March 3, 1964 M. L. TROTT 3,123,361

PHONOGRAPH NEEDLE PLAY TIMING APPARATUS

Filed June 2, 1961

3 Sheets-Sheet 1

FIG. 1.

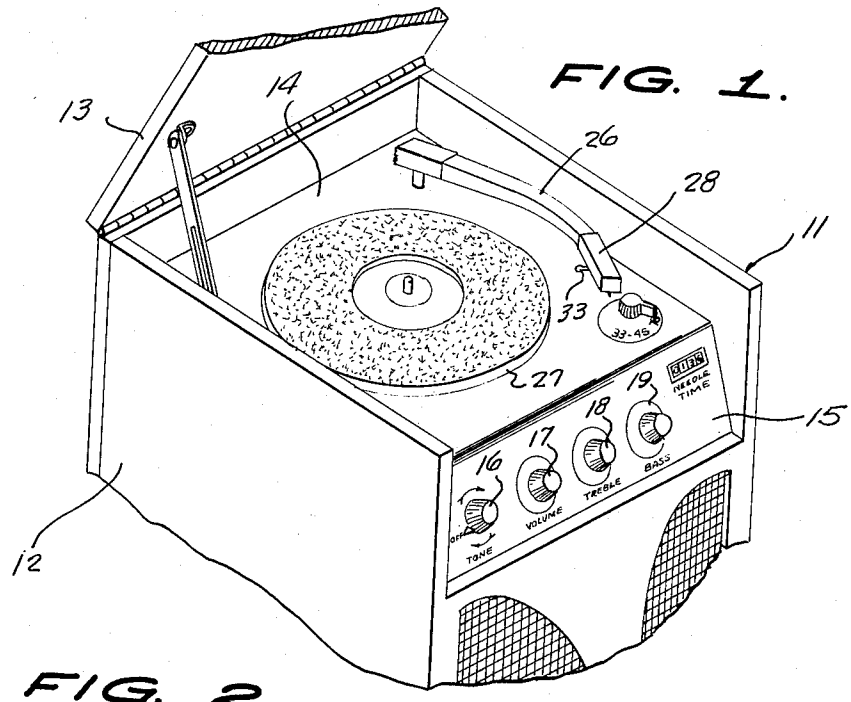


FIG. 2.

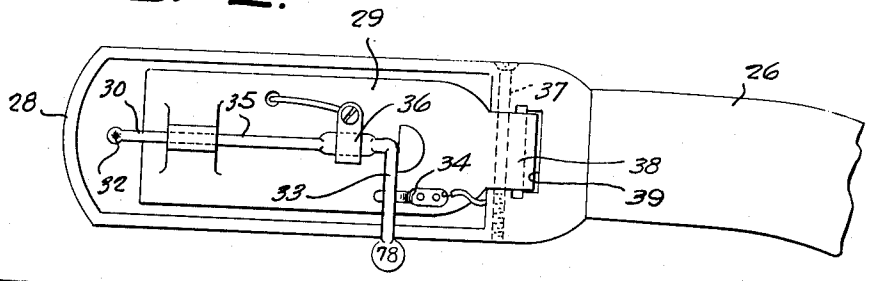
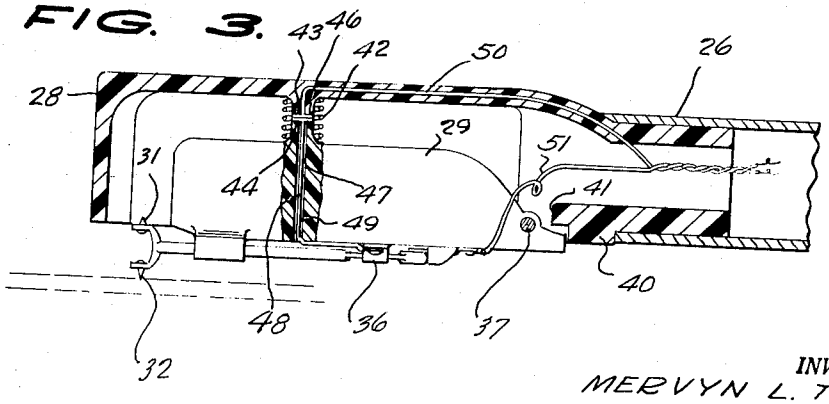


FIG. 3.



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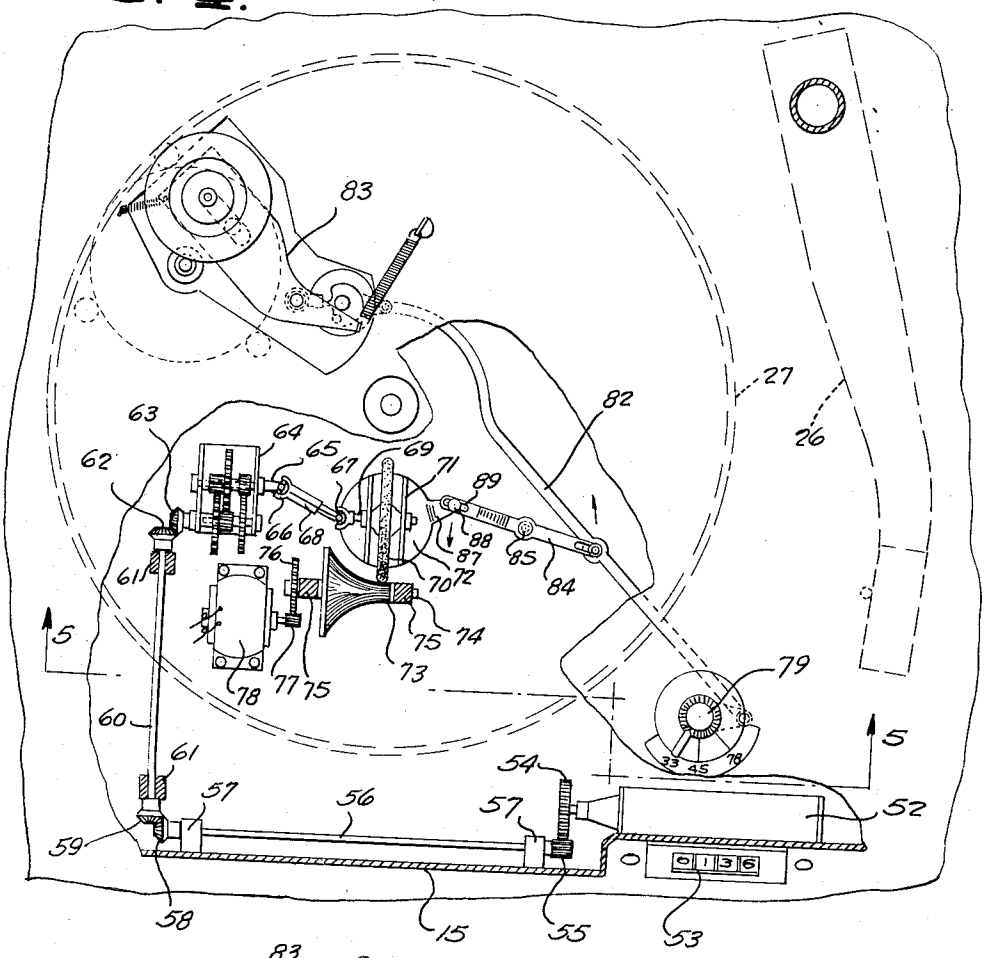
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FIG. 4.



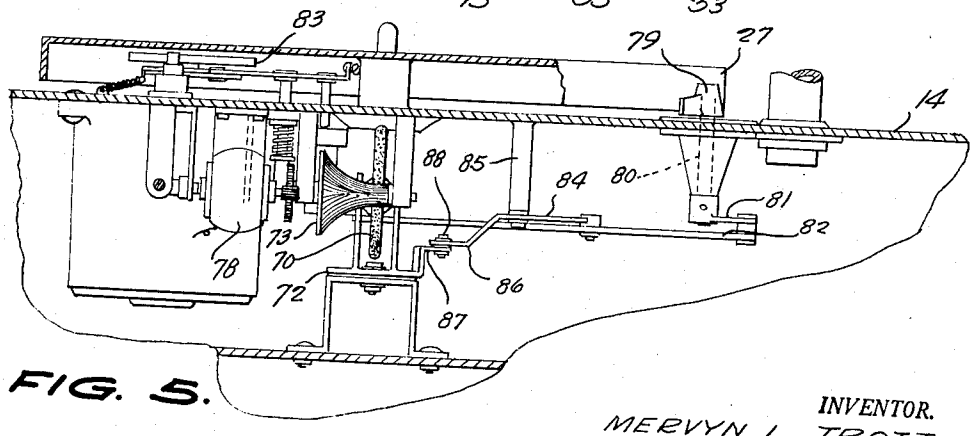


FIG. 5.

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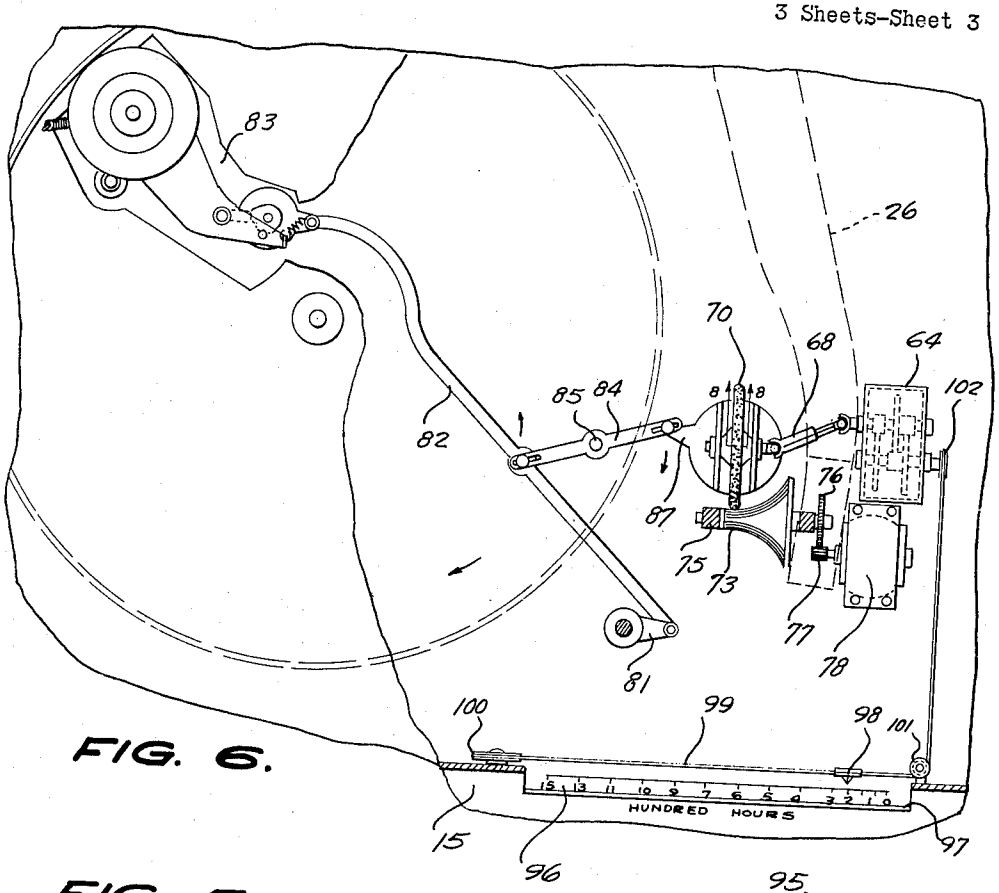
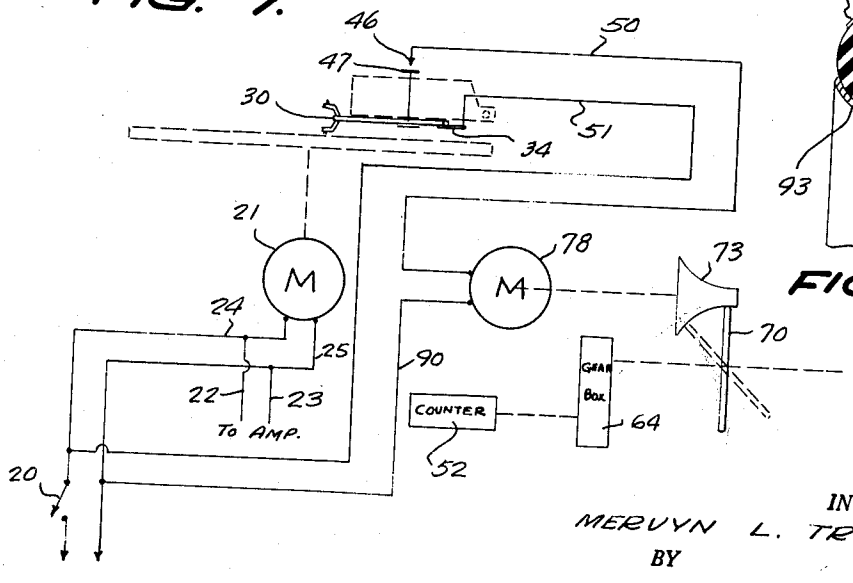


FIG. 6.

FIG. 7.



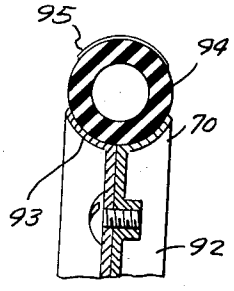


FIG. 8.

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United States Patent Office 3,123,361 Patented Mar. 3, 1964

3,123,361

PHONOGRAPH NEEDLE PLAY TIMING APPARATUS

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Filed June 2, 1961, Ser. No. 114,407
7 Claims. (Cl. 274—1)

This invention relates to phonographs, and more particularly to a device for indicating the extent to which a given phonograph stylus has been played, whereby to provide an indication as to whether it is advisable to replace the stylus.

A main object of the invention is to provide a novel and improved safety device for indicating the extent to which a given phonograph stylus has been played, the safety device being relatively simple in construction, being easy to install in a phonograph cabinet, and operating automatically to provide an accurate and reliable indication as to the amount of playing to which a stylus has been subjected.

A further object of the invention is to provide an improved protective device for phonographs to indicate the extent to which a given phonograph stylus has been played, regardless of different playing speeds during its use, the device involving relatively inexpensive components, being durable in construction, and occupying a relatively small amount of space, whereby it may be readily installed in an ordinary phonograph cabinet.

A still further object of the invention is to provide an improved means for registering the amount of playing of a given phonograph needle, whereby to provide an indication of the condition thereof, the device being provided with means to automatically adjust same in accordance with the speed of playing of the associated phonograph so that the indication provided will be in accordance with the actual amount of playing contact of the phonograph needle with phonograph records, regardless of the speed at which the records are played.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIGURE 1 is a fragmentary perspective view showing the upper portion of a phonograph provided with an improved needle playing register device according to the present invention.

FIGURE 2 is a bottom plan view of the free end of the tone arm of the phonograph of FIGURE 1, to an enlarged scale, and illustrating the manner in which the operating arm of the needle rotating assembly is in electrical contact with a conductor to establish the circuit for operating the needle playing register.

FIGURE 3 is a vertical cross sectional view taken through the tone arm portion illustrated in FIGURE 2.

FIGURE 4 is a fragmentary horizontal cross sectional view, with parts broken away, and with the turntable removed, of the phonograph assembly of FIGURE 1.

FIGURE 5 is a vertical cross sectional view taken substantially on the line 5—5 of FIGURE 4.

FIGURE 6 is a fragmentary horizontal cross sectional view of a phonograph assembly equipped with a modified form of needle playing register device according to the present invention.

FIGURE 7 is an electrical wiring diagram showing the electrical connections of the needle playing register of the present invention.

FIGURE 8 is an enlarged cross sectional detail view taken substantially on the line 8—8 of FIGURE 6.

Referring to the drawings, and more particularly to FIGURES 1 to 5, 11 generally designates a phonograph provided with a main cabinet 12 having a hinged top

cover 13 and having a motor board 14 mounted in its top portion in a position to be exposed when the top cover 13 is elevated to the position illustrated in FIGURE 1. The phonograph is provided with the front control panel 15 which may depend from the forward edge of the motor board 14, as illustrated, or which may be connected to the forward portion of the motor board in any suitable manner, the panel 15 providing a support for the various operating controls of the phonograph, such as the tone control 16, the volume control 17, the treble control 18, and the bass control 19. The tone control 16 also controls the main switch 20 associated with the phonograph motor 21 (FIGURE 7) and may also serve as the control means for turning on the amplifier associated with the phonograph by circuit means well known in the art and including the supply conductors 22 and 23 connected respectively to the motor lead wires 24 and 25, as shown in FIGURE 7.

The phonograph is provided with a tone arm 26 which is swingably mounted in the usual manner so that it may be rotated freely with respect to the phonograph turntable, shown at 27, so as to track with the grooves of a phonograph record disposed on the turntable. The tone arm 26 is provided at its free end with the downwardly open housing portion 28 in which is mounted a phonograph cartridge 29, for example, a cartridge of the type provided with a double needle assembly 30 of conventional construction, comprising the opposed respective needle elements 31 and 32, one of which is designed for use with long-playing records and the other of which is designed for use with records intended to be rotated at higher speeds, for example, at a speed of 78 revolutions per minute. Thus, the needle element 32 may be designed for use with the grooves of a long-playing record, and is illustrated in a depending operative position, the laterally extending adjusting arm 33 of the double needle assembly 30 being therefore in a position extending outwardly from the left side of the housing 28, as viewed in FIGURE 1. As is well known to those skilled in the art, to place the other needle element 31 in its lowermost operative position, the arm 33 is rotated through an angle of 180°, whereby to cause said arm to extend laterally from the right side of housing 28, as viewed in FIGURE 1. The device of the present invention is intended for use to indicate the amount of wear, in terms of extent of actual playing, of the most frequently used needle of the asembly 30, for example, the long-playing needle element 32.

Secured to the under side of the cartridge 29 in a position to be engaged by the arm 33 in the position shown in FIGURES 1 and 2 is a conductive lug element 34. The arm 33 and the shank 35 of the double needle assembly 30 are made of conductive material, and are rotatably supported in conductive contact with a metal clip 36 secured to the bottom surface of the cartridge 29.

As shown in FIGURE 3, the cartridge 29 is pivoted in the housing 28 on a transversely extending pivot bolt 37, the cartridge 29 being pivoted at its inner end portion, namely, the reduced right hand portion thereof shown at 38 in FIGURE 2, which is received in a recess 39 formed in the bottom wall 40 of the tone arm 26. As shown in FIGURE 3, the recess 39 is formed with the top flange 41 which overlies the end of reduced portion 38 and limits the counterclockwise rotation of cartridge 29, as viewed in FIGURE 3.

A coiled spring 42 surrounds a depending integral stud element 43 formed in the top wall of housing portion 28 and also surrounds an upstanding stud element 44 formed on the top of cartridge 29, biasing the cartridge in a counterclockwise direction, as viewed in FIGURE 3. Respective contact elements 46 and 47 are carried by the

opposing ends of the stud elements 43 and 44, said contact elements normally being separated but being engaged with each other responsive to the lowering of the tone arm 26 to bring the cartridge stylus into engagement with a record groove, the weight of the cartridge and tone arm overcoming the opposing force of the coiled spring 42. A wire 48 connects the lower contact element 47 to the metal clip member 36, the wire extending through a vertical bore 49 formed in the cartridge 29. A wire 50, embedded in the top wall of housing portion 28, is connected to the upper contact element 46. An additional wire 51 is connected to the lug 34. The wires 50 and 51 extend through the hollow tone arm 26, along with the phonograph cartridge lead wires (not shown) associated with cartridge 29.

It will be readily apparent from FIGURE 2, that when the adjusting arm 33 of the phonogarph needle assembly 30 is in the position illustrated in FIGURE 2, namely, is in a position wherein the long-playing needle element 32 is lowermost and operative, wires 50 and 51 are electrically connected together, assuming that the tone arm is at its operating position, namely, is in a position wherein the needle element 32 engages in a record groove so that the weight of the tone arm and cartridge assembly causes the contact elements 46 and 47 to engage each other, as above described.

Mounted on the control panel 15 is a conventional counter 52 provided with numbered wheels which are visible through an opening 53 formed in the panel. The counter 52 is provided with the driving gear 54 which meshes with a pinion gear 55 carried on a shaft 56 journaled in suitable bearing brackets 57, 57 secured to the inside surface of panel 15. A beveled gear 58 on shaft 56 meshes with a beveled gear 59 on a counter shaft 60 journaled in bearing brackets 61, 61 secured to the under side of the motor board 14. A further beveled gear 62 on the opposite end of counter shaft 60 meshes with a beveled gear 63 on the output shaft of a reduction gear assembly 64 secured to the underside of motor board 14, the reduction gear assembly having an input shaft 65 which is connected by universal joints 66 and 67 and a universal shaft element 68 to the end of a shaft 69 carrying a friction wheel 70. The friction wheel 70 is supported on the shaft 69 which is in turn journaled in a bracket 71 depending from a rotatable supporting bracket 72 of circular shape and pivoted at its center to the motor board 14 for rotation around a vertical axis which includes the diameter of the friction wheel 70. The friction wheel 70 engages the periphery of a generally conical driving member 73 carried on a shaft 74 journaled in depending bearing brackets 75, 75 secured to the bottom surface of motor board 14, the shaft 74 being provided with a driving gear 76 which meshes with a pinion gear 77 carried on the shaft of an electric motor 78 secured to the bottom surface of motor board 14. The periphery of the driving member 73 is arcuately contoured, the contour thereof having its center of curvature at the axis of the rotatable disc member 72, so that when the disc member is rotated the friction wheel 70 continuously engages the peripheral surface of the driving member 73, but the driving radius changes in accordance with the angle of rotation of member 72. Thus, when the member 72 is rotated in a clockwise direction, as viewed in FIGURE 4, the friction wheel 70 is caused to engage a portion of the periphery of the driving member 73 of increased driving radius, so that the friction wheel rotates through a greater angle per revolution of member 73 than in the position illustrated in FIGURE 4. In other words, the driving ratio between member 73 and the counter 52 increases as the rotatable bracket 72 is rotated in a clockwise direction, as viewed in FIGURE 4.

The phonograph is provided with the usual speed changing mechanism, including the speed control knob 79 mounted on the top end of a shaft 80 which is vertically journaled in the motor board 14 and which is provided

with the actuating arm 81 connected through a link bar 82 to the conventional speed changing mechanism 83. The rotatable supporting disc 72 is connected to the link arm 82 by a pivoted lever 84 which transmits movement of link bar 82 to member 72.

As shown in FIGURE 5, the lever 84 is pivotally connected to the bottom end of a depending stud 85 secured to the motor board 14, the lever 84 having the offset free end portion 86 which is pivotally connected to an upwardly offset lug 87 formed on the periphery of the circular supporting disc 72, the end of the lever being slotted, as shown at 89, so as to provide a pivotal connection at 88 between the lug element 87 and the offset free end portion 86 of lever 84. The lever 84 is suitably dimensioned to rotate the bracket member 72 through the proper angle for each adjustment step of the speed control knob 79, namely, to adjust the driving radius between member 73 and the friction roller 70 in accordance with the actual groove speed of a phonograph record as determined by the operation of the speed control knob 79. Therefore, the counter 52 will be driven simultaneously with the motor 78 and will register values in accordance with the actual lengths of grooves engaged physically by the needle element 32, regardless of the selected speed of play, thus reflecting the condition of the phonograph needle element 32, since, as is well known, the needle deteriorates in accordance with the amount of actual play for which it has been employed. It will thus be seen that by controlling the driving ratio between the member 73 and the counter 53 in the manner above described, the counter does not merely register the number of hours of use of the needle but actually registers a value showing the actual amount of tracking of the needle with the record grooves, regardless of the particular speeds employed.

As shown in FIGURE 7, the wire 50 is connected to one terminal of the register motor 78, the other terminal of motor 78 being connected by a wire 90 to the supply wire 25. Wire 51 is connected to supply wire 24, so that the motor 78 becomes energized responsive to the interengagement of the opposing contact elements 46 and 47, namely, as soon as the tone arm has been lowered so that its stylus element 32 engages in the record groove.

As shown in FIGURE 8, the friction wheel 70 comprises a rigid main portion 92 formed with an annular outwardly concave rim 93 in which is mounted the annular hollow resilient replaceable tire element 94 formed with transversely extending peripheral serrations 95 at its outer surface to provide maximum driving friction between the member 94 and the periphery of the driving element 73.

In the modification illustrated in FIGURE 6, the counting means comprises a calibrated scale 96 mounted horizontally on the inside surface of the panel 15 and exposed through the horizontal notch 97 formed in the panel. A pointer element 98 is carried on an endless cable 99 supported on pulleys 100, 101 and 102, the pulley 102 being mounted on the output shaft of the gear reduction assembly 64, as shown. Thus, when the motor 78 is energized the pointer element 94 moves along the scale 96, being driven by the pulley 102, providing an indication of the amount of playing of the associated needle element in the same manner as is provided by the counter 52 in the form of the invention illustrated in FIGURES 1 to 5.

While certain specific embodiments of an improved phonograph stylus trackage indicator have been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In a phonograph, a stylus trackage indicator comprising a counter, a motor drivingly connected to said

counter, a tone arm provided with a transducing cartridge having a stylus adapted to engage in the grooves of a phonograph record, normally open switch means in the tone arm, means to close said switch means responsive to the lowering of the tone arm to a position wherein the stylus engages a record, and an energizing circuit including said switch means connected to said motor.

2. In a phonograph having a rotary turntable and a tone arm pivoted to overlie the turntable and provided with a transducing cartridge having a depending stylus, a stylus trackage indicator comprising a counter, a motor drivingly connected to said counter, normally open switch means on the tone arm, means operated by the weight of the tone arm to close said switch means when the tone arm is supported on said stylus, and an energizing circuit connected to said motor through said switch means.

3. In a phonograph having a rotary turntable and a tone arm pivoted to overlie the turntable and provided with a transducing cartridge pivoted at one end thereof to the tone arm having a depending stylus at its other end, a stylus trackage indicator comprising a counter, a motor drivingly connected to said counter, normally open switch means of the tone arm, means operated by the weight of the tone arm to close said switch means responsive to the pivotal movement of the cartridge relative to the tone arm resulting from the engagement of the stylus with the groove of a record on the turntable, and an energizing circuit connected to said motor through said switch means.

4. In a phonograph having a rotary turntable, a tone arm provided with a transducing cartridge having a depending stylus adapted to engage in the grooves of a record on the turntable, and adjustable speed control means to adjust the speed of the turntable, a stylus trackage indicator comprising a counter, a motor, adjustable-ratio transmission means, means drivingly connecting said motor to said counter through said transmission means, means operatively connecting said transmission means to said speed control means to adjust the transmission ratio in accordance with the adjustment of the speed control means, switch means in the tone arm closing responsive to the engagement of said stylus with a record, whereby the tone arm is supported on the stylus, and an energizing circuit connected to said motor through said switch means.

5. In a phonograph having a rotary turntable, a tone arm provided with a transducing cartridge having a depending stylus adapted to engage in the grooves of a record on the turntable, and adjustable speed control means to adjust the speed of the turntable, a stylus trackage indicator comprising a counter, a motor, a friction cone driven by said motor, an adjustably mounted friction wheel engaging said cone, means drivingly connecting said wheel to said counter, means to adjust the point of engagement of said friction wheel on the cone in accordance with the adjustment of the speed control means, switch means in the tone arm closing responsive to the engagement of said stylus with a record, whereby the tone arm is supported on the stylus, and an energizing circuit connected to said motor through said switch means.

6. In a phonograph having a rotary turntable, a tone arm provided with a transducing cartridge having a depending stylus adapted to engage in the grooves of a record on the turntable, and adjustable speed control means to adjust the speed of the turntable, a stylus trackage indicator comprising a counter, a motor, a friction cone driven by said motor, said cone having a substantially arcuate longitudinal peripheral contour, bracket means rotatably mounted on an axis concentric with said longitudinal peripheral contour, a friction wheel journaled on said bracket means with its center on said axis, said friction wheel engaging the arcuate periphery of the cone, whereby to provide adjustment of the driving ratio between the cone and the wheel as the bracket means is rotated, means drivingly connecting said wheel to said counter, means to adjust the point of engagement of said friction wheel on the cone in accordance with the adjustment of the speed control means, switch means in the tone arm closing responsive to the engagement of said stylus with a record, whereby the tone arm is supported on the stylus, and an energizing circuit connected to said motor through said switch means.

7. In a phonograph having a rotary turntable, a tone arm, a transducing cartridge pivoted in the free end of said tone arm and having a depending stylus adapted to engage in the grooves of a record on the turntable, whereby to support the tone arm on the stylus, and adjustable speed control means to adjust the speed of the turntable, a stylus trackage indicator comprising a counter, a motor, a friction cone driven by said motor, said cone having a substantially arcuate longitudinal peripheral contour, bracket means rotatably mounted on an axis concentric with said longitudinal peripheral contour, a friction wheel journaled on said bracket means with its center on said axis, said friction wheel engaging the arcuate periphery of the cone, whereby to provide adjustment of the driving ratio between the cone and the wheel as the bracket means is rotated, means drivingly connecting said wheel to said counter, means to adjust the points of engagement of said friction wheel on the cone in accordance with the adjustment of the speed control means, cooperating switch contacts on the cartridge and the tone arm closing when the tone arm is supported on said stylus, and an energizing circuit connected to said motor through said switch contacts.

References Cited in the file of this patent

UNITED STATES PATENTS

2,958,949 McGuskin ---------- Nov. 8, 1960