degrees. The turntable 5 is located outside of the belt loop. The pulleys are placed close to the turntable so that the free distance between the points of belt-contact at the pulleys and belt-contact at the turntable can be made small. This decreases the length of free belt in the drive which thus reduces compliance to a minimum. A cross-over roller 15 is journaled on the end of an arm 16 which is pivotally mounted on the plate 2. One of the loops of the belt 14 is used as the cross-over loop. A suitable biasing spring 17 is con-

nected to the arm 16 and the plate 2. The spring 17 serves to supply the pressure with which the cross-over roller 15 maintains the cross-over loop of the endless belt 14 at the desired tension. Since this is a single continuous belt wrapped several times around the pulleys 11 and 13 the tension is distributed throughout the entire length of the belt. The endless multiple belt operates at a sufficiently small tension per belt loop as to take up in the belt any fluctuations of the driving pulley without transmitting them to the driven pulley or turntable.

Between shafts 8 and 9 there is fixed to the base 1 a post 18. Pivotally mounted on post 18 is an arm 19 carrying a motor 20. The arm 19 is provided with an opening 21 through which extends the motor shaft 22. The motor shaft 22 carries a pulley 23 which cooperates with an idler pulley 24 on arm 19 to drive a single wrap belt 25. In order to maintain the free distance between the point of belt-contact at the motor pulley and the pulleys 10 or 12 as small as possible, the pulleys 10 and 12 are shown as being of relatively large diameter. It is understood, however, that it is not necessary that the shafts 8 and 9 be rotated by the pulleys 10 or 12, respectively, as the shafts themselves might act as pulleys and could be driven directly by belt 25. Nor is it necessary for the diameters of the different pulleys to be as shown, for any arrangement of pulley diameters may be used in order that the turntable may be driven at either one of two speeds. This method of rim drive, in addition to the advantages mentioned above, transmits motor speed irregularities to the pulleys 10 or 12 only in a torsional direction which are in turn filtered out by the multiple belt.

The pivot arm 19 has an upwardly extending handle 26 by means of which it may be conveniently manipulated in an arcuate slot 27 in plate 2. By means of handle 26 the motor-driven pulley belt 25 may be moved into frictional engagement with either pulley 10 or 12. Proper tension of the belt 25 against either pulley 10 or 12 may be maintained by screwing a cap nut 28 against the plate 2. If a multiple belt, such as described above, is used to drive pulleys 10 and 12, it will average out irregularities in the motor speed in the manner previously discussed. It is obvious that, if a multiple belt is used in this position, the cross-over must be made at one end or the other, beyond the point where the belt 25 comes in contact with either pulley 10 or 12. With multiple belts used in both positions, any irregularities which may arise in the driving source will be substantially eliminated thus producing uniform rotation of the turntable. Although the preferred form of the invention is as shown, it is understood, however, that any type of belting, that is multiple or single wrap, may be used in either or both positions, as desired, without departing from the scope of the invention.

In the position shown in Fig. 1, the turntable is being driven at the slow speed, 33⅓ revolutions per minute. When it is desired to drive the turntable at 78 revolutions per minute the handle 26 is moved to the right so that the pulley belt 25 is tensioned against pulley 12, as shown by the dotted lines in Fig. 2.

In accordance with this invention there is provided a simple, inexpensive, turntable driving mechanism which may be readily associated with turntables of existing phonograph apparatus.

What is claimed is:

1. In phonograph apparatus, the combination of a belt connecting a pair of pulleys in a closed loop, a turntable located outside of said loop, said belt being in frictional driving engagement with the rim of said turntable, means for alternatively driving said pulleys at differing peripheral speeds, and means to drive said turntable at either one of two speeds in accordance with which one of said pulleys is being driven.

2. In phonograph apparatus, the combination of a multiple belt engaging a pair of pulleys in a closed loop, a turntable located outside of said loop, said belt being in frictional driving engagement with the periphery of said turntable, a roller engaging one of the loops of said belt to provide a cross-over from one pulley to the other pulley, means for alternatively driving said pulleys at different peripheral speeds, and means to drive said turntable at either one of two speeds in accordance with which one of said pulleys is being driven.

3. In phonograph apparatus, the combination of a belt engaging a pair of pulleys in a closed loop, a turntable located outside of said loop, said belt being in frictional driving engagement with the rim of said turntable, a motor-driven belt, means including said motor-driven belt to alternatively drive said pulleys at differing peripheral speeds, and means including said first belt to drive said turntable at either one of two speeds in accordance with which one of said pulleys is being driven.

4. In phonograph apparatus, the combination of a multiple belt engaging in a closed loop a pair of pulleys, said driving pulleys being mounted on separate shafts each of which carries a driven pulley, the ratios of the diameters of the driving and driven pulleys on each shaft being different, a turntable located outside of said loop, said belt being in frictional driving engagement with the periphery of said turntable, a spring-tensioned roller engaging one of the loops of said belt, a motor-driven belt, a carriage therefor, means to selectively displace said carriage to bring said motor-driven belt into frictional driving engagement with either one or the other of said driven pulleys, means for holding said carriage securely in position while said motor-driven belt is in driving engagement with either one or the other of said driven pulleys to drive said turntable at either one of two speeds in accordance with which one of said driven pulleys is being driven.

5. In phonograph apparatus, the combination of a multiple belt engaging in a closed loop a pair of driving pulleys, said pulleys being mounted on separate shafts, the ratios of the diameter of each of said pulleys to the diameter of the associated shaft being different, a turntable located outside of said loop, said belt being in frictional driving engagement with the periphery of said turntable, a spring-tensioned roller engaging one of the loops of said belt, a second belt engaging a motor-driven pulley and an idler pulley, a carriage therefor, means to selectively displace said carriage to bring said second belt into frictional driving engagement with either one or the other of said shafts, means for holding said carriage securely in position while said second belt is in driving engagement with either one or the other of said shafts, to drive said turntable at either one of two speeds in accordance with which one of said shafts is being driven.

6. A turntable driving mechanism comprising the combination of a belt engaging a pair of pulleys in a closed loop, a motor-driven belt for alternatively driving said pulleys at differing pe-

ripheral speeds, and means to drive said first belt at either one of two speeds in accordance with which one of said pulleys is being driven.

7. A turntable driving mechanism comprising the combination of a multiple belt engaging in a closed loop a pair of driving pulleys, said pulleys being mounted on separate shafts each of which carries a driven pulley, the ratios of the diameters of the driving and driven pulleys on each shaft being different, a spring-tensioned roller engaging one of the loops of said belt, a second belt engaging a motor-driven pulley and an idler pulley, a carriage therefor, means to selectively displace said carriage to bring said second belt into frictional driving engagement with either one or the other of said driven pulleys, means

for holding said carriage securely in position while said second belt is in driving engagement with either one or the other of said driven pulleys to drive said multiple belt at either one of two speeds in accordance with which one of said driven pulleys is being driven.

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