

Nov. 7, 1950

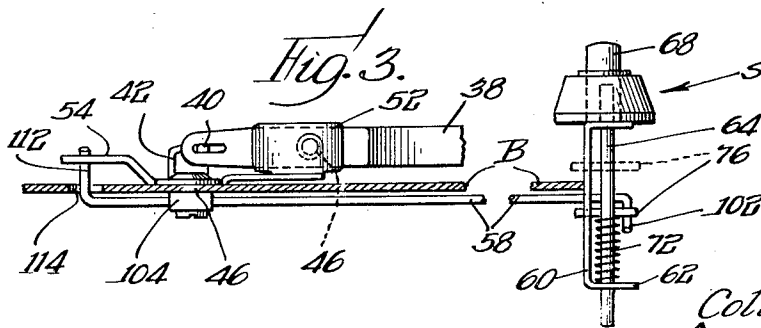
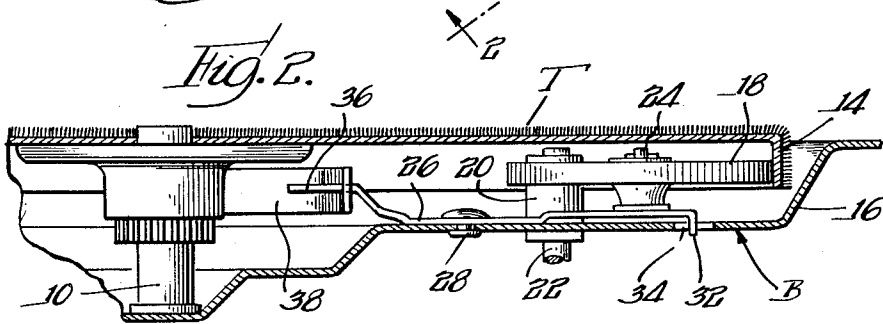
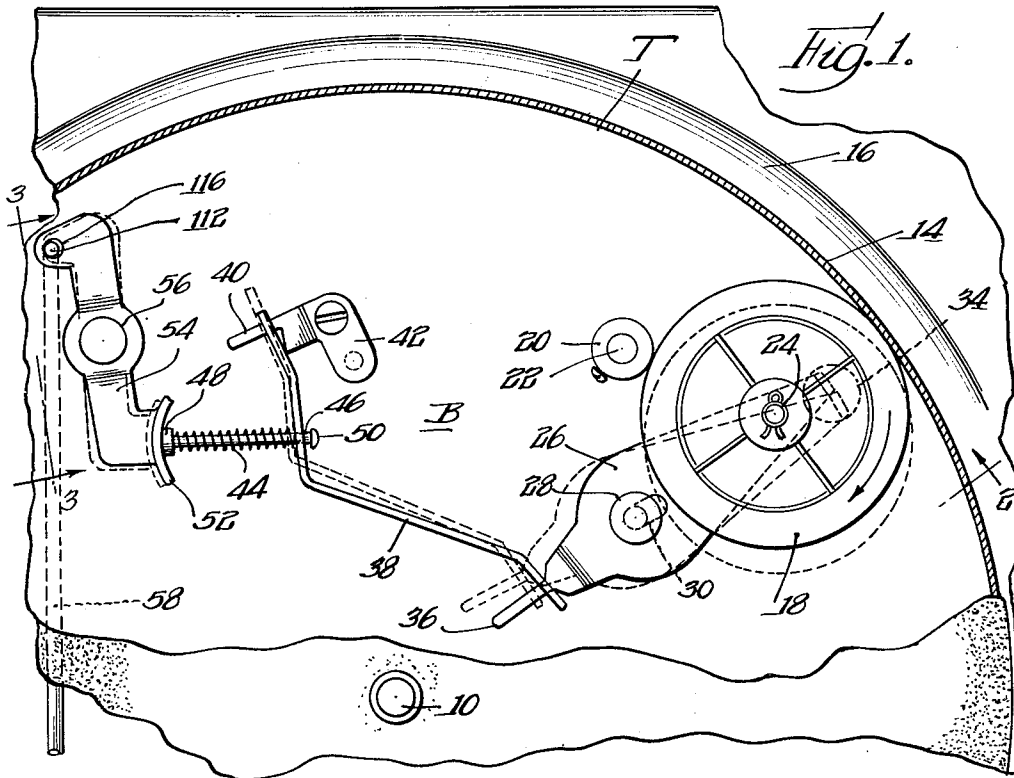
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2,529,376

TURNTABLE MECHANISM

Filed Oct. 30, 1946

2 Sheets-Sheet 1



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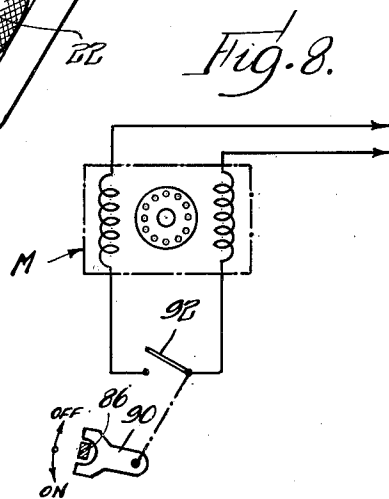
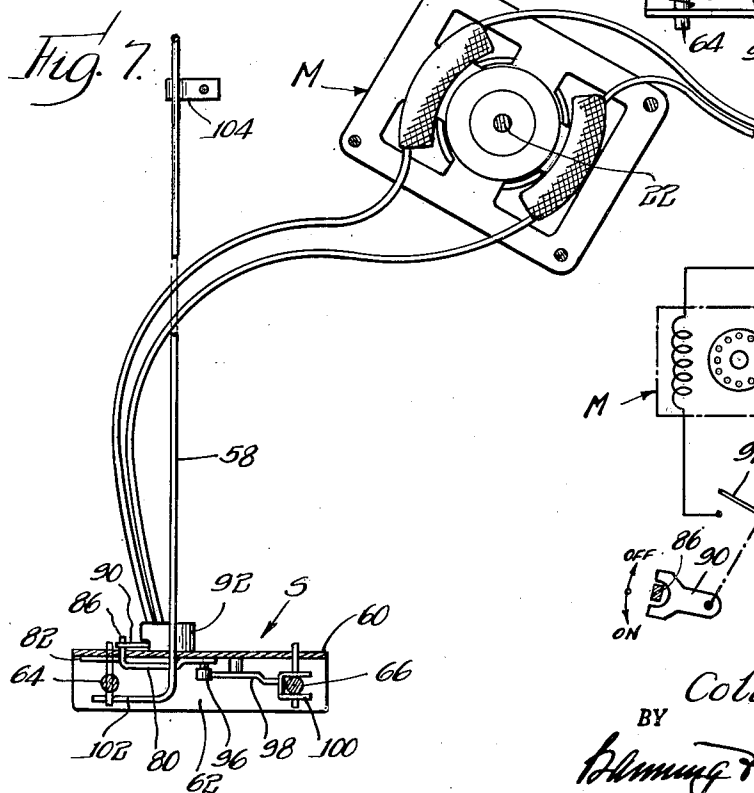
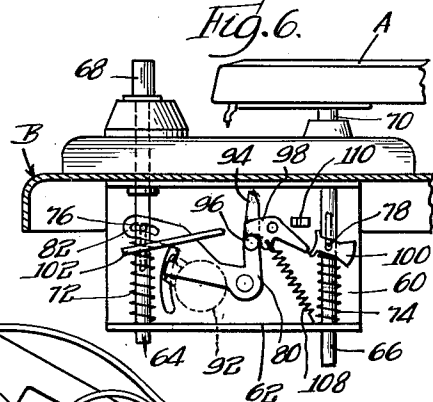
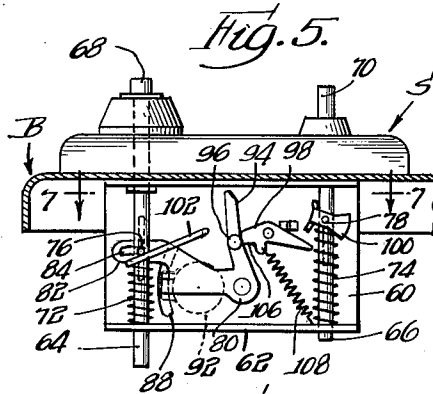
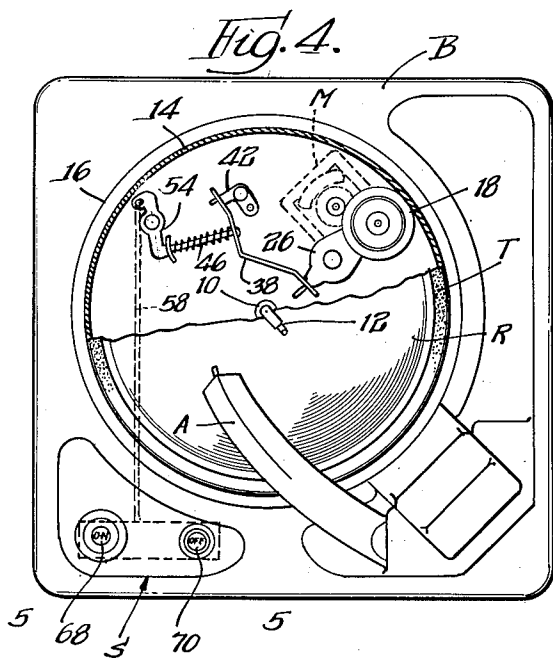
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2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

2,529,376

## TURNTABLE MECHANISM

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12 Claims. (Cl. 74-472)

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This invention relates to phonographs, and particularly to the drive for rotating a phonograph turntable.

Phonograph turntable drives commonly include a friction wheel which functions as an idler between a driving roller and the peripheral flange that forms the rim of the turntable. The wheel is urged by spring pressure or otherwise so that its tread is engaged with the driving roller and turntable rim, and continues to remain so engaged when the phonograph is not in use. Inasmuch as the playing time of a phonograph is very brief in comparison with the time during which the machine stands idle, the friction wheel tread is subjected to continuous pressure at the points where it contacts the driving roller and turntable flange over relatively long periods of time. The tread of the friction wheel is composed of a material such as rubber which, when subjected to continuous pressure at a particular point, tends to develop a hard, flat spot at that point. Thus, the tread of such a wheel may, in time, acquire one or more of these hard spots thereby destroying the uniformity of values inherent in its frictional working surface. It has been found that the sounds reproduced by a phonograph whose frictional driving wheel has become thus affected, are characterized by the recurring emission of an undesirable "bump" or similar noise.

An object of the present invention is to preserve a working surface having uniform frictional qualities and diameter on the peripheral tread of the friction wheel employed in a phonograph turntable drive.

Another object is to provide an improved on-off control for a phonograph which, among its functions, serves to retract or permit disengagement of the friction wheel when the phonograph is turned off, and to restore driving engagement thereof when the phonograph is turned on.

A further object is to so arrange the parts of the turntable drive that the peripheral tread of the friction wheel is relieved of spring pressure as an incident to switching off the phonograph.

A still further object is to provide an improved means for effecting disengagement of the friction wheel from the driving roller and turntable when the phonograph is not in use.

Various other objects, advantages and features of the invention will be apparent from the following specification when taken in connection with the accompanying drawings wherein a certain preferred embodiment is set forth for purposes of illustration.

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In the drawings, wherein like reference numerals refer to like parts throughout:

Fig. 1 is a fragmentary plan view of a turntable and relevant portions of the drive mechanism therefor, a part of the turntable being shown broken away for clarity of illustration.

Fig. 2 is a vertical sectional view taken along the line 2-2 in Fig. 1;

Fig. 3 is a vertical sectional view taken along the line 3-3 in Fig. 1;

Fig. 4 is a plan view of a record player which incorporates the present invention, certain parts thereof being shown broken away;

Figs. 5 is an enlarged fragmentary view in vertical section, taken on the line 5-5 in Fig. 4;

Fig. 6, which is a view similar to Fig. 5, shows the operating parts in different relative positions;

Fig. 7, which is a plan sectional view taken on the line 7-7 in Fig. 5, illustrates certain of the electrical connections that may be employed; and

Fig. 8 is a wiring diagram of the record player.

Referring to Figs. 1 and 4, the turntable T is mounted to rotate about a vertical axis 10. One or more records R may be centered for play on the turntable through whose center is vertically extended a spindle 12. A tone arm A adapted to carry a stylus which tracks in the grooves of the record is pivotally mounted on a supporting base B of the machine.

The turntable is formed with a peripheral depending flange 14 providing therefor a rim which extends into a well 16 in the base B to define an enclosure for certain of the parts of the driving mechanism which embody my present invention. For rotating the turntable a friction wheel 18, Figs. 1 and 2, is provided to afford a frictional coupling between a driving roller 20 and the flange 14 of the turntable T. The roller 20 is carried fast on the upper end of a drive shaft 22 which is operatively connected to a power source such as the motor M, Figs. 4 and 7, that is mounted on the underside of the base B. The drive shaft 22 is fixed in its position relative to the axis 10 of the turntable T, and the roller 20 is laterally aligned with the flange 14.

The friction wheel 18 is mounted for free rotation upon a stud 24 fixed to and extending upwardly from a horizontally disposed mounting plate 26 that rests upon the base B as shown in Figs. 1 and 2. A rivet 28 affixed to the base B fits loosely in a slot 30 in the plate 26 to secure the plate 26 slidingly and swingingly in place, thereby to permit movement of the friction wheel 18 laterally with respect to the roller 20 and the flange 14, the diameter of the wheel 18 being

somewhat greater than the clearance therebetween.

The end of the mounting plate 26 near the friction wheel 18 has a turned-down lug 32 which lies within an opening 34 in the base B. The opposite end of the plate 26 has a tail 36 that is received in a slot in one end of a bar 38 that functions as a lever in a manner which will be explained presently. The other end of the bar-lever 38 is slotted to receive a fulcrum lug 40 extending from a small bracket 42 secured to the base B. The lever 38 rests upon the base B and is capable of movement relative thereto within the limits permitted by the lug 40 and tail 36 and their cooperating slots in the lever 38.

Spring pressure is applied to the lever 38 at a point intermediate the ends thereof for urging the friction wheel 18 into driving engagement with the roller 20 and the flange 14. For this purpose there is provided a compression spring 44, Fig. 1, disposed on a pin 46 that is passed through an opening in the lever 38. The ends of the spring 44 bear respectively against an abutment head 48 of the pin 46 and the proximate surface of the lever 38. The end of the pin 46 which passes through the lever 38 is enlarged as indicated at 50 to limit movement of the pin 46 relative to the lever 38 under the expansive force of the spring 44. The head 48 of pin 46 abuts or is adjacent to an arcuate shoulder 52 formed on one end of a rocker 54 that is pivotally mounted as indicated at 56 on the base B. The rocker 54 is connected by a rock shaft 58, Figs. 1 and 3, to an actuating mechanism controlled by the "on-off" switch S, Fig. 4, the details of such construction being described hereinafter. When the rocker 54 is actuated to the full-line position thereof shown in Fig. 1, the shoulder 52 bears against the head of pin 46 and tends to compress the spring 44. The lever 38 and mounting plate 26 then assume the full-line positions thereof illustrated in Fig. 1, causing the plate 26 to rock and slide about the rivet 28 whereby to shift the friction wheel 18 firmly into engagement with the driving roller 20 and turntable flange 14. Under these conditions the turntable T may be frictionally driven by the roller 20 acting through the medium of the friction wheel 18, which serves as an idler in the transmission thus provided.

Details of the on-off switch S are shown in Figs. 3, 5, 6 and 7. A plate bracket 60 is secured to and depends from the underside of the base B. This bracket has at its lower end a horizontal flange 62 with apertures therein through which the "on" plunger 64 and "off" plunger 66 of the switch S extend, these plungers being mounted for vertical reciprocatory movement. The upper ends of the plungers 64 and 66, respectively, carry the "on" or start button 68 and the "off" or stop button 70 of the switch S. Coiled springs 72 and 74 are disposed respectively on the plungers 64 and 66, extending between pins 76 and 78 carried thereby and the flange 62. These pins extend through vertical slots in the bracket 60 to prevent the plungers from turning.

A switch lever 80 pivotally mounted on the bracket 60 has an arm 82 in which is formed an arcuate slot 84 through which is extended the pin 76 carried by the plunger 64. The lever 80 also has an ear 86 (see Fig. 7) that extends through a slot 88 in the bracket 60 and into the bifurcation of a forked arm 90 which is part of an electrical switch 92 mounted on the bracket 60, the purpose of this switch being to control

the operation of the motor M, as will appear subsequently. Another arm 94 of the switch lever 80 carries a roller 96 that cooperates with a spring-urged latch 98 pivoted on the bracket 60. A pawl 100 pivoted on the pin 78 carried by the plunger 66 is arranged to trip the latch 98 when the stop button 70 is depressed.

Operation of the turntable T is initiated by depressing the start button 68. As the plunger 64 descends, the pin 76 thereon depresses the arm 82 of the switch lever 80, Fig. 5, and also engages and depresses a lateral finger 102, Figs. 3, 5 and 7, formed on the end of the rock shaft 58 which is journaled in the bracket 60 and also in a bearing 104 that is secured to the underside of base B. The switch arm 94 is rocked counterclockwise, as viewed in Fig. 5, causing the roller 96 to be disengaged from a recess 106 in the latch 98, thereby enabling the latch 98 to be rotated by its spring 108 until arrested by a stop tongue 110 bent out from the wall of the bracket 60. The roller 96 rides up on a nose at the end of the latch 98 to maintain the switch lever 80 in the position thereof shown in Fig. 5.

Actuation of the switch lever 80 as just described is effective to rock the rock shaft 58. The end of the rock shaft 58 remote from the switch S is turned upwardly to provide a finger 112, Fig. 3, passing through a clearance opening 114 in the base B to enter an opening 116, Fig. 1, in the rocker 54. As the rock shaft 58 is thus rocked, it actuates the rocker 54 into the full-line position thereof shown in Fig. 1, thereby transmitting to the mounting plate 26 a movement which causes the friction wheel 18 to operatively engage with the driving roller 20 and the flange 14. In this movement of the parts the wheel 18 is urged by the elastic force of the compression spring 44 into a firm operative driving engagement, as previously explained. As another incident to such actuation of the switch lever 80, the switch arm 90, Figs. 7 and 8, is rocked to effect closure of the contact in the electrical switch 92, thus establishing an operating circuit through the turntable motor M. Hence, the motor M commences to operate for driving the roller 20, Figs. 1 and 2, which, through the medium of the friction wheel 18, drives the turntable T rotatively.

To interrupt operation of the turntable T, the stop button 70 is depressed; this causes the plunger 66 to descend into the position thereof shown in Fig. 6. The pawl 100 then engages the tail of the latch 98 to trip this latch and release the switch lever 80, which thereupon rocks clockwise as viewed in Fig. 6 under the influence of spring 72. The roller 96 is free to enter the recess 106 in the latch 98 provided for this purpose. Depression of the stop button 70 may be performed either manually or automatically, as by engagement of the tone arm A therewith, the latter being familiar practice in automatic record changers. Release of the switch lever 80 from its previously latched position enables the spring 72 to restore the plunger 64 into its upper position shown in Fig. 6. In this movement the electrical switch 92 is opened to break the circuit through the motor M, thereby causing the driving roller 20, Fig. 1, to cease operation. As the pin 76 on the plunger 64, Fig. 6, is raised, the finger 102 of the rock shaft 58 is relieved of the downward thrust previously exerted upon it by the pin 76. Hence, the rocker 54, Fig. 1, no longer is subjected to a positive force acting against the force of the spring 44. The pin 48, therefore, is free to shift along its axis under the influence of its

spring 44 until the enlarged portion 50 of the pin 46 is arrested by engagement with the lever 38.

In consequence of the operation just described, the reactive force of the spring 44 upon the lever 38 is cancelled, thereby relieving the friction wheel 18 of pressure from this spring. Due to the resiliency of the friction material in the tread of the wheel 18, and the natural tendency of the rotating parts to disassociate themselves when no force is acting to maintain them engaged, the wheel 18, mounting plate 26 and lever 38 may shift into positions such as those indicated by broken lines in Fig. 1. It will be clear from Fig. 1 that the rotation of the turntable, which rotates in the same direction as the friction wheel 18, will carry the friction wheel 18 and the mounting plate 26 from the full line position illustrated in Fig. 1 to the dotted line position in that figure. The abutting contact of the head 48 of the pin 46 with the arcuate shoulder 52 of the rocker 54 will permit the lever 38, which is slotted or bifurcated, to receive the fulcrum lug 40 to be shifted from the full line position of the lever 38 shown in Fig. 1 to the dotted line position illustrated in that figure. This construction permits free independent movement of the mounting plate 26 and the lever 38 when the latter is relieved of the pressure of the spring 44. In any event, the friction wheel 18, under these circumstances, will be either free of engagement with the driving roller 20 and turntable flange 14, or will barely touch these parts without any contact pressure, thus achieving the purpose of my present invention.

From the foregoing it will be appreciated that I have provided a substantial improvement in the construction and arrangement of a phonograph turntable drive whereby the peripheral tread of the friction wheel 18 is subjected to contact pressure by the driving roller 20 and turntable flange 14 only when the machine is in operation. This is very effective in prolonging the useful life of the friction wheel and enabling it to give more satisfactory performance while in service.

It is obvious that various changes may be made in the specific embodiment set forth for purposes of illustration without departing from the spirit of the invention. The invention is accordingly not to be limited to the specific embodiment shown and described, but only as indicated in the following claims.

I claim:

1. A power transmission from an electric motor to a phonograph turntable in which is comprised a friction wheel movable toward and from an associated rotatable element in the transmission adapted to drive the latter when in contact therewith, an electrical circuit extending between a source of power and the motor, a switch interposed in the circuit for controlling operation of the motor, a motion transmitting device in connection with the friction wheel for moving the same towards its associated rotatable element in the transmission, and operating means for the motion transmitting device operatively associated with the switch and actuated with the operation thereof to advance the friction wheel into contact position with its associated rotatable element only when the circuit is closed to the motor, said motion transmitting device having means for permitting free limited independent movement of the friction wheel away from said associated rotatable element

when the circuit is opened, thereby causing said rotatable element to move the friction wheel to a position inoperative to transmit motion and whereby the transmission is interrupted and maintained in an interrupted condition.

2. In a drive mechanism for a phonograph turntable, a driving roller arranged to rotate about a fixed axis, a friction wheel, means supporting said friction wheel for bodily movement relative to said driving roller and said turntable, resilient means for urging said friction wheel into contact with said driving roller and a rim portion of said turntable, said friction wheel having a diameter exceeding the clearance between the driving roller and said rim portion, and means for relieving the friction wheel of pressure of said resilient means and for permitting a free independent movement of the friction wheel away from the driving roller for causing the turntable to move the friction wheel out of contact with the driving roller.

3. In a drive mechanism for a phonograph turntable, a driving roller arranged to rotate about a fixed axis, an electric motor operatively connected with the driving roller, a friction wheel, means supporting said wheel for bodily movement relative to said driving roller and said turntable, a spring, means for stressing said spring when the motor is energized, means applying the elastic force of said stressed spring to said friction wheel supporting means for urging said friction wheel into contact with said driving roller and a rim portion of said turntable, said friction wheel supporting means having a free independent movement when relieved of spring stress, and means for relieving said friction wheel supporting means of the stress of the spring when the motor is de-energized, thereby causing the rotation of the turntable to move the friction wheel away from the driving roller into a position inoperative to transmit motion.

4. A phonograph drive mechanism for a phonograph turntable comprising a driving roller, a friction wheel, a mounting member for the friction wheel, means for mounting said member for bodily movement relative to said roller and said turntable, a lever connected with the mounting member and arranged to move the friction wheel into contact with the driving roller and the turntable, a spring, means for stressing the spring, and means for applying the elastic force of the spring to the lever to force the friction wheel into motion transmitting contact pressure against the roller and the turntable to rotate the latter and for relieving the lever of said elastic force to cause the rotary movement of the turntable to move the friction wheel out of motion transmitting contact with the driving roller.

5. In a drive mechanism for a phonograph turntable, a driving roller, a friction wheel, a mounting member for the friction wheel, means for mounting said member for bodily movement relative to said roller and said turntable, a lever connected with the mounting member and arranged to move the friction wheel in contact with the driving roller and the turntable, a rocker, a spring interposed between the rocker and the lever, and means for moving the rocker toward and from the lever for compressing the spring and forcing the friction wheel into motion transmitting contact pressure against the driving roller and the turntable to rotate the latter and also to relieve the lever of spring pressure and cause the rotary movement of the turn-

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table to move the friction wheel out of motion transmitting contact with the driving roller.

6. In a drive mechanism for a phonograph turntable, a driving roller, a friction wheel, a mounting member for the friction wheel, means for mounting said member for bodily movement relative to the driving roller and the turntable, a lever connected with the mounting member and arranged to move the friction wheel in contact with the driving roller and the turntable, a rocker having an arcuate shoulder, a spring interposed between the rocker and the lever, a pin supporting the spring and connected with the lever and having a slidable abutment engagement with the arcuate shoulder of the rocker, and also having movement relative to said lever to enable the spring to be compressed by the rocker, and means for moving the rocker toward the lever and compressing the spring to force the friction wheel into motion transmitting engagement with the driving roller and the turntable to rotate the latter and for moving the rocker away from the lever to relieve the latter of spring pressure and cause the rotary movement of the turntable to carry the friction wheel out of motion transmitting contact with the driving roller.

7. A phonograph including a turntable having a depending peripheral flange, a motor, a driving roller operatively connected with the motor and disposed below the turntable in lateral alignment with said flange, a friction wheel having a diameter exceeding the clearance between the driving roller and said flange, a member supporting the friction wheel and mounted for bodily movement relative to said roller and said flange, a lever fulcrumed at one end and connected at the other end with said member and movable to actuate said member and carry the friction wheel into engagement with the driving roller and the flange of the turntable, a rocker, a spring interposed between the rocker and the lever and compressible by movement of the rocker for actuating said lever and said member for frictionally engaging the friction wheel with the driving roller and the flange of the turntable, and means for energizing the motor and for simultaneously actuating the rocker for effecting said engagement of the friction wheel with the driving roller and said flange and for de-energizing the motor and for simultaneously actuating the rocker to relieve the said lever and member of spring pressure and thereby cause the rotation of the turntable to carry the friction wheel out of contact with the driving roller and maintain the friction wheel in a position inoperative to transmit motion.

8. In a drive mechanism for a phonograph turntable, a driving roller, a friction wheel, a mounting member for the friction wheel, means for mounting said member for bodily movement relative to said roller and said turntable, a lever connected with the mounting member and arranged to move the friction wheel in contact with the driving roller and the turntable, a rocker, a spring interposed between the rocker and the lever, a motor operatively connected with the driving roller, an electrical circuit extending between a power source and the motor, a switch interposed in the circuit for controlling the operation of the motor, and operating mechanism including a switch lever connected with the switch and movable to open and close said circuit, and a rock shaft connected with the rocker for operating the rocker simultaneously with the switch.

9. In a drive mechanism for a phonograph turntable, a driving roller, a friction wheel, a

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mounting member for the friction wheel, means for mounting said member for bodily movement relative to said roller and said turntable, a lever connected with the mounting member and arranged to move the friction wheel into contact with the driving roller and the turntable, a rocker, a spring interposed between the rocker and the lever, a motor operatively connected with the driving roller, an electrical circuit extending between a power source and the motor, a switch interposed in the circuit for controlling the operation of the motor, and operating mechanism including a switch lever connected with the switch and movable to open and close said circuit, a rock shaft connected with the rocker, and a plunger provided with means for actuating the switch lever to close said circuit and energize the motor and with means for simultaneously operating the rock shaft to move the rocker toward the first mentioned lever to compress said spring.

10. In a drive mechanism for a phonograph turntable, a driving roller, a friction wheel, a mounting member for the friction wheel, means for mounting said member for bodily movement relative to said roller and said turntable, a lever connected with the mounting member and arranged to move the friction wheel into contact with the driving roller and the turntable, a rocker, a spring interposed between the rocker and the lever, a motor operatively connected with the driving roller, an electrical circuit extending between a power source and the motor, a switch interposed in the circuit for controlling the operation of the motor, an operating mechanism including a switch lever connected with the switch and movable to open and close the circuit, a rock shaft connected with the rocker, a plunger provided with means for actuating the switch lever to close said circuit and energize the motor and with means for simultaneously operating the rock shaft to move the rocker toward the first mentioned lever to compress said spring, resilient means for urging said plunger upwardly, and a spring biased latch arranged to engage said switch lever for locking said plunger against upward movement for holding the circuit closed.

11. In a drive mechanism for a phonograph turntable, a driving roller, a friction wheel, a mounting member for the friction wheel, means for mounting said member for bodily movement relative to said roller and said turntable, a lever connected with the mounting member and arranged to move the friction wheel into contact with the driving roller and the turntable, a rocker, a spring interposed between the rocker and the lever, a motor operatively connected with the driving roller, an electrical circuit extending between a power source and the motor, a switch interposed in the circuit for controlling the operation of the motor, operating mechanism including a switch lever connected with the switch and movable to open and close the circuit, a rock shaft connected with the rocker, a plunger provided with means for actuating the switch lever to close said circuit and energize the motor and with means for simultaneously operating the rock shaft to move the rocker toward the first mentioned lever to compress said spring, resilient means for urging said plunger upwardly, a spring biased latch arranged to engage said switch lever for locking said plunger against upward movement for holding the circuit closed, and a second plunger provided with means for engaging and moving the latch to release the switch lever and cause said resilient means to move the associated

plunger upwardly and the switch lever to circuit-opening position.

12. In a drive mechanism for a phonograph turntable, a driving roller, a friction wheel, a mounting member for the friction wheel, means for mounting said member for bodily movement relative to said roller and said turntable, a lever connected with the mounting member and arranged to move the friction wheel into contact with the driving roller and the turntable, a rocker, a spring interposed between the rocker and the lever, a motor operatively connected with the driving roller, an electrical circuit extending between a power source and the motor, a switch interposed in the circuit for controlling the operation of the motor, operating mechanism including a switch lever connected with the switch and movable to open and close the circuit, a rock shaft connected with the rocker, a plunger provided with means for actuating the switch lever to close said circuit and energize the motor and with means for simultaneously operating the rock shaft to move the rocker toward the first men-

tioned lever to compress said spring, resilient means for urging said plunger upwardly, a spring biased latch arranged to engage said switch lever for locking said plunger against upward movement for holding the circuit closed, a second plunger provided with a pivoted dog arranged to engage the latch and release the switch lever and cause said resilient means to move its associated plunger upwardly and move the switch lever to circuit-opening position, and a spring for moving said second plunger upwardly and for elevating the dog to a position above the latch.

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