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Van Antwerp

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[54] **PHONOGRAPH RECORD PLAYER**

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[73] Assignee: **The Magnavox Company,** Fort Wayne, Ind.

[22] Filed: **Mar. 20, 1972**

[21] Appl. No.: **235,971**

[52] **U.S. Cl.** ..... **274/39 A**
[51] **Int. Cl.** **G11b 3/60**
[58] **Field of Search** ..... 274/9 A, 1 E, 10 R, 39 A

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Primary Examiner—William D. Martin, Jr.
Assistant Examiner—A. Jason Mirabite

[57] **ABSTRACT**

A phonograph record player is provided wherein a turntable drive mechanism is mounted within a well formed in a supporting base, the turntable having a depending flange which nests in an annular well portion of greater depth. Mounted on the surface forming the bottom of the well is a drive means for effecting rotation of the turntable. The drive means includes motive means having a rotatable upright shaft member, the upper end of which terminates adjacent the underside of the turntable and in driving contact with a vertically adjustable rotary idler member which, in turn, is in driving contact with the depending flange formed on the turntable. The upright shaft member is supported by an interior bearing projecting axially downwardly from the lower end of the member into the motive means. A tone arm and activating means therefor are included and the system further includes automatic sensing means which controls the speed of the turntable and the place where the tone arm engages the record in dependence upon the type of record being played.

19 Claims, 15 Drawing Figures

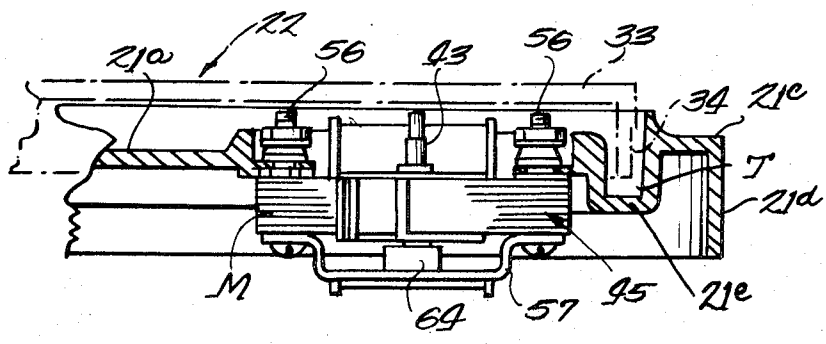
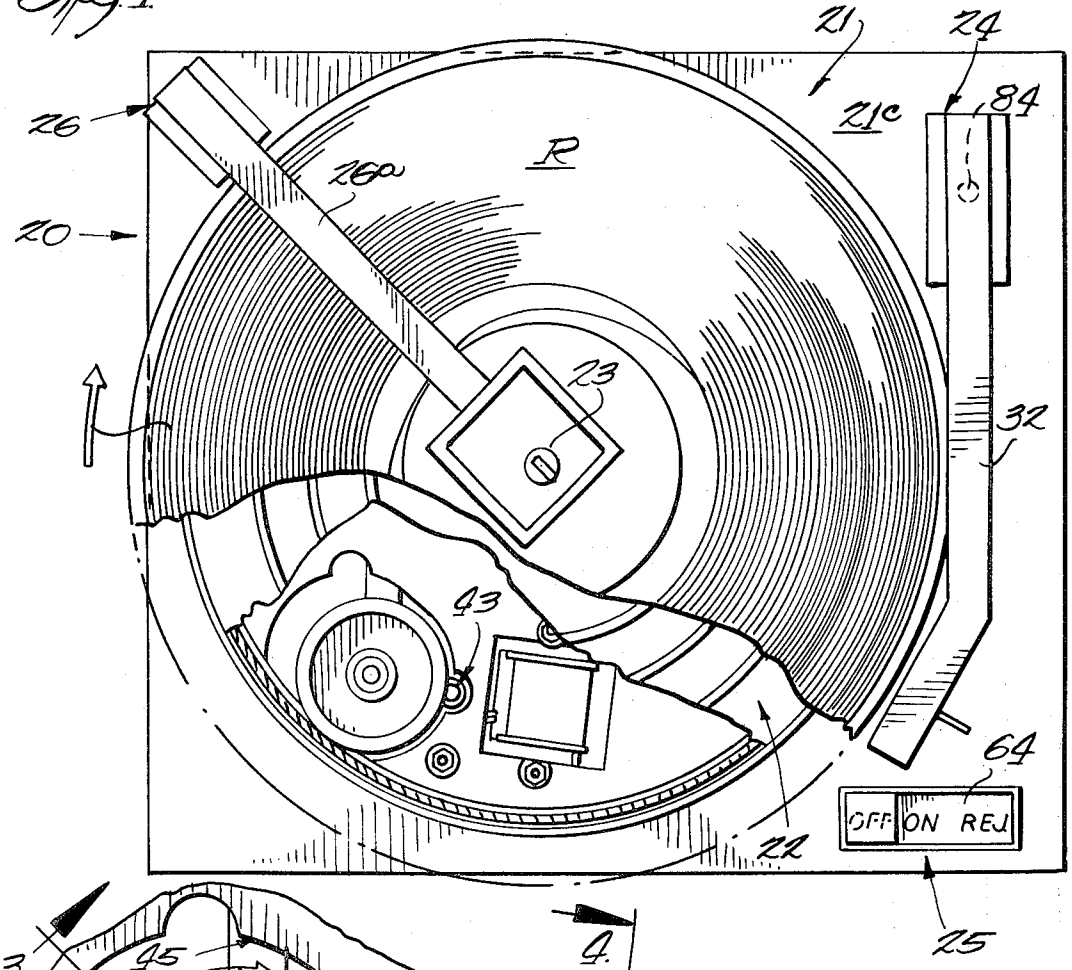


Fig. 1


21
24
26
21c
84
26a
R
20
23
32
43
64
OFF ON REV
22
25

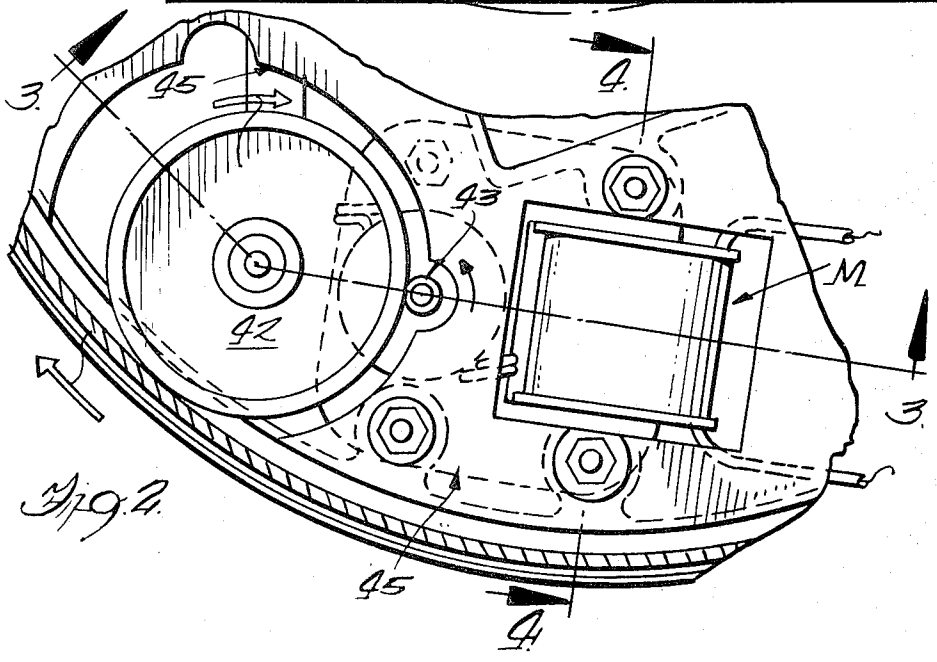

3
45
4
43
M
42
3
45
4

Fig. 2

Fig. 3

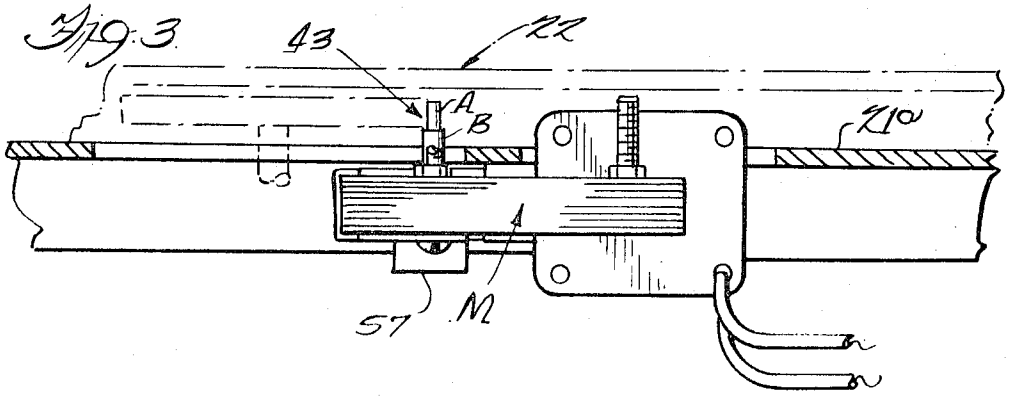


Fig. 4

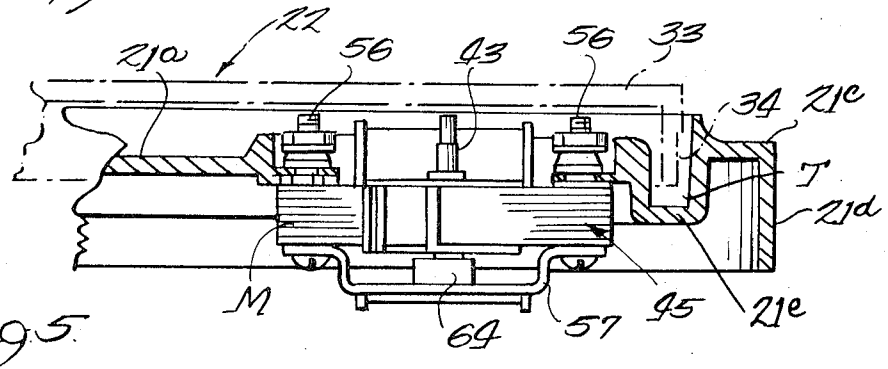


Fig. 5

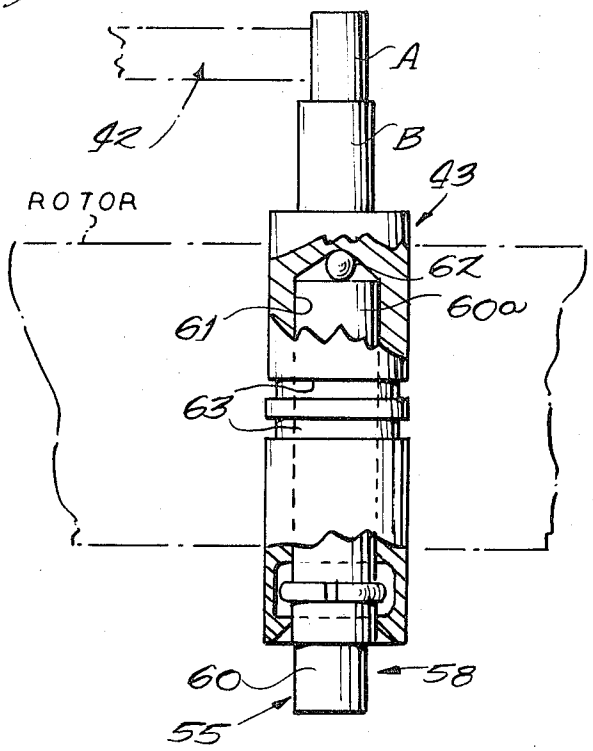
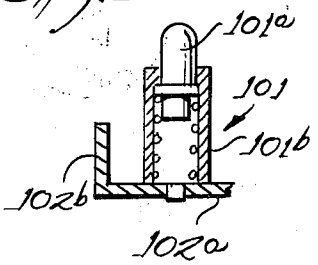


Fig. 15



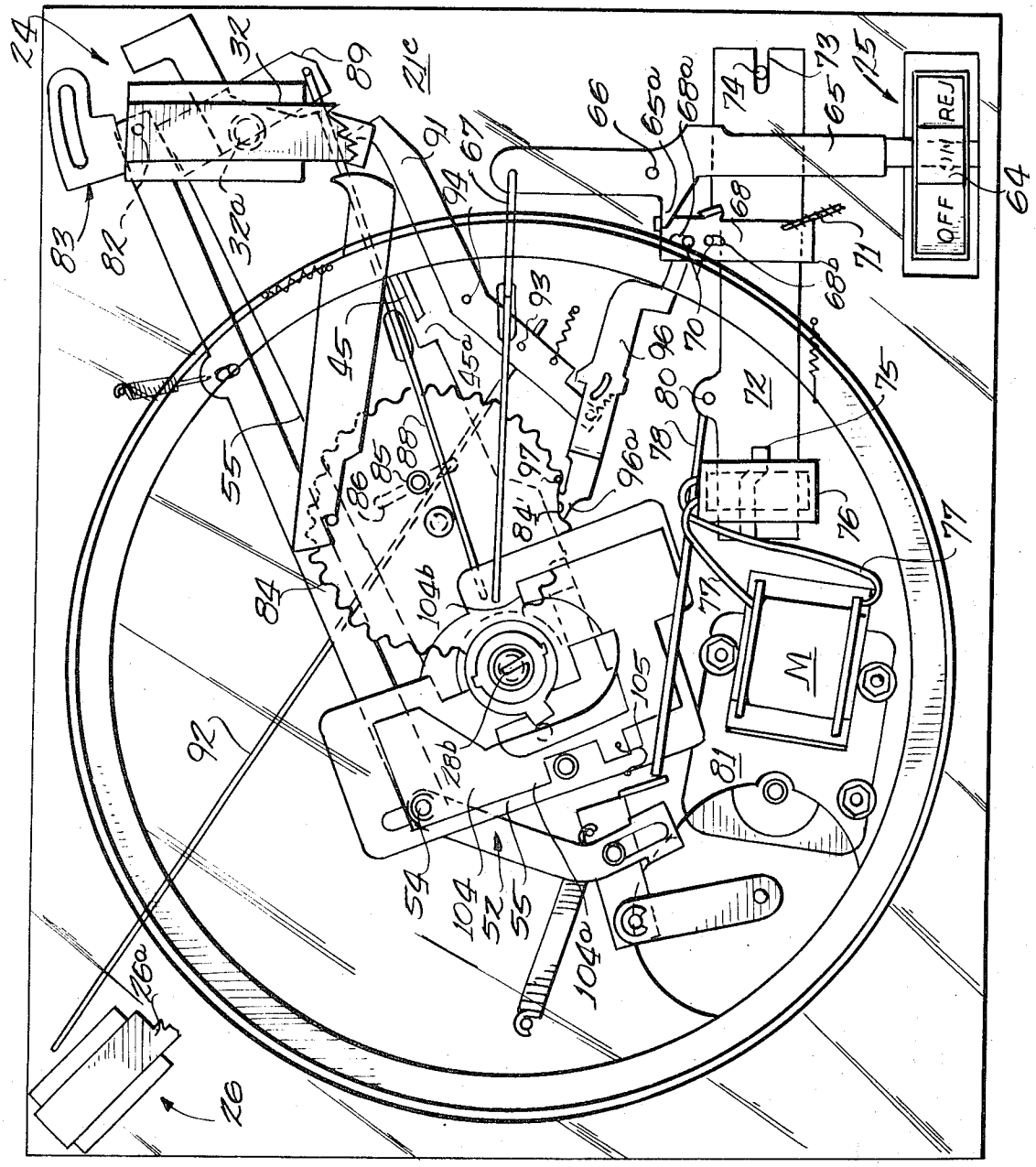


Fig. 6.

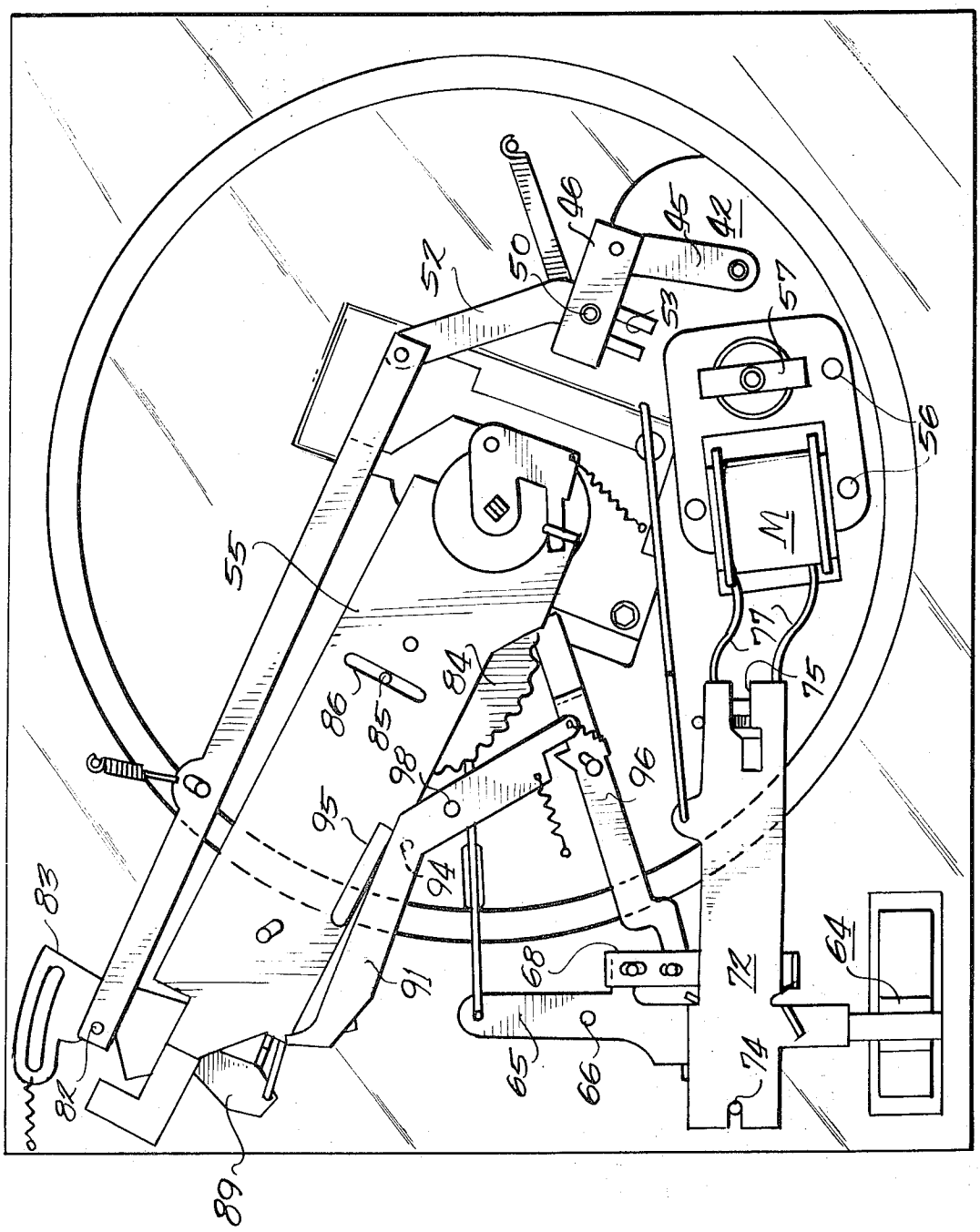

42
45
46
50
52
53
56
57
55
84
85
86
95
96
98
94
91
83
82
89
68
65
66
72
74
64
75
77

Fig. 7

Fig. 8

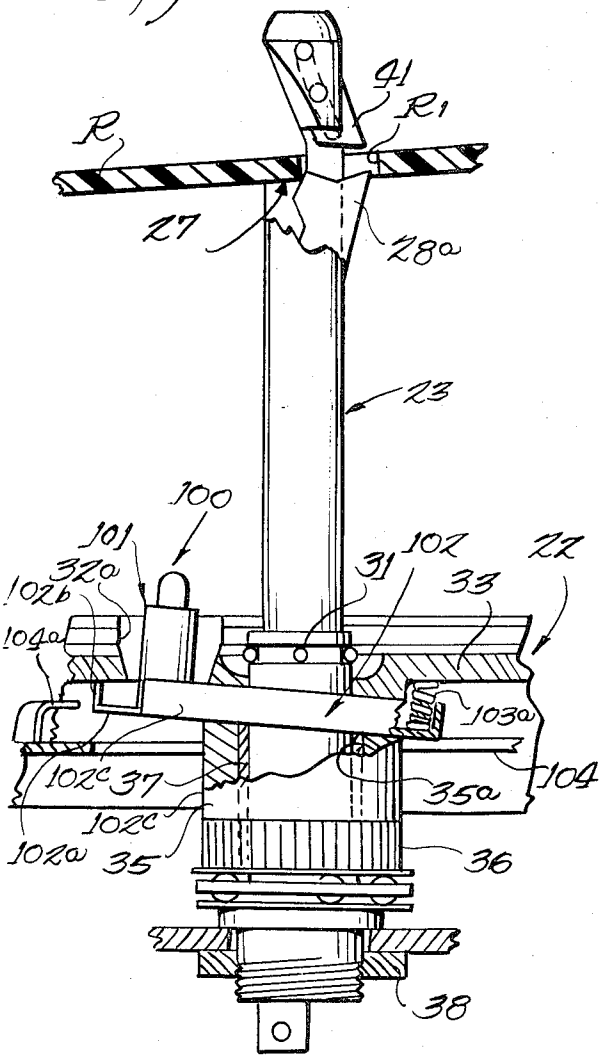


Fig. 9

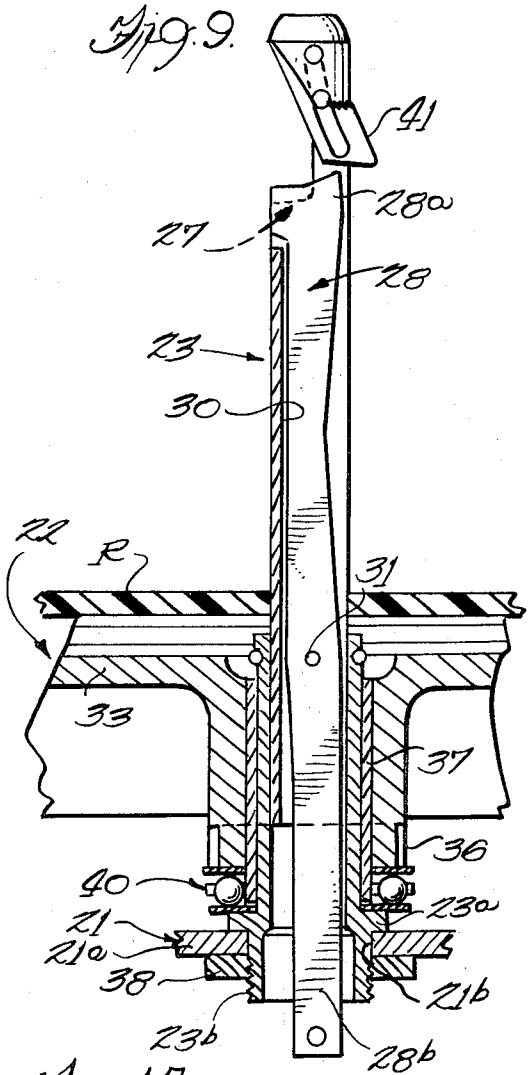


Fig. 10

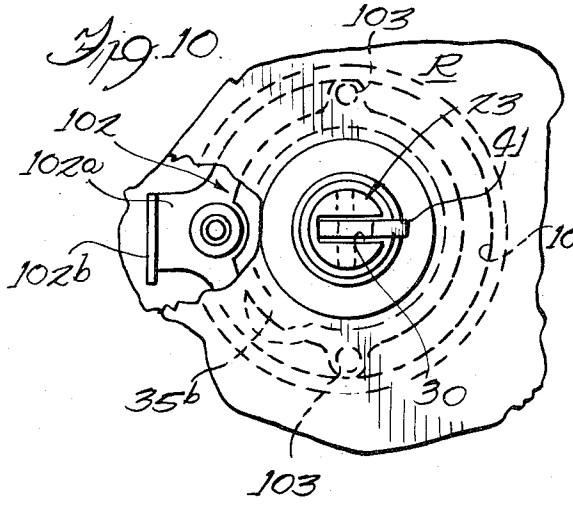


Fig. 14

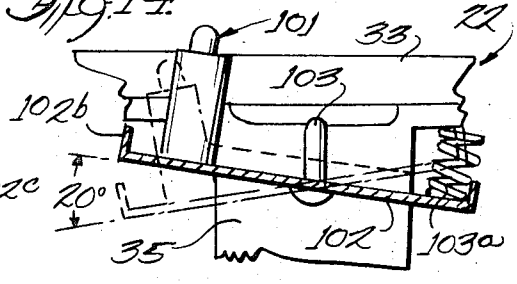


Fig. 11.

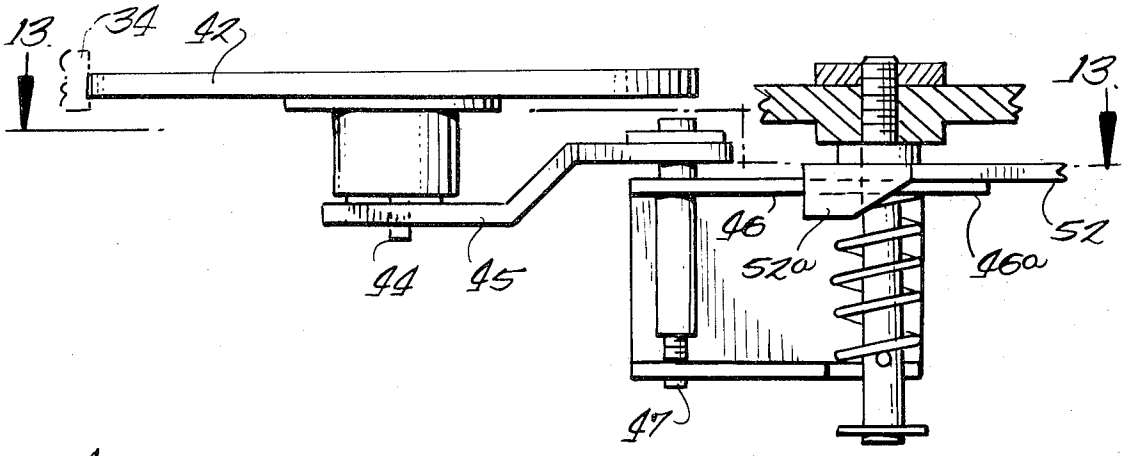


Fig. 12.

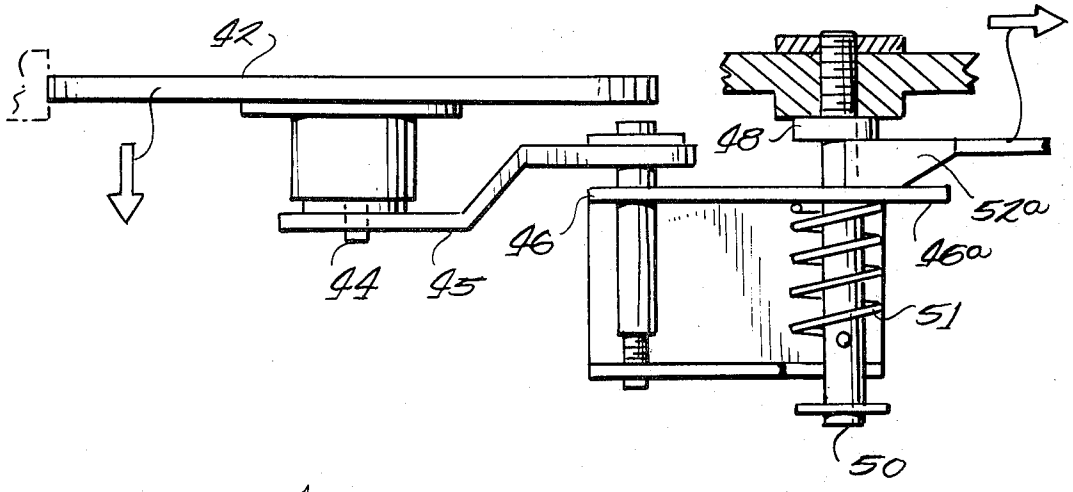
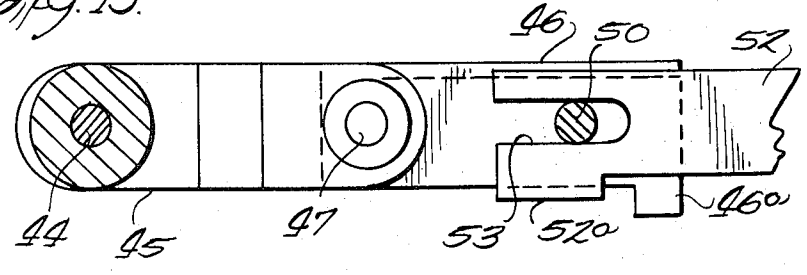


Fig. 13.



PHONOGRAPH RECORD PLAYER

BACKGROUND OF THE INVENTION

Styling of phonograph record players in recent years has been towards compactness and a slim or low profile appearance. The associated design of the mechanism has been towards simplicity and ease of operation. Heretofore, difficulty in achieving these objectives has been due, in part, to the manner of mounting the drive means for the turntable whereby portions of the drive means would project downwardly a substantial distance below the supporting surface for the turntable. The substantial downward projection was normally caused by various external bearings and brackets which were required to support the armature of an electric motor and various other upright members used in driving the turntable. Furthermore, because of these various bearing brackets, oil slingers or the like were normally required in order to minimize contamination of the various drive components for the turntable by the bearing oil. Contamination of these components causes loss of drive friction, thus premature failure. In addition, the utilization of such bearing brackets and component parts increased the material and assembly costs of the player. Where the turntable included a flange for strength or propulsion purposes, these problems were aggravated.

Furthermore, relatively complex mechanisms were provided to control the speed of the drive means and the specific actuating cycle of the tone arm. This usually involved one or more manual selections and additional sub-turntable space.

SUMMARY OF THE INVENTION

Thus, it is an object of this invention to provide a record player which is compact in construction and simple in operation and which may be stylized so as to have a low profile.

It is a further object of this invention to provide a record player which is of simple and inexpensive construction, and yet has stable and uniform operating characteristics.

It is a still further object of this invention to provide a record player which is adapted to automatically accommodate records of various diameters and will automatically change the rotational speed of the turntable to suit the particular record being played.

Further and additional objects will appear from the description, accompanying drawings and appended claims.

In accordance with one embodiment of the invention, a record player is provided which comprises a supporting base having a generally circular well formed therein and an annular peripheral well portion concentric therewith of greater depth. A flanged turntable rotatably mounted above the well is positioned so that the flange extends downwardly into the well portion.

In driving engagement with the inner surface of the turntable flange is an idler wheel which, in turn, is in contact with the upper end portion of a stepped shaft comprising the driving member. The shaft comprises a part of a rotor which is mounted within a stator secured to the base in the well, so that the stator protrudes downwardly only a minimum amount from the well base. The base of the well has an annular trough portion which is partially coplanar with the driving member and in which is disposed the peripheral flange of the turntable. The upper end of the driving member has a first or upper portion of a predetermined diameter and a second or lower portion of greater diameter. The first portion terminates closely adjacent the underside of the turntable. The idler wheel is mounted for vertical adjustment and, when in one position of adjustment, is adapted to engage the driving member first portion whereby a predetermined rotational speed is imparted to the turntable and, when in a second position of adjustment, is adapted to engage the second portion whereby a second predetermined rotational speed is imparted to the turntable. The driving member is rotated at a predetermined uniform speed. The position of the idler wheel is automatically set by the type of record being played. The same mechanism which selects the turntable speed also selects the point at which the tone arm is set down on the turntable.

DESCRIPTION

For a more complete understanding of the invention, reference should be made to the drawings wherein:

FIG. 1 is a top plan view of one form of the improved record player shown with a conventional 12-inch record in playing position on the turntable; portions of the record and turntable are broken away to expose various components of the drive means.

FIG. 2 is an enlarged, fragmentary plan view of the exposed components of the drive means shown in FIG. 1.

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2.

FIG. 4 is a sectional view taken along line 4—4 of FIG. 2.

FIG. 5 is an enlarged, fragmentary, elevational view partly in vertical section showing one form of an upright driving member utilized in rotating the turntable.

FIG. 6 is a top plan view of the record player of FIG. 1 showing the mechanism interconnecting the pickup arm and the turntable drive mechanism and controls therefor.

FIG. 7 is a bottom view of the player shown in FIG. 6.

FIG. 8 is a fragmentary enlarged side elevational view of the spindle for the turntable with portions of both the spindle and turntable removed; the ejector arm carried by the spindle being shown in one position of adjustment.

FIG. 9 is similar to FIG. 8, but in vertical section and showing the ejector arm in a changed position.

FIG. 10 is a fragmentary top view of FIG. 8 with a portion of the turntable surface removed.

FIG. 11 is a fragmentary, side elevational view of the mechanism for effecting vertical adjustment of the idler wheel.

FIG. 12 is similar to FIG. 11, but showing the idler wheel in a changed position.

FIG. 13 is a fragmentary sectional view taken along line 13—13 of FIG. 11.

FIG. 14 is a fragmentary side elevational view of a sensing device shown in FIG. 10, portions of the device have been removed and the device in a depressed state is shown in dotted lines.

FIG. 15 is an enlarged fragmentary vertical sectional view of the button assembly forming a part of the sensing device.

Referring now to the drawings and more particularly to FIG. 1, one form of the improved phonograph record player 20 is shown which includes a base 21, and a turntable 22 mounted on the base for rotation about an upright spindle 23. Spaced outwardly from the periphery of the turntable are a pickup or tone arm assembly 24, a function selector 25, and a record stabilizing assembly 26, the latter being diagonally disposed with respect to the selector.

The spindle 23, as seen in FIGS. 8 and 9, is provided with a notch or shelf 27 formed adjacent the upper end thereof on which the lowermost record R of a stack of records is caused to be disposed prior to the record being released from the shelf so that it may fall by gravity into playing position on the turntable 22. The diameter of the spindle 23 is slightly less than the center opening R_1 formed in a conventional 12-inch record.

To release the record R from the shelf, the spindle 23 is provided with an elongated pivotally mounted upright ejector arm 28, which is disposed within a suitable elongate slot 30 formed in one side of the spindle. The arm 28 normally assumes the position shown in FIG. 8 wherein the upper end 28*a* of the arm is offset with respect to the vertical axis of the spindle. Upon the arm being moved in a counterclockwise direction about pivot pin 31, the upper end 28*a* of arm 28 will contact the inside of the record opening R_1 and push the record to the left, as seen in FIGS. 8 and 9, until the record is released from the shelf 27. The movement of the ejector arm 28 is in timed sequence with the outward pivotal movement of the pickup arm 32, the latter forming a part of assembly 24. The mechanism for effecting the ejector arm movement will be described more fully hereinafter. Suffice to say at this point, the lower end 28*b* of the ejector arm projects downwardly beneath the turntable 22 and a portion 21*a* of the base 21.

The turntable 22 is provided with an annular, horizontally disposed, record-engaging surface 33 having a depending peripheral flange 34, see FIG. 4. The center of the surface 33 is provided with a depending hub 35, the lower end portion of spindle which is formed into a pinion gear 36, see FIGS. 8 and 9. The hub is provided with a center bore 35*a* into which is disposed a bushing 37 which, in turn, revolves around the lower portion of the spindle. The lower end of the spindl is provided with a shoulder 23*a* which rests against the upper surface of the base portion 21*a*. The portion 23*b* of the spindle 23, which extends downwardly from the shoulder, is externally threaded and is disposed within an opening 21*b* formed in the base portion 21*a*. A nut 38 is threaded onto the lower end of the spindle and clamps the base portion 21*a* between the shoulder 23*a* and the nut.

Disposed on the upper surface of shoulder 23*a* is a thrust bearing 40 which is engaged by the underside of the hub 35 and permits the turntable 22 to rotate independently of the spindle.

Adjustably secured to the upper end of the spindle, is a dog or lug 41, the function of which and the manner of being secured to the spindle end being well understood in the record player art.

Rotation of the turntable 22 in a clockwise direction as viewed in FIG. 1, is accomplished by a vertically adjustable idler wheel 42 which is in frictional driving engagement with the peripheral flange 34 of the turntable 22, see FIGS. 1, 2, 11, and 12. The idler wheel, in turn, is driven by a shaft 43 which is fixed to the rotor of an electric motor M, see FIGS. 3–5.

The upper end of the shaft which protrudes from the rotor has a first or upper cylindrical section A which is of lesser diameter than the adjacent second or lower section B. By reason of the diameter differential, the shaft 43, notwithstanding that it is rotated at a constant speed, is capable of imparting to the turntable 22 through the idler wheel 42, a speed of either 33-⅓ revolutions per minute or 45 revolutions per minute. When the periphery of wheel 42 is in frictional engagement with section A of shaft 43, see FIG. 5, the turntable speed is 33-⅓ rpm. On the other hand, when the idler wheel 42 has been vertically adjusted so that the periphery thereof is in frictional engagement with shaft section B, the turntable speed is 45 rpm.

As seen in FIGS. 11–13, the idler wheel 42 is rotatably mounted on an upright axle 44, which, in turn, is secured to one end of an arm 45. The opposite end of arm 45 is pivotally connected to a second arm 46 by means of an adjustable pin 47. The pin 47 is adjustable so that the periphery of the idler wheel 42 will be in proper registry with either shaft section A or B when the wheel is in predetermined positions of adjustment. Second arm 46 is connected to a stationary member 48 by a pin 50. The pin 50 has the upper end thereof secured to member 48 and the lower end portion thereof encompassed by a coil spring 51. The lower end of the spring is affixed to the pin and the upper end of the spring engages arm 46 urging the latter in a direction towards the stationary member 48. Interposed member 48 and arm 46 is a cam lever 52. The lever is provided with an elongated slot 53 which is adapted to accommodate the shaft of pin 50, see FIG. 13. The slot 53 permits the lever 52 to be moved relative to the pin 50. The free end of the lever 52, that is the end closest to pin 50, is provided with a depending cam 52*a*, see FIGS. 11 and 12. One side of the cam, which is adapted to engage a lug 46*a* on arm 46 when the lever is moved to the right as viewed in FIG. 11, is included at an angle of approximately 30° so as to enable the cam to more smoothly engage the lug 46*a* and move the arm 46 downwardly relative to the stationary member 48. The downward movement of arm 46 is transmitted to the idler wheel 42 through arm 45.

The opposite end of cam lever 52 is pivotally connected at 54 to a horizontally adjusted slide 55, see FIG. 6. The adjustment of the slide is accomplished through a mechanism to be described more fully hereinafter.

The base 21, as seen in FIGS. 1, 4, and 6, has an exposed upper horizontal surface 21*c* which is preferably delimited by a depending flange 21*d* see FIG. 4. The upper surface 21*c* is provided with a generally circular well or recessed section which includes the planar portion 21*a*. The portion 21*a*, in turn, is delimited by an annular well portion 21*e* defining trough T. The depth of the trough with respect to surface 21*c* is greater than well surface portion 21*a*. The trough T is adapted to accommodate the depending peripheral flange 34 of turntable 22, see FIG. 4.

Well surface portion 21*a* is provided with a plurality of openings, in addition to opening 21*b* previously mentioned, so as to permit the drive motor M for shaft 43 and the various other mechanisms which cooperate with the pickup arm assembly 24, record stabilizing assembly 26 and function selector 25 to be secured to the

well surface portion 21*a* or surface 21*c* of the base 21.

In FIG. 4, it will be noted, that the motor M for shaft 43 has a thin profile and is secured to surface portion 21*a* by a plurality of tie bolts 56. Because of the thin profile of the motor and the relative position of surface portion 21*a*, the underside of the motor projects downwardly only a short distance, thereby enabling the record player 20 to have overall minimum height in the order of 3-½ inches in one embodiment.

The shaft 43, in the illustrated embodiment, is supported in a vertical position by a bracket 57 so that shaft section A terminates closely adjacent the underside of the record-supporting surface 33 of the turntable 22, see FIGS. 3 and 4. Bracket 57 carries a bearing 58 which includes a vertical first member or stud 60 disposed within a center longitudinally extending bore 61 formed in the lower end portion of a second member or shaft 43 and a ball bearing 62 disposed between the closed end of bore 61 and the adjacent upper end 60*a* of stud 60. The bore is sized relative to the stud diameter so that the shaft is free to rotate about the axis of the stud.

The exterior of the shaft 43 is provided with a pair of annular grooves 63 in which is deposited cementitious material for bonding the rotor of motor M to the shaft 43.

The lower end of the stud 60 is accommodated within a seat 64 mounted on bracket 57. By reason of the shaft 43 being supported only from the bottom by a single bracket, no problem of wicking of the bearing lubricant along the exterior of the shaft results. In lieu of the bearing construction shown in FIG. 5, the bore may be formed in the first member which extends upwardly from the bracket and is adapted to receive the lower end of the second member. In such an arrangement, the bottom of the second member may be provided with a thrust bearing washer or the like. In either construction, however, only a single supporting bracket is required thereby enabling the stator to be positioned in closer proximity to the underside of the turntable.

FIGS. 6 and 7 show some of the mechanism mounted on base 21 which provides interconnection between the pickup arm assembly 24, function selector 25, and record stabilizing assembly 26. The mechanical components to be hereinafter described are shown in FIG. 6 in the relative position when the turntable is rotating at a speed of 33-⅓ rpm.

The function selector 25 consists of a three position control 64, which is manually adjustable to "off," "on," and "rej." positions. The control 64 is exposed and is mounted on the lower right-hand corner of base surface 21*c*, as seen in FIG. 1. The location of the control may vary as desired. The control 64 operatively engages one end of a control arm 65 which is pivotal about a pin 66. The opposite end of the arm has pivotally connected thereto one end of a rod 67, which, in turn, is connected to a suitable mechanism for effecting a change of cycle of the pickup arm 32. The details of the mechanism will be described hereinafter.

Arm 65 is provided with a laterally projecting nose 65*a* which is disposed adjacent pin 66. The nose 65*a* is adapted to engage a latch 68 which is mounted for linear movement. The latch 68 is provided with a pair of elongated, longitudinally aligned slots 68*a* and *b* which are adapted to slidably accommodate pins 70. Latch 68, as seen in FIG. 6, is biased in a down position by spring 71. When latch 68 is in its down position, it blocks movement of switchplate 72 toward the left, as seen in FIG. 6. The movement of switchplate 72 is at right angles to the movement of latch 68.

One end of the switchplate is provided with a longitudinally extending rectilinear guide slot 73 which is adapted to accommodate a stationary guide pin 74. The opposite end of the switchplate is also provided with an elongated non-rectilinear slot 75 in which is slidably disposed the actuator, not shown, of an electrical switch 76. Switch 76 is connected by suitable electrical leads 77 to motor M and thus, controls the operation of the latter.

The movement of switchplate 72 effects operation of a disengage rod 78 which has one end thereof pivotally connected thereto at 80 and the opposite end thereof engageably connected to a yoke 81. The function of rod 78 is to disengage the idler wheel from the drive shaft 43 and turntable flange 34 when the player is in a shut-off position.

The set-down position of the pickup arm 32 is governed by an indexing pin 82 which is adapted to be shifted into one of two positions simultaneously with the vertical adjustment of the idler wheel 42. The indexing pin 82 serves to block the movement of a size selector cam 83 during a change of cycle of the pickup arm 32, that is to say, for example, when the arm has moved through the run-out groove formed adjacent the center of the record being played and has automatically swung outwardly about a pivot point 32*a* beyond the periphery of the turntable 22 and the record disposed thereon, whereby the bottom record of this stack of records supported on the upper end of the spindle is actuated by the ejector arm 28 to a position wherein it is free to fall by gravity into playing position. Thus, the selector cam 83, in combination with the indexing pin 82, controls the inward movement of the arm 32 before it makes playing contact with the playing surface of the new record.

The change cycle, as aforenoted, is accomplished by a gear 84 which is driven by the small pinion gear 36 formed at the lower end of the turntable hub 35. A roller 85, carried by gear 84, is disposed within an elongated transverse slot 86 formed in the slide 55 and thus, as the gear is rotated, the slid is actuated in a linear direction. The slide 55, upon being actuated, performs a dual function of (a) engaging the lower end 28*b* of the ejector arm 28 causing the latter to pivot to the position shown in FIG. 9 wherein the lowermost record of the stack of records supported on the end of the spindle 23 is free to fall into playing postion; and (b) lifting and lowering the pickup arm 32 and moving same out and in with respect to the turntable.

The gear 84 has a peripheral portion 84', see FIG. 6, wherein the teeth have been removed. This portion of the gear is disposed adjacent the hub gear 36 while the record is being played by the pickup arm. Thus, the change cycle gear 84 is inactive while the pickup arm 32 is in record playing position. Change cycle gear 84 is set into rotational contact with hub gear 36 by a trip pawl which is mounted on the gear 84 and is pushed by a radially protruding nub 35*b*, see FIG. 10, formed on the turntable hub 35. The trip pawl is moved into a nub-engaging position by a wire link 88 which has one end thereof connected to a trip lever in frictional engagement with the pawl and the other end connected to an index plate 89. The index plate 89 moves with the

pickup arm **32** and thus, when the needle carried by the latter reaches the run-out portion of the groove formed in the record being played, the trip pawl is pushed to a position wherein it will be engaged by the hub formed on the turntable hub.

The change cycle gear **84** may also be set into motion by the manual adjustment of the control **64** of the function selector **25** to the reject position. The control arm **65** which is activated by the control **64** is connected by the wire rod **67** to the trip lever. Thus, the trip pawl through the trip lever may be automatically moved into change cycle position by rod **88** or manually moved into said position by rod **67.**

Slide **55** is provided with a ramp portion, not shown, which, when the slide is moved, engages a lift pin, also not shown, to cause the pickup arm **32** to be raised off the playing surface of the record. The structure to effect raising of the pickup arm is of conventional design, the operation of which is well understood in the record player art.

Automatic shut-off of the player is instigated by the record-support arm **26***a* of the record stabilizing assembly **26** moving downwardly to a rest position subsequent to the last record of the stack having been moved into playing position on the turntable **22.** One form of record stabilizing assembly **26** is described in the copending application of Robert L. Van Antwerp and Larry M. Hughes, Ser. No. 54,337 entitled "PHONOGRAPH RECORD PLAYING APPARATUS," filed July 13, 1970 now U.S. Pat. No. 3,731,937. Upon the arm **26***a* moving to its rest position, a delay lever **91** is actuated by a linkage **92** in clockwise direction about pivot point **93.** At the time the arm **26***a* begins to move to its rest position, a pin **94** carried on delay lever **91** is disposed within a slot **95** formed in slide **55** and thus, prevents the delay lever **91** from being pivoted. Subsequently, however, the slide **55** is moved relative to the pin **94,** whereupon the latter is disposed adjacent the slot opening **95***a* thereby permitting the pin **94** to be freed from the slot enabling the delay lever **91** to be rotated in the clockwise direction. When the delay lever **91** is rotated, as mentioned, it urges a shut-off lever **96** to move into a position whereby at the proper time during the next change cycle, one end **96***a* thereof will be engaged by a pin **97** carried by gear **84** and cause the lever **96** to be moved in a counterclockwise direction by said pin and pulling upwardly on latch **68,** as seen in FIG. **6,** releasing the spring biased switchplate **72** so that it may move to the left causing the actuator of switch **76** to be moved to the off position. Simultaneous with the switch being moved to its off position, the end **91***a* of delay lever **91** is positioned so that during the next change of cycle of the arm **32** it will block movement of the selector cam **83** thereby causing the index plate **89** to hold the pickup arm **32** in its outward rest position, as seen in FIG. **1.** Various other types of shut-off mechanisms from that shown and described can be utilized without affecting the scope of the invention.

FIGS. **8, 10, 14,** and **15** disclose a sensing device **100** and the various components thereof. The device **100** is adapted to automatically determine the rotational speed of the turntable, thereby eliminating the need for manually selecting such speed. It also pre-selects the position at which the pickup arm will set-down according to the record that has been positioned on the turntable, thereby eliminating manual selection of this function also. Device **100** includes a button assembly **101** which is affixed to a shift ring **102,** the latter encompassing the depending hub **35** formed on the underside of the turntable **22.** The ring **102** is adapted to pivot through an arc of approximately 20° about a pair of diametrically disposed pivot pins **103,** carried on the hub **35,** see FIGS. **10** and **14.** The ring **102** is provided with a laterally projecting peripheral tongue portion **102***a* on which the button assembly **101** is mounted so as to extend transversely upwardly therefrom. Disposed outwardly beyond the assembly **101** and extending upwardly from the outer edge of portion **102***a* is a lug **102***b*, see FIG. **8.** Aside from the tongue portion **102***a*, the remainder of the periphery of ring **102** is provided with an upwardly projecting flange **102***c* which provides stiffness to the ring notwithstanding that it might be formed of thin gauge material.

Diametrically disposed opposite tongue portion **102***a* is a spring **103***a* which has the lower end thereof in contact with the ring and the upper end thereof in contact with the underside of the record-engaging surface **33** of the turntable **22.** The spring **103***a* biases the ring **102** so that the upper end of the button assembly **101** will project upwardly above the exposed side of the record-engaging surface **33** of the turntable. A suitable opening **33***a* is formed in surface **33** through which the button assembly **101** extends, see FIG. **8.** The biasing effect of spring **103***a* may be readily overcome when engaged by a conventional 33-⅓ rpm record R disposed in playing position on the turntable, see FIG. **9.**

The opening **33***a*, in the illustrated embodiment, through which the sensing button assembly extends, is located in close proximity to the spindle **23,** and thus, when a conventional 45 rpm record with an enlarged central opening is being played, the record will not engage the button assembly and depress same. An adapter, not shown, is normally placed over the spindle so as to accommodate the enlarged central opening of the conventional 45 rpm record. The underside of such an adapter would be provided with a cut out to allow the button assembly to pass the adapter without obstruction, as the turntable is rotated. The utilization of an adapter for 45 rpm records in the record-playing art is well known.

The sensing device 100 is shown in FIG. **8** in a relative position whereby the turntable speed is 45 rpm. When so positioned, the lug **102***b* formed on ring **102,** will cause sliding movement of the shift plate **104,** see FIG. **6,** to which the end of the cam lever **52** is connected by a pin **54.** Shift plate **104** is provided with a raised tab **104***a* which will be engaged by the lug **102***b*, only when the sensing device has not been depressed. The elevation of the tab **104***a* is such that when the sensing device is in a depressed state, the ring lug **102***b* will pass beneath the tab **104***a* thereby permitting the shift plate **104** to move by reason of lug **102***b* engaging opposite tab **104***b* of shift plate **104** at its level lower than tab **104***a* and overcoming toggle spring **105** moving shift plate **104** to its alternate 33-⅓ rpm position.

As seen in FIG. **15,** the sensing button assembly **101** includes a spring loaded pin **101***a* which is mounted within a sleeve **101***b*. The lower end of the sleeve is riveted or otherwise secured to the tongue portion **102***a* of the ring **102.** By reason of the pin being spring-loaded, the latter will be engaged by a conventional 31-⅓ rpm record when it is in playing position, notwithstanding that the record is in a warped state.

While the button assembly is shown disposed adjacent the center of the turntable, it may, if desired, be located radially outwardly from the center of rotation a distance beyond the periphery of the 45 rpm records; in which case only the larger diameter records (33-⅓ rpm) would engage the button assembly and depress same. In this latter arrangement the spindle adapter for the 45 rpm records would not require the cut out, as aforenoted.

Thus, it will be seen that a record player has been provided which permits same to have an attractive low profile appearance. Furthermore, the player is of simple construction requiring only a single on-off-reject switch, and has stable and uniform operation characteristics. The improved player is capable of accommodating records of various diameters and will automatically change the turntable speed and the playing position of the pickup arm to suit the particular record being played.

I claim:

1. A phonograph record player having a low profile comprising supporting means, said supporing means having an upper surface provided with a depressed well portion and a peripheral trough surrounding said well, a turntable rotatably mounted on said supporting means and having a horizontally disposed record-engaging surface, said turntable having a flange extending downwardly into said trough, and drive means for said turntable, said drive means including an electric motor mounted on the well portion of the supporting means, an upright rotatably mounted member extending from and driven by said motor, said member having an upper driving end thereof terminating closely adjacent the underside of said turntable surface, a rotary element secured in a predetermined relationship to said supporting means and in driving engagement with said flange and the upper end of said upright member, said well portion and a trough being apertured to accommodate said rotary element.

2. The phonograph record player of claim **1** wherein said rotary element is vertically adjustable with respect to said upper end and said upper end has a plurality of vertically related portions of different diameters whereby said rotary element, when in one position of vertical adjustment relative to said upper end effects rotation of said turntable at a first predetermined speed and when in a second position of vertical adjustment relative to said upper end effects rotation of said turntable at a second predetermined speed.

3. The phonograph record player of claim **2** wherein the upright member has a first cylindrical upper end portion and a second cylindrical upper end portion disposed downwardly relative to said first upper end portion, one of said end portions having a greater diameter than the other; said rotary element being adapted to selectively engage said upper end portions.

4. The phonograph record player of claim **3** including adjustably mounted cam means operatively engaging a portion of said rotary element, and means for effecting adjustment of said cam means; adjustment of said cam means imparting vertical adjustment of said rotary element.

5. The phonograph record player of claim **4** wherein said rotary element is in continuous engagement with said upright member while said rotary element is being adjusted vertically.

6. The phonograph record player of claim **5** wherein said rotary element is out of engagement with said turntable flange and said upright member, when said player is shut off.

7. The phonograph record player of claim **1** wherein said motor has a rotor means and stator means, and said rotatably mounted upright member is coaxial with and an extension of said rotor means, a single bearing unit rotatably supporting said rotor means relative to said stator means subtending said upright member and being secured relative to said supporting means, the axial extension of said bearing unit being generally coextensive with the axial extension of said rotor means.

8. The phonograph record player of claim **7** wherein said bearing unit has a stationary upright shaft seucred to said supporting means and a rotatable sleeve having a recess which rotatably rests on said shaft in load-bearing relationship is secured to said rotor means and supports said upright member.

9. The phonograph record player of claim **8** wherein the lower end of said upright member is provided with an axial bore having a closed upper end, and said bearing unit stationary upright shaft is accommodated within said bore and the upper terminus of said stationary section is in load-bearing engagement with the closed upper end of said bore.

10. The phonograph record player of claim **9** wherein a rotatable bearing member is disposed between said upright shaft and said bore terminus.

11. A phonograph record player according to claim **1** wherein said rotatably mounted turntable accommodating thereon one or more records in playing position; an adjustably mounted pickup arm mounted on said support means for contacting the exposed playing surface of the record disposed in playing position on said turntable, said arm having an initial set-down position adjacent the outer periphery of the record being played; adjustable coupling means engaging said drive means and turntable for rotating same at said predetermined speeds; and single control means operatively connected to said pickup arm and said coupling means and selectively engageable by a record when the latter is disposed in playing position on said turntable whereby the turntable speed and the initial set-down position of said pickup arm are automatically adjusted to the playing characteristics and peripheral dimension of the record being played.

12. The phonograph record player of claim **11** wherein said control means includes a sensing element carried by said turntable, said sensing element being actuated only by a record of predetermined size when the latter is in playing position and in contact with said turntable.

13. A phonograph record player having a low profile, comprising supporting means having a surface provided with a well, said well having a peripheral trough; a turntable rotatably mounted within said well and having a generally vertical axis and a horizontally disposed record-engaging surface, a flange depending from the periphery of said turntable, said flange being accommodated by said trough, the depth of said trough being greater than the depression of at least a portion of the bottom surface of the well overlaid by said turntable; and turntable drive means mounted on said portion of the well bottom surface and in close proximity to the

underside of said turntable surface, said drive means being in driving relation with said turntable flange.

14. The phonograph record player of claim **13** wherein said trough is of annular configuration and concentric with the rotary axis of said turntable.

15. The phonograph record player of claim **14** wherein the trough and the bottom surface of the well delimited thereby are separated from one another by an upwardly projecting annular wall.

16. The phonograph record player of claim **13** wherein said turntable drive means includes a motor driven upright member terminating closely adjacent the underside of said turntable surface and in driving relation with said turntable flange, and a single bearing unit subtending said upright member and being secured to said well bottom surface; saidearing unit said bearing a stationary upright section in axially aligned, interfittings load-bearing relation with said upright member.

17. A multi-speed phonograph record player for playing various size records, the playing characteristics of one size record requiring rotation thereof at one predetermined speed and the playing characteristics of a second size record requiring rotation thereof at a second predetermined speed, said player comprising support means having an upper surface provided with a depressed well portion and a peripheral trough surrounding said well, a rotatably mounted turntable for accommodating thereon one or more records in playing position and having a flange extending into said trough; an adjustably mounted pickup arm for contacting the exposed playing surface of the record disposed in playing position on said turntable, said arm having an initial set-down position adjacent the outer periphery of the record being played; adjustable drive means engaging said turntable for rotating same at said predetermined speeds said drive means engaging said flange through an opening in the wall of said trough; and single control means operatively connected to said pickup arm and said drive means and selectively engageable by a record when the latter is disposed in playing position on said turntable whereby the turntable speed and the initial set-down position of said pickup arm are automatically adjusted to the playing characteristics and peripheral dimension of the record being played.

18. The phonograph record player of claim **17** wherein said control means includes a sensing element carried by said turntable, said sensing element being actuated only by a record of predetermined size when the latter is in playing position and in contact with said turntable.

19. The phonograph record player of claim **18** wherein said sensing element includes a spring loaded detent which projects upwardly from said turntable surface, said detent being engaged and depressed by a record of predetermined size when the latter is disposed in playing position on said turntable surface.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,814,442 Dated June 4, 1974

Inventor(s) Robert L. Van Antwerp

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 26, "pin" should be --point--

Column 3, line 42, delete "spindle"

Column 3, line 46, "spindl" should be --spindle--

Column 6, line 45, "slid" should be --slide--

Column 7, line 4, "hub" should be --nub--

Column 8, line 66, "31-1/3" should be --33-1/3--

Column 9, line 29, after "turntable" change the comma to a semicolon

Column 9, line 39, before "trough" delete "a"

Column 10, line 16, "seucred" should be --secured--

Column 11, line 16, after the semicolon delete "saidearing unit said bearing" and substitute the following: --said bearing unit having--

Column 11, lines 17 and 18, "interfittings" should be --interfitting--

Signed and sealed this 22nd day of October 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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