April 20, 1943. E. O. THOMPSON 2,316,858

TURNTABLE DRIVE MECHANISM

Filed Sept. 27, 1941 2 Sheets-Sheet 1

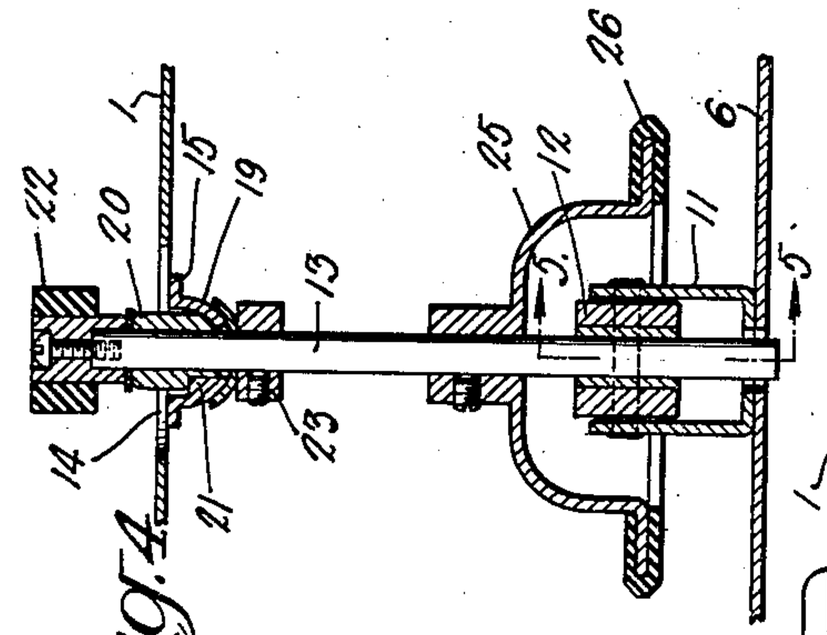

Fig. 4.

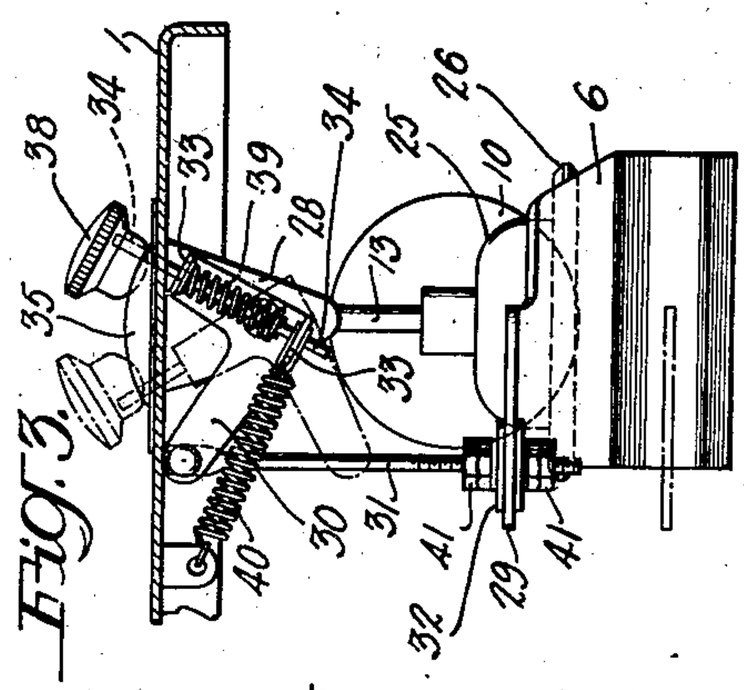

Fig. 3.

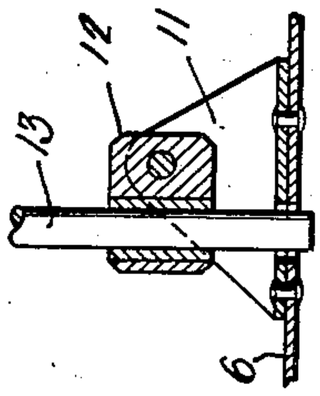

Fig. 5.

Fig. 1.

Fig. 7.

Fig. 6.

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TURNTABLE DRIVE MECHANISM

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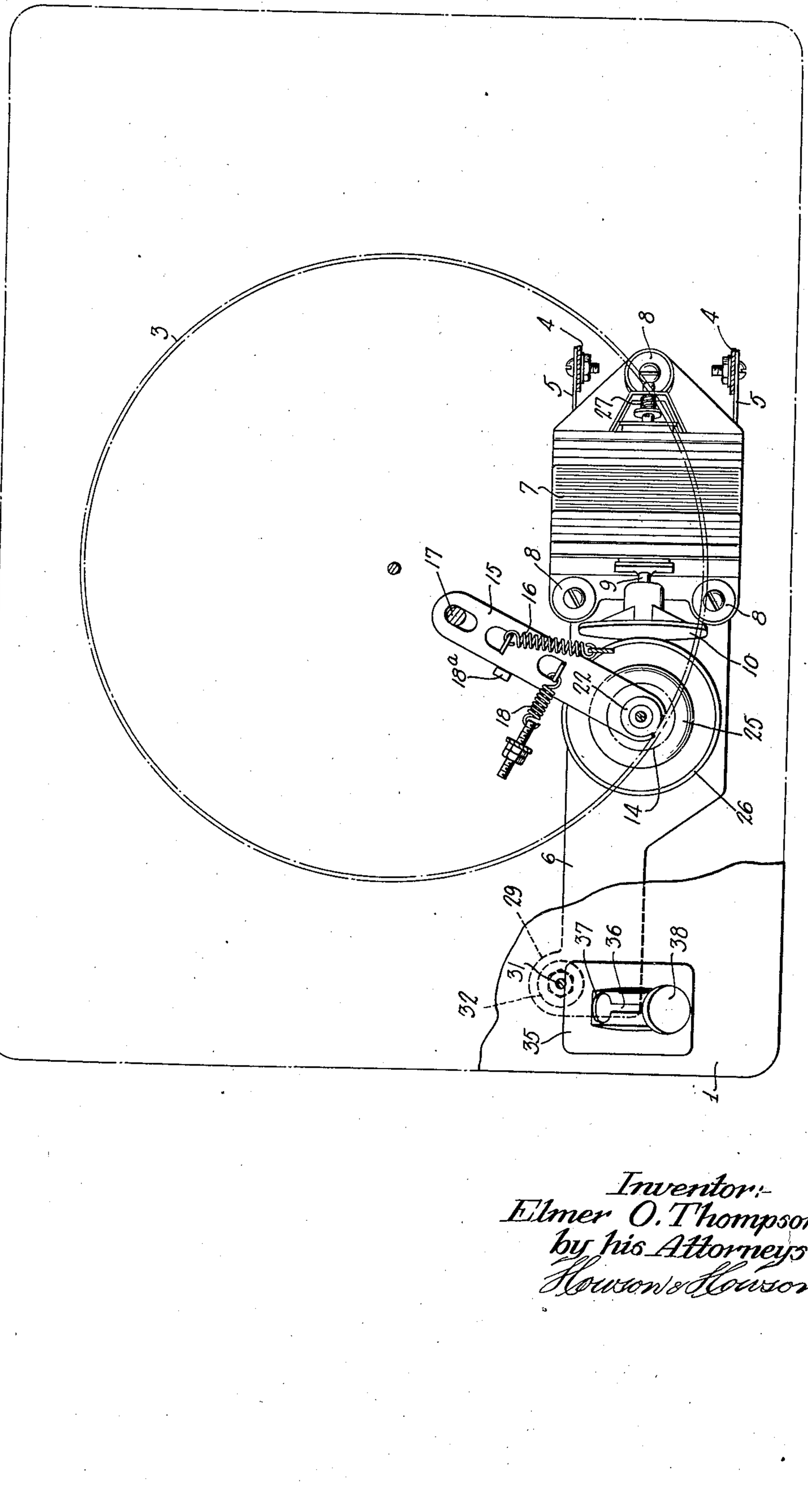

Fig. 2.

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UNITED STATES PATENT OFFICE

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TURNTABLE DRIVE MECHANISM

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Application September 27, 1941, Serial No. 412,654

7 Claims. (Cl. 74—194)

This invention relates to drive mechanisms for phonographs and more particularly to a phonograph turntable drive mechanism of the type adapted to provide variable or multi-speed operation of the phonograph.

For some time, there has existed a demand for an inexpensive phonograph turntable speed control capable of simple adjustment to meet widely different requirements. For example, it is advantageous to utilize a phonograph having a drive mechanism adapted for operation at two substantially different principal speeds, with a speed control adapted to vary the phonograph speed about each of these principal speeds as a mean. It is also desirable that the above noted control functions be performed by a single manually operable member capable of various modes of operation to selectively perform the control functions.

In accordance with the foregoing, it is a principal object of the present invention to provide a novel and improved phonograph speed control which will permit operation of the phonograph at two substantially different speeds.

A further object of the invention is to provide a novel phonograph speed control adapted to vary the phonograph speed about the two principal speeds.

Still another object of the invention is to provide a single manually operable control member for a phonograph, which member is manually adjustable to permit operation of the turntable within two different speed ranges, the selection of the speed range and the selection of the speed within each range being determined by different modes of adjustment of the single control manual. Another object of the invention is to provide a phonograph speed control manual of novel character adapted for easy and smooth adjustment to regulate the phonograph speed.

Other objects of the invention will be clear from the following description and claims.

In the drawings:

Fig. 1 is a side elevation of a phonograph drive mechanism constructed in accordance with the present invention;

Fig. 2 is a top plan view of the mechanism with the base plate and turntable shown in dot and dash outline;

Fig. 3 is a detail sectional view taken along line 3—3 of Fig. 1;

Fig. 4 is a detail sectional view of a part of the drive mechanism;

Fig. 5 is a further detail sectional view taken along line 5—5 of Fig. 4; and

Figs. 6 and 7 are views of a portion of the mechanism illustrating a turntable speed indicator which may be employed.

With reference to the drawings, one form of apparatus constructed according to this invention may comprise a rectangular metal base plate 1 having a circular recessed central portion 2 to accommodate the conventional turntable 3 which may be supported for rotation on base plate 1 by a bearing (not shown). The cooperating phonograph tone arm and amplifier may be of any conventional type and hence no details thereof need be given here.

Beneath the base plate 1 a pair of depending arms 4 (Fig. 1) serve to pivotally mount one end 5 of a generally horizontal bracket 6. The other end of bracket 6 is supported in a manner to be described so that the bracket is rotatable to a small extent about its pivot.

An electric driving motor 7 is mounted on bracket 6 by means of semi-resilient bushings 8 which prevent the vibration of the motor being transmitted to the remainder of the mechanism. The axis of the motor drive shaft 9 is generally horizontal and a driving disc 10 is secured at one end of shaft 9.

As is best shown in Figs. 1, 4, and 5, bracket 6 carries a small U-shaped bracket 11 which in turn carries a pivotally mounted bearing 12 slidably supporting the lower end of a second shaft 13. The shaft 13 extends upward through a large opening 14 in the base plate 1. To support the upper end of the shaft 13, a lever 15 (Figs. 2 and 4) is secured beneath base plate 1 and is arranged for generally longitudinal movement under the influence of a spring 16 and for rotary movement about a stud 17 by a spring 18. At its free end lever 15 has a cup shaped depression 19 (Fig. 4) through which the shaft 13 passes. An oilless bearing 20 is seated in the cup 19 and is prevented from rotating by a lug 21 which extends into a recess in bearing 20. At the upper end of shaft 13 there is a rubber covered driving pulley 22. Below lever 15 a collar 23 is mounted on shaft 13. Collar 23 and pulley 22 serve to prevent longitudinal movement of shaft 13 relative to lever 15 yet the construction is such that shaft 13 is properly supported for rotation while permitting a slight rocking of the shaft 13 and its bearing 20. The pulley 22 is urged into contact with the inner edge of a right angle flange 24 on the edge of turntable 3 by the springs 16, 18 (Fig. 2), and a stop 18a limits the counterclockwise rotation of lever 15. A generally bell shaped pulley 25 (Fig. 4) having a rubber cov-

ered flange 26 is secured to shaft 13 over the bearing 12 so that its flange 26 will bear against the driving face of the disc 10. A thrust bearing 27 on the motor 7 continuously urges shaft 9 toward the left (as shown in Fig. 1) to maintain contact between the disc 10 and pulley 25. By the structure thus far described, a driving connection between motor 7 and turntable 3 is provided. Certain features of this structure are described and claimed in the copending application of C. B. Dale, Serial No. 416,418, filed October 24, 1941, and form no part of the present invention.

The construction and arrangement of disc 10 and pulley 25 is such that the speed of rotation of the turntable 3 will be determined by the point of contact between them, that is, the greater the driving radius of disc 10 the greater will be the turntable speed. To vary this driving radius on disc 10 the pivotally mounted bracket 6 is adjustable between the positions shown in the full and dotted lines of Fig. 1, as will now be explained. A bracket 28 is mounted beneath base plate 1 above the free end 29 of bracket 6 to support a pivotally mounted bell crank 30. The end of one arm of crank 30 is pivotally secured to an end of link 31, the other end of which is secured to the end 29 of bracket 6 through a resilient bushing 32. The other arm of crank 30 carries two spaced parallel lugs 33 which are slotted to receive a small diameter rod 34. These lugs are spaced above and below the pivot of crank 30. Lower lug 33 has a small circular hole to loosely receive rod 34 while the upper lug 33 has an elongated slot 33*a* (Fig. 1) through which rod 34 passes. The width of slot 33*a* is no greater than is necessary to receive rod 34, which is longitudinally slidable relative to the apertured lugs.

A rectangular slot in base plate 1 is covered by an escutcheon 35 (see Fig. 2). This escutcheon has a slot 36 which terminates at each end in a round opening 37. Rod 34 extends upwardly through the base plate slot and escutcheon 35 and at its upper end it carries a round bottomed knob 38. However, as shown in Fig. 3, the rod 34 and knob 38 are eccentrically joined. A coil spring 39 is arranged to firmly seat knob 38 on escutcheon 35. Spring 39 surrounds rod 34 and its upper end engages the upper lug 33 while its lower end engages a small collar or flange affixed to rod 34. The spring is under compression so that it urges rod 34 downward to seat knob 38. A spring 40 takes up the play between the lower end of rod 34 and the lower lug 33. Certain features of the above construction are related to the copending application of W. J. Green, Serial No. 411,435, filed September 18, 1941.

With the above construction it will be seen that the knob 38 has two normal positions which are determined by the openings 37. Movement of knob 38, after raising it slightly against the action of spring 39, from one position to the other will cause rotation of the bell crank 30 about its pivot and link 31 will transmit this motion to bracket 6 which will rotate about its pivot so that the driving radius of disc 10 will be changed. Thus the turntable speed can be quickly varied from one speed to another by moving knob 38 from one position to another. The linkages are preferably so designed that the turntable speed can be changed from full to half speed by this arrangement, full speed being about 78 R. P. M.

In order to vary the speed of the turntable about the mean speed determined by the positioning of the knob 38 in one of the openings 37, it is only necessary to rotate the knob 38 while leaving it in one of its positions. By virtue of the eccentric rod to knob connection, rotation of knob 38 while it is seated in one of the openings 37 will cause the rod 34 to rock the bell crank 30 about its pivot, thus providing a small range of adjustment for the bracket 6. Since in this instance the central axis of rotation of knob 38 remains stationary, the upper portion of the rod is rotated through a small circle about the axis of knob 38. The loose mounting of the lower end of the rod permits this. Since the upper portion of rod 34 can move relative to the upper lug 33 only longitudinally of slot 33*a*, its rotation causes the bell crank 30 to rock about its pivot.

By means of this novel construction the knob 38 serves to establish the general range of the turntable speed and also to provide a vernier to accurately determine the turntable speed within that range.

A normally fixed adjustment such as the nuts 41 on link 31 may be used as the initial speed setting means to initially adjust the bracket 6.

To indicate the turntable speed, the flange 24 of the turntable is provided with a predetermined number of markings 42 (Fig. 7). Beneath the base plate 1 a lamp 43, such as a neon bulb energized from an alternating current source, is provided, and adjacent the lamp a small opening 44 is provided in the vertical wall of the depression 2 (Fig. 6). Light from the lamp shines through the opening onto the turntable flange, the lamp and the markings on the turntable forming a stroboscope to indicate the turntable speed. Preferably the number of the markings 42 is such that the stroboscope will indicate when the turntable is being driven at full and half speed.

The above described apparatus makes possible accurate control of the phonograph with a simple mechanism. The two speed operation of the turntable for the reproduction of different recordings and the uniform speed operation during both recording and reproducing are obviously very desirable. Further by initially adjusting the nuts 41 the same turntable speed can be obtained with the motor 7 connected to power supplies of different frequencies (such as 50 and 60 cycles) it being only necessary to use a different escutcheon 35 and different turntable markings 42 to obtain accurate half speed operation and proper indication of the turntable speed, as will be understood.

Of course, the above described drive mechanism can be used on either manual or automatic phonographs or on phonographs including an automatic record changing mechanism of any suitable type. Further, it is clear that the apparatus described is capable of modification without departing from this invention as defined in the appended claims.

I claim:

1. In a turntable speed control device for a phonograph, a control panel having an aperture therein, a rotatable control manual seatable in said aperture, a rotatably mounted adjusting member, means actuated by said member for varying the speed of rotation of the turntable, means extending longitudinally from the base of said manual eccentrically of the center thereof, said last means being attached to said member

and being constrained for movement relative to said member in a plane generally parallel to the axis of rotation thereof, whereby rotation of said manual will cause adjustment of said member to control the speed of the turntable.

2. In a drive mechanism for a phonograph, variable speed drive means, a manual control element arranged for translational movement between different positions and for rotary movement about its axis when disposed in one of said positions, a member attached to said control element eccentrically of its axis, means for maintaining the axis of said element stationary while it is in one of said positions, a pivoted bell crank operatively associated with said member for actuation thereby in response to the different movements of said control element, and means operable by said bell crank for adjusting said drive means.

3. In a drive mechanism for a phonograph, variable speed drive means, a manual control element arranged for translational movement between different positions and for rotary movement about its axis when disposed in one of said positions, a member attached to said control element eccentrically of its axis, means for maintaining the axis of said element stationary while it is in one of said positions, a pivoted bell crank having apertured portions through which said member extends, said portions being constructed and arranged to effect actuation of said bell crank in response to the different movements of said control element, and means operable by said bell crank for adjusting said drive means.

4. In a drive mechanism for a phonograph, a vertical shaft to be driven, a wheel on said shaft, a generally horizontal pivoted bracket, a pivoted bearing on said bracket in which one end of said shaft is slidably journaled, driving means on said bracket including a flat driving disc having its face in driving engagement with the edge of said wheel, and manually adjustable means for moving said bracket about its pivot to vary the driving radius of said disc.

5. In a drive mechanism for a phonograph, a vertical shaft to be driven, a wheel on said shaft, a generally horizontal pivoted bracket, a pivoted bearing on said bracket in which one end of said shaft is slidably journaled, driving means on said bracket including a flat driving disc having its face in driving engagement with the edge of said wheel, a manual control member arranged for translational movement between different positions and for rotational movement when in one of said positions, and means operable by said member during either movement of the same for moving said bracket about its pivot to vary the driving radius of said disc.

6. In a phonograph drive mechanism, variable speed drive means including a vertically adjustable element, a control member arranged for translational movement between two horizontally spaced positions and for rotational movement when in either of said positions, and means for effecting vertical movement of said element in response to either movement of said control member, whereby said drive means is quickly adjustable to different principal speeds corresponding to said positions and is also accurately adjustable to speeds about the principal speeds.

7. In a phonograph drive mechanism, variable speed drive means including a vertically adjustable element, a control member including a manual knob arranged for translational movement between two horizontally spaced positions and for rotational movement when in either of said positions, guiding and retaining means for said member having a slot with enlarged ends for seating said knob in either of said positions, and means for effecting vertical movement of said element in response to either movement of said control member, whereby said drive means is quickly adjustable to different principal speeds corresponding to said positions and is also accurately adjustable to speeds about the principal speeds.

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