Dec. 12, 1933. E. E. COLLISON ET AL 1,938,810

AUTOMATIC PHONOGRAPH

Filed Nov. 17, 1930 5 Sheets-Sheet 1

FIG. 1

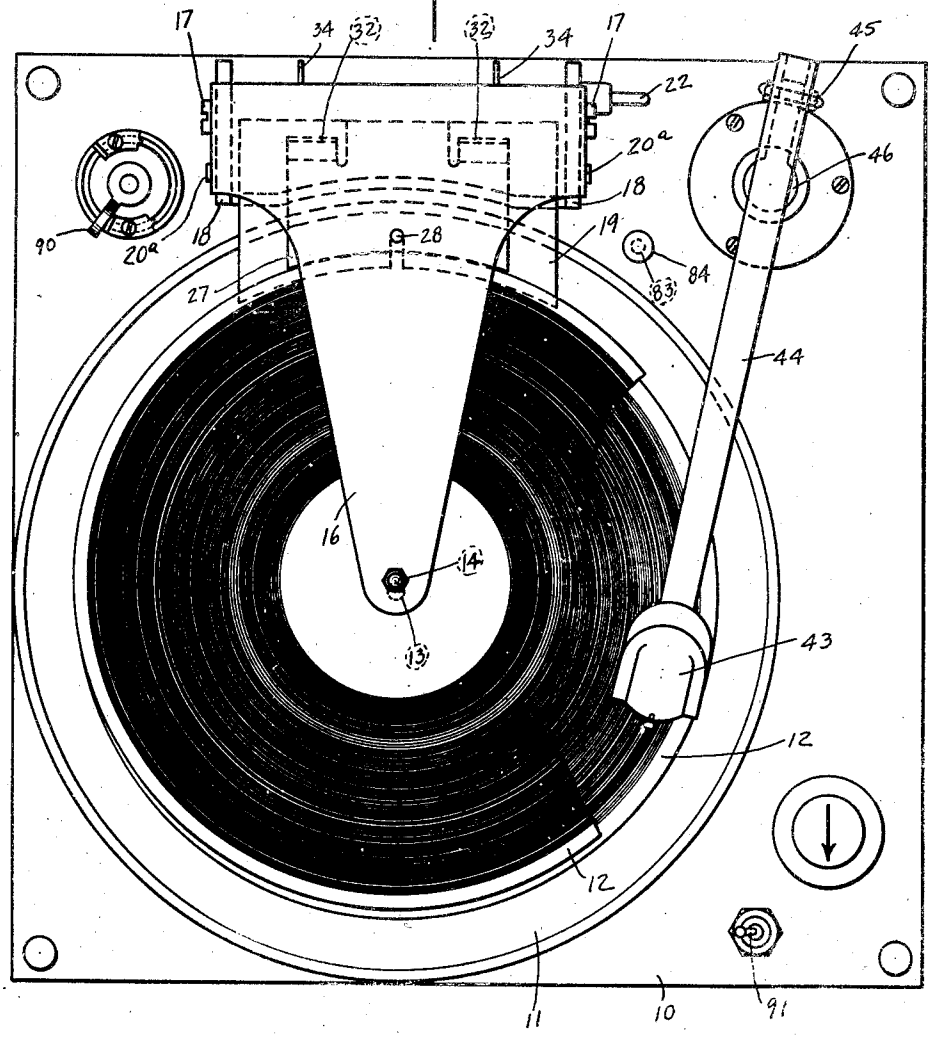
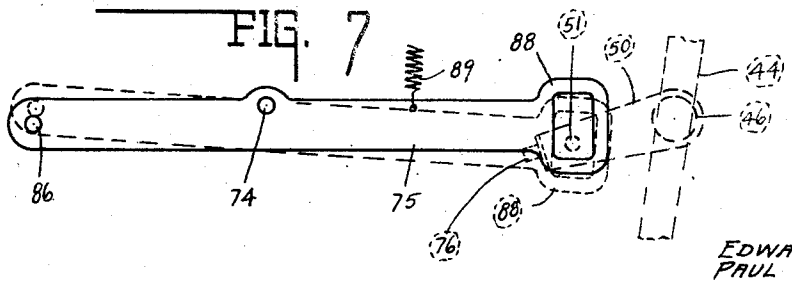


FIG. 7



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AUTOMATIC PHONOGRAPH

Filed Nov. 17, 1930 5 Sheets-Sheet 2

FIG. 2

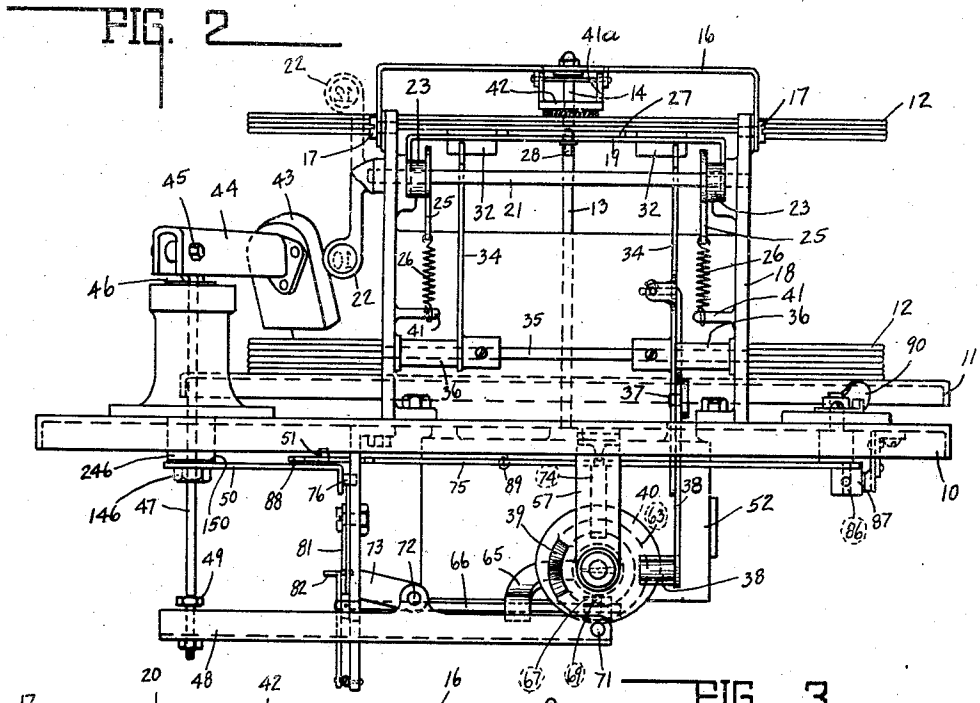
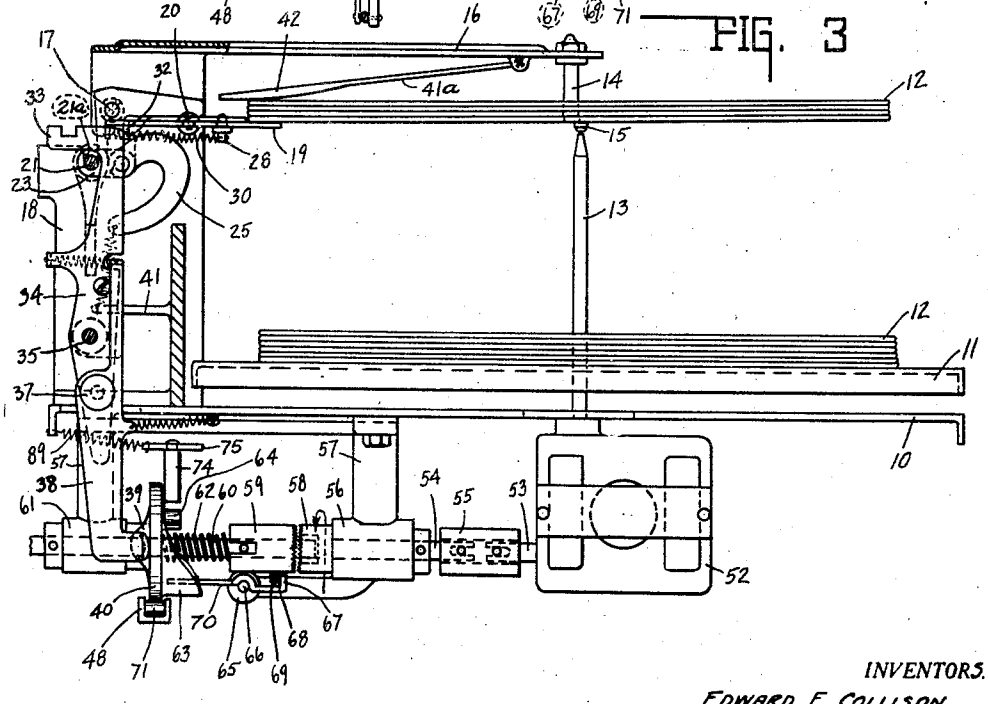


FIG. 3



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AUTOMATIC PHONOGRAPH

Filed Nov. 17, 1930 5 Sheets-Sheet 3

FIG. 4

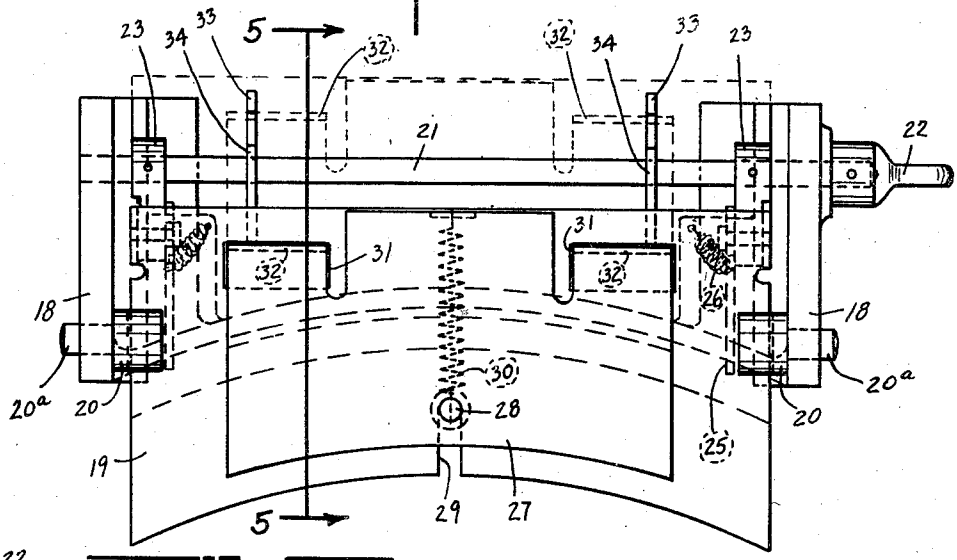


FIG. 5

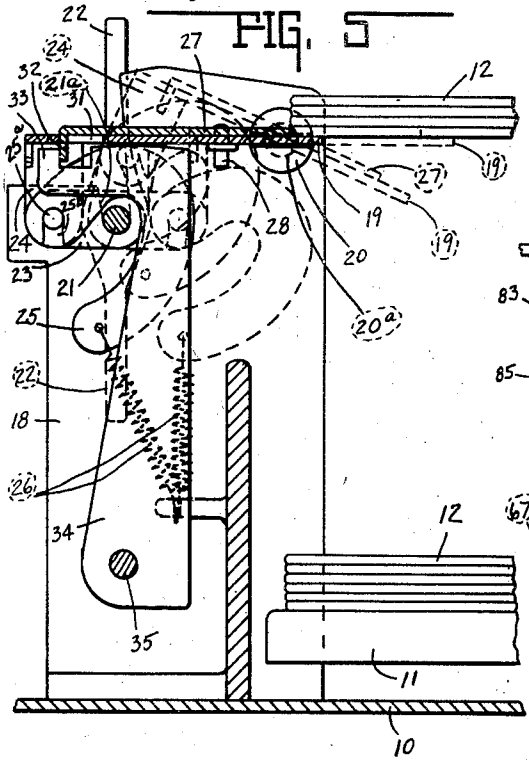
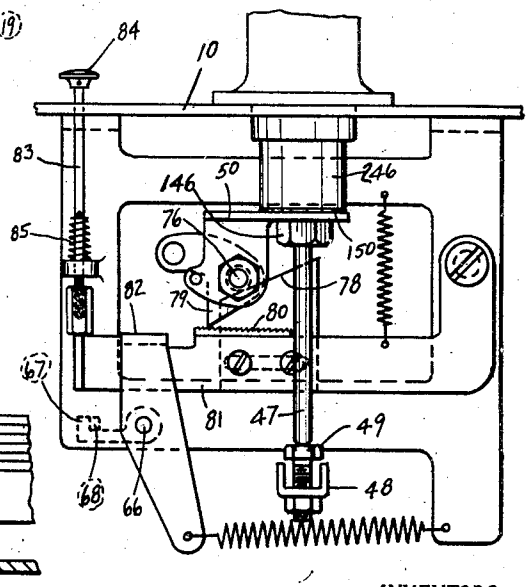


FIG. 6



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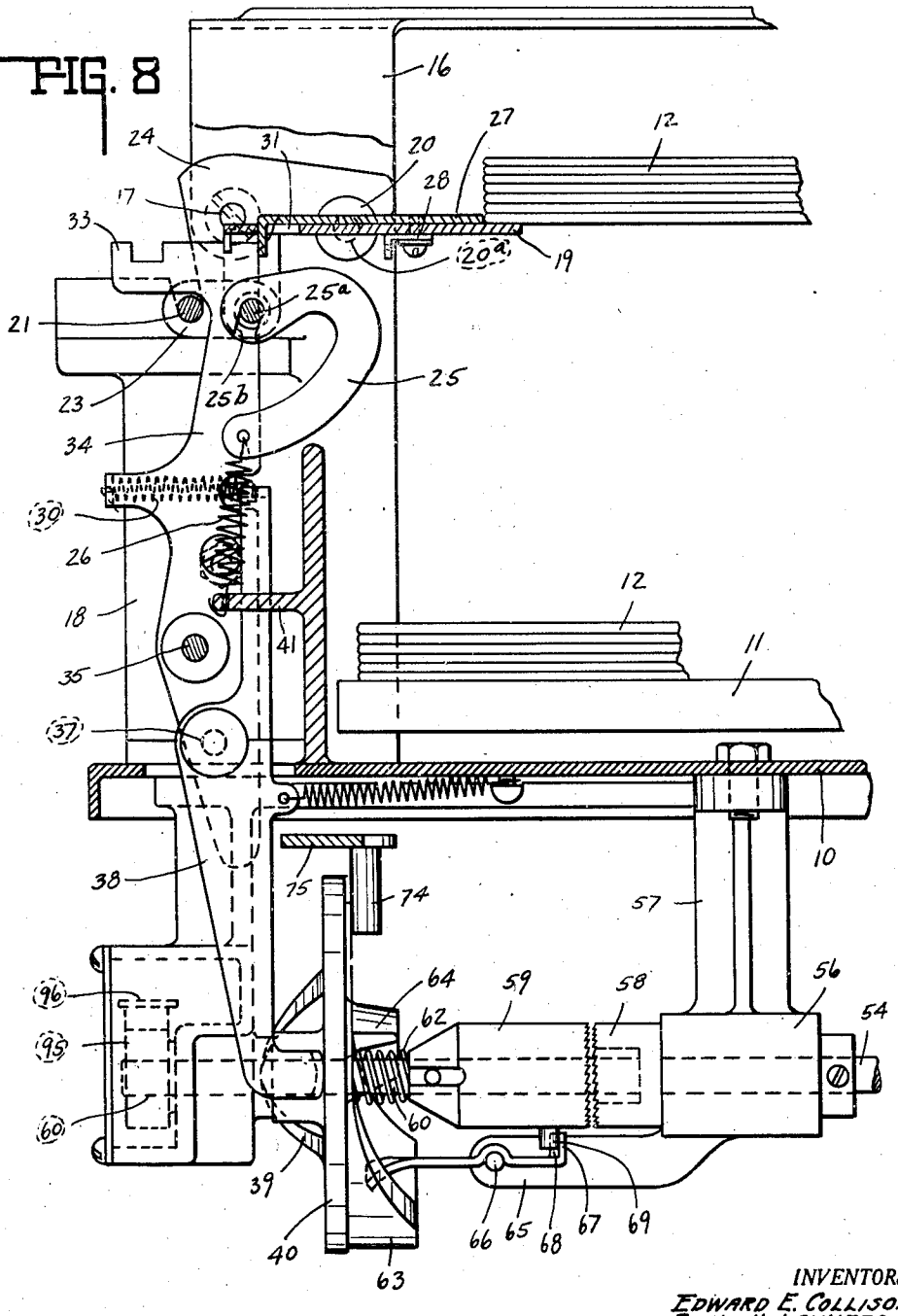
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Filed Nov. 17, 1930 5 Sheets-Sheet 4

FIG. 8



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AUTOMATIC PHONOGRAPH

Filed Nov. 17, 1930 5 Sheets-Sheet 5

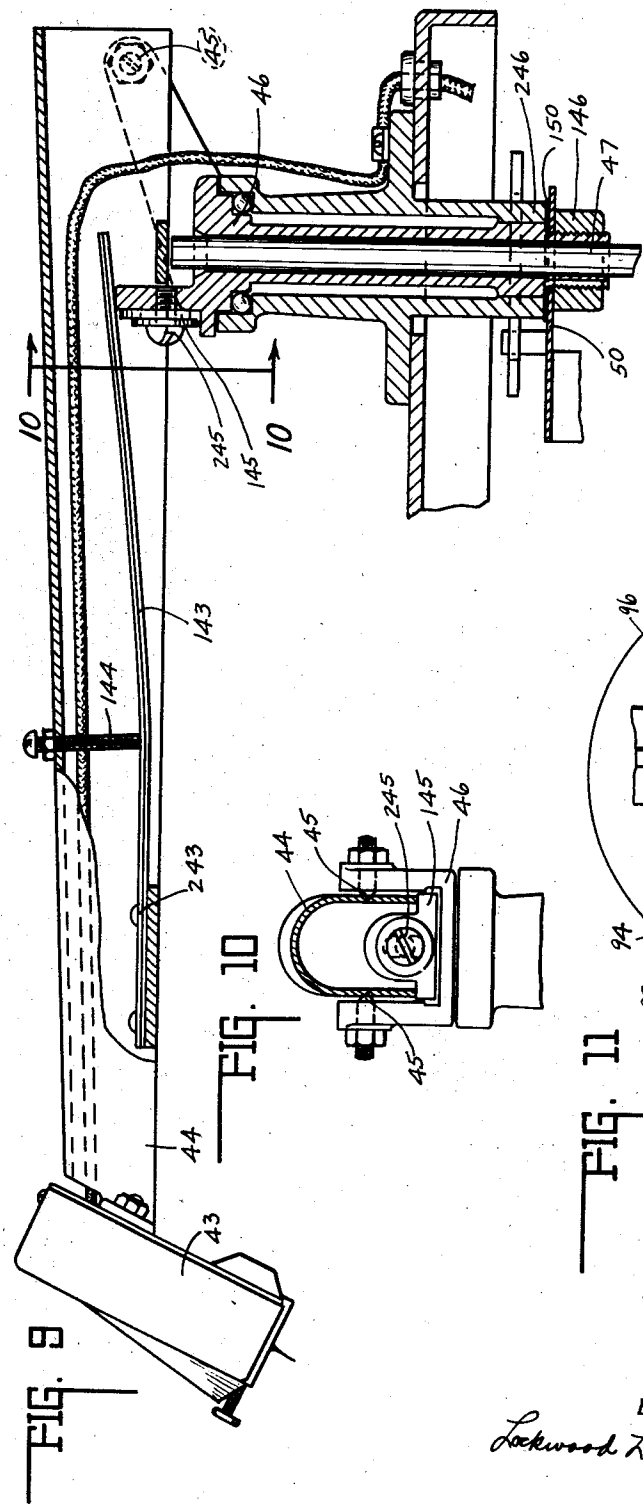


FIG. 9

FIG. 10

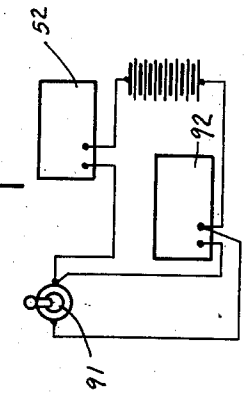


FIG. 12

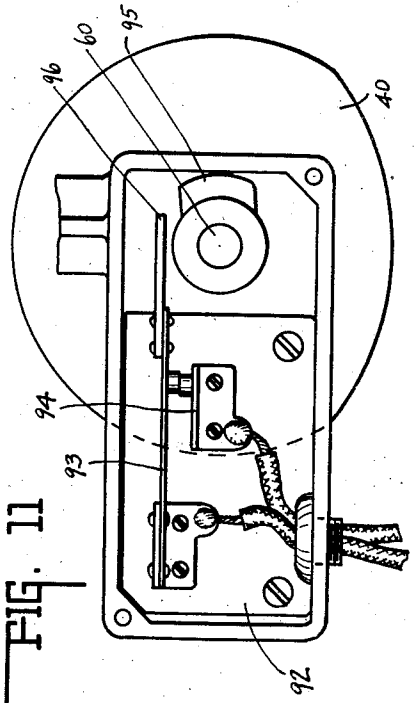


FIG. 11

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UNITED STATES PATENT OFFICE

1,938,810

AUTOMATIC PHONOGRAPH

Edward E. Collison and Paul U. Lannerd, Fort Wayne, Ind., assignors to The Capehart Corporation, Fort Wayne, Ind.

Application November 17, 1930
Serial No. 496,082

5 Claims. (Cl. 274—10)

This invention relates to an automatic phonograph of the semi-automatic type for playing disk records, as set forth and described in our co-pending application, Serial No. 477,218, filed August 23, 1930.

One feature of the invention resides in the arrangement of the driving mechanism wherein it is directly connected with and in line with the motor shaft whereby all gears are eliminated, and all mechanism is controlled by a single cam and clutch, including means for continuing play after the master switch is opened, until the end of the record is reached.

Another feature of the invention resides in the removable mechanism for changing the position of the record support and yielding discharge member to adapt them to either a ten or twelve-inch record and indicate such position to the operator.

Another feature resides in the simplified mechanism for manually controlling the tone arm so as to position it for engagement at the beginning of either a ten or twelve-inch record in a simplified manner.

A further feature resides in the provision of a weighted member for holding the records firmly in position upon the record support for positive engagement by the record discharge member.

Still another feature resides in the mechanical trip manually operated for changing a record before its completion.

Other features include the means for controlling the weight of the reproducer in respect to its engagement with the record for obtaining the desired tone qualities and permit positive control by the record groove; adjustable positioning of the tone arm support for causing it to operate at a predetermined level; the mounting of the tone arm on an angle so as to urge its inward movement in following the tone grooves of the record; and a frictional resistance for the tone arm to dampen its swinging movement while being positioned at the beginning of a record.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

Fig. 1 is a plan view of the instrument showing the records in the group partially broken away with a record in playing position on the turntable. Fig. 2 is a rear elevation with the mechanism in playing position. Fig. 3 is a side elevation with the mechanism in playing position. Fig. 4 is a plan view of the record supporting and discharge mechanism. Fig. 5 is a side elevation of a record supporting and discharge mechanism. Fig. 6 is a rear elevation of the tone arm control. Fig. 7 is a plan view of the control lever for the tone arm. Fig. 8 is an enlarged view of the record changing mechanism with parts broken away and removed. Fig. 9 is a sectional elevation of the tone arm and its mounting. Fig. 10 is a section taken on line 10—10 of Fig. 9. Fig. 11 is a rear elevation of the circuit control switch. Fig. 12 shows a wiring diagram of inter-switch control.

In the drawings there is shown a supporting table 10 upon which a record turntable 11 is rotatably mounted for supporting the record 12 to be played. Rotatably mounted with the turntable and extending upwardly therefrom, there is an elongated centering pin 13 for centering and holding upon the turntable in playing position a plurality of records. Mounted above the centering pin in a position to be supported thereby, there is a record retaining spindle 14 upon which a plurality of records are mounted and held suspended by the offset 15, said offset being in alignment with the pin 13 and slightly spaced from the upper end thereof.

The spindle 14 extends downwardly from the bracket plate 16 pivotally mounted at 17 on the supporting standard 18 so as to swing upwardly thereon. The rear edge of the lower record 12 in the group of records held by the spindle 14 is supported upon the plate 19 projecting forwardly from the standard 18.

As best shown in Figs. 4 and 5, the plate 19 is slidably mounted in a pair of swivel trunnions 20, said trunnions being pivotally mounted in the standard 18, whereby said plate may slide forwardly and rearwardly of said trunnions while swiveling thereon. The trunnions 20 are provided with studs 20*a* which project laterally from each side of the standard 18 for supporting the bracket plate 16 in its lowered position and holding the spindle 14 with its offset head 15 slightly spaced above the centering pin 13 as shown in Fig. 3, By means of this arrangement, there is no direct contact between the revolving pin 13 and the spindle 14 with the consequent elimination of frictional resistance and noise.

Mounted below said plate and having its bearing in the standards 18, there is a shaft 21 operated by the lever 22. Said shaft 21 is removable from the standard through the slot 21*a*. Keyed to the shaft there are links 23 pivotally connected to the downwardly extending ears 24 mounted on the rear of the supporting plate. Thus,

when the shaft 21 is rotated by the lever 22, it will cause the plate to swing upwardly and forwardly or upwardly and rearwardly, depending upon the direction of movement.

As illustrated in Fig. 5, said plate is shown in full lines in its rearward position for supporting twelve-inch records, and the lever 22 extends upwardly displaying the numeral 12 to indicate twelve-inch records as shown in dotted lines in Fig. 2. When the lever is swung downwardly to the position shown in dotted lines in Fig. 5 or in full lines in Fig. 2, the shaft 21 is rotated thereby swinging the ears 24 upwardly and overcenter to a forward position illustrated in dotted lines in Fig. 5. In this position the supporting plate will receive ten-inch records and the opposite side of the lever will be exposed, indicating the numeral 10 as shown in Fig. 2. For yieldingly positioning the plate in either forward or rearward position, there is provided a curved link 25 pivotally connected with one of the ears 24 by the pin 25*a* engaging in the slot 25*b* at one end thereof and connected by a spring 26 to the projections 41 on the standards 18. Thus, the supporting plate is yieldingly held in one position or the other upon being moved past center.

Slidably mounted upon the upper surface of the plate 19, there is a record discharge plate 27 guided in its movement thereon by the pin 28 extending through the slot 29. The discharge plate is normally held in retracted position by the spring 30 connected at one end to the pin 28 and at the other end to the rear surface of the supporting plate 19. Said supporting plate is provided with openings 31 in which the downwardly extending ears 32 extend in position to be engaged by the fingers 33 upon the record discharge actuating arms 34. Said arms are secured to the shaft 35 supported by the standards 18 in the bearings 36. Pivotally mounted to the standard 18 there is a lever 38 adapted to be engaged by the cam surface 39 on the cam 40. The upper end of the lever is connected by the spring 30 to one of the arms 34 so that upon the lever 38 being actuated by the cam 39, the upper end thereof through the spring 30 will yieldingly pull the arms 34 forwardly, through the shaft 35, for actuating the discharge plate 27, This yielding action through the spring 30 prevents any binding action between the discharge plate 27, the record engaged thereby and the spindle 14 with the head 15, which may occur by reason of slight variations in diameter of the record.

It will be noted that the fingers 33 as above described engage the ear 32 when the supporting plate 19 is in rearward position for supporting a twelve-inch record. When said plate is in forward position to support ten-inch records, the ears 32 will be engaged by the forward shoulders of the arms 34 so that in either position the arms 34 will move the plate 27 to discharge a record.

In order that the records will firmly seat upon the supporting plate 19, the bracket 16 is provided with a hinged arm 41*a* having a weight 42 at the free end thereof, the weight engaging the upper surface of the top record immediately above the plate 19. When the bracket is swung to vertical position for inserting the records, the arm will swing rearwardly out of the way, while swinging into engaging position as the bracket is lowered. This arrangement prevents the record from tilting in respect to the supporting plate to a position wherein the discharge plate would not engage with the edge thereof.

The reproducer 43 is rigidly mounted upon the tone arm 44 which, in turn, is pivotally mounted at 45 on a swivel support 46. Extending through the swivel support and connected with the tone arm, there is a control rod 47. Said rod is elevated by the lever 48 and adjustable contact 49. Rigidly secured to the rod, there is an arm 50 with an upwardly extending pin 51 thereon in position to be actuated for swinging the tone arm laterally by the mechanism hereinafter described.

As shown in Figs. 9 and 10, upon the rod 47 moving upwardly to elevate the tone arm, it forces the swivel support 46 upwardly therewith which, in turn, carries a nut 146 at the lower end thereof upwardly forcing the arm 50 and friction washer 150 into frictional contact with the lower end of the fixed swivel mounting 246. Thus, while the tone arm swivels freely upon roller bearings when in lowered position so as to avoid any resistance to following the record grooves, when in raised position its swinging movement will be dampened by the friction washer 150 to prevent its over-swinging its proper posititon when being lowered into engagement at the beginning of the record.

As it is very important in obtaining the desired quality of tone that the reproducer bear with a certain weight upon the record, a leaf spring 143 is secured to the forward end of the tone arm as at 243 and freely rests upon a projection extending upwardly from the swivel support 46. The downward pressure exerted by the spring 143 on the reproducer 43 is governed and controlled by the adjusting screw 144 extending downwardly through the top of the tone arm against the spring 143 intermediate its ends. By forcing the screw 144 against the spring, the downward pressure of the reproducer against the record is decreased so that in effect the reproducer is lightened and by releasing the same, the pressure is increased up to the actual weight of the reproducer. The lower position of the reproducer is governed by the adjustable plate 145 mounted upon the upward extension of the support 46 by the adjusting screw 245. Inasmuch as the tone arm rests upon the shoulders formed on said plate, its vertical adjustment limits the downward movement of the tone arm so that it will be free to swing over the records when in elevated position.

The turntable is rotated continuously by the motor 52 through the medium of a drive shaft, of which the elongated centering pin 13 is an extension. The motor is provided with a second driving shaft 53 connected with the shaft 54 by the universal coupling 55. The shaft 54 is mounted in the bearing 56 supported by the bracket 57 from the table 10.

Keyed to said shaft there is a clutch member 58 in position to engage the clutch member 59 slidably keyed to the shaft 60, said shaft 60 having a bearing at one end within the clutch member 58 and at the other end being supported by the bracket 61, depending from the table 10. The spring 62 normally maintains said clutch members in operative engagement.

The cam 40 is keyed to the shaft 60, and in addition to the cam surface 39 on one face thereof, there are provided cam surfaces 63 and 64 on the other face thereof. The bearing bracket 65 extends from the bracket 57 for re-

tatably supporting the rod 66, on which the latch 67 is secured, having a cam face 68 adapted to be engaged by the pin 69 protruding from the clutch member 59. Said latch has an extension 70 thereon in position to be engaged by the cam surface 64 on the cam 40 for causing the latch 67 to engage the pin 69.

In operation, when the rod 66 is turned clockwise (Fig. 3) the latch 67 will release the pin 69 so that the spring 62 will force the clutch member 59 into engagement with the clutch member 58, thereby revolving the cam 40. When the cam surface 64 makes one complete revolution, it will engage the extension 70, turning the rod in the reverse direction so as to raise the latch 67 in position to cause the pin 69 to ride upon the cam surface 68 of said latch, compressing the spring 62 and disengaging the clutch members, whereby the cam 40 will come to rest.

The periphery of the cam 40 engages the roller 71 on the arm 48, said arm being pivoted at 72 to a supporting bracket 73. This movement will raise the rod 47, elevating the tone arm so as to disengage the reproducer from the record. The cam surface 63 on the cam 40 will thereupon engage the depending pin 74 extending downwardly from the rod 75 which engages the pin 51 on the arm 50 for swinging the tone arm laterally away from the record. The cam surface 39, as above described, operates the arms 34 to cause a new record to be discharged and drop by gravity over the offset head 15 and centering pin 13 into playing position on the turntable.

When the record reaches the end of the playing groove, the arm 50 will have caused the pin 76 to ride up the cam surface 78 or will cause the pawl 79 to oscillate in engagement with the ratchet toothed plate 80 for forcing the arm 81 downwardly releasing the trip lever 82 which is keyed to the shaft 66 thus operating to throw the clutch members 58 and 59 into engagement for driving the record changing mechanism.

Means is provided manually for accomplishing the same purpose through the medium of the plunger 83 which extends downwardly through the table 10 so as to engage the end of the lever 81. Said plunger is provided with the head 84 extending above the table and normally held in upward position by the spring 85. When it is desired to change a record before the end thereof is reached, the head 84 is manually pressed downwardly for actuating the lever 81 and releasing the trip lever 82.

Upon the tripping of the lever 82 and the clutches being thrown into engagement, as above described, the cam face 63 will engage the pin 74 projecting from the lever 75. The lever 75 is pivoted at 86 in the eccentric bushing 87, and the opposite end thereof is provided with a head 88 in which the pin 51 rides. The spring 89 normally maintains the lever against the cam so that when the cam forces the lever against the tension of the spring, it will carry the pin 51 to the position shown in dotted lines in Fig. 7, whereupon the reproducer will be moved beyond the periphery of the record. Upon being released by the cam, the spring 89 moves the lever in the opposite direction carrying the pin 51 back to a position where the reproducer will engage the beginning of the record.

For manually adjusting the tone arm for records of different sizes, the pivotal mounting 86 of said arm 75 is eccentrically mounted in the bushing 87 so as to be swung to different pivotal positions by the handle 90, thereby changing the swing of the tone arm a distance of one inch so that in one position, it will bring the reproducer into engagement with a ten-inch record and in another position will move it an inch less distance to the beginning of a twelve-inch record.

In operation, the bracket plate 16 is swung to vertical position so that the weight 42 drops back against it out of the way. A plurality of records are then mounted over the offset 15 onto the spindle 14. A group of either ten-inch records or twelve-inch records may be so mounted, whereupon the bracket plate is manually lowered to horizontal position as shown in Fig. 3 with an arcuate portion of the record resting upon the supporting plate 19. One record will have been placed upon the turntable manually and the reproducer manually positioned thereon, whereupon the switch 91 is turned on to energize the motor 52. The clutch members 58 and 59 will normally be disengaged so that the motor will rotate the turntable for reproduction of the record.

Upon the reproducer reaching the end of the record, the pin 76 will ride up the cam surface 78 or the pawl 79 will engage the ratchet teeth 80, forcing the lever 81 downwardly to release the latch 82 and turn the rod 66 which will cause the latch 67 to disengage the pin 69, allowing the spring 62 to bring the clutch members into engagement. Thus, the cam 40 will be set in motion. The first action of the cam 40 will be to depress the lever 48, elevating the rod 47 to raise the reproducer from the record. Thereupon, the cam surface 63 will engage the pin 74 to swing the lever 75 to a position for causing the tone arm to swing outwardly beyond the periphery of the record. Thereupon, the cam surface 39 will actuate the arms 34 to push the bottom record laterally in position to drop over the offset head 15 into playing position.

The lever 75 being released by the cam surface 63, will be drawn back by the spring 89 so that the head 88 in engagement with the pin 51 swings the tone arm back to a predetermined position for engagement with the beginning of the record and the above described operation will be repeated.

When it is desired to play ten-inch records, the handle 22 is swung to a position for indicating the numeral 10 and the handle 90 will be moved to a predetermined position for adjusting the pivotal mounting of the rod 75. This will position the record supporting plate 19 forwardly to accommodate the ten-inch record and the tone arm will be positioned accordingly. When the lever 22 is moved to the opposite position so as to indicate the numeral 12, the supporting plate 19 will be moved rearwardly to accommodate a twelve-inch record. At the same time, the handle 90 is swung to the opposite position for causing the lever 75 to move the tone arm inwardly a lesser distance to the beginning of the twelve-inch record.

When it is desired to eject a record before playing thereof is completed, the plunger 83 is pressed down for tripping the control mechanism in the same manner as is followed when the reproducer reaches the end of the record groove, and a new record is discharged and dropped to playing position.

In order that the mechanism may be brought to rest only after completion of the playing of a record regardless of when the master switch is operated to discontinue playing, there is provided a switch 92 having a contact spring 93

adapted to be engaged with the contact plate 94 when in normal position for closing the circuit therethrough. On the end of the shaft 60 there is a cam 95 which engages and raises the contact leaf 93 through the fiber projection 96 extending therefrom. Therefore, upon each cycle of operation, the circiut through the switch 92 is broken, and the machine continues because the circuit through the master switch 91 is closed. When, however, the switch 91 is open for discontinuing playing, the operation of the machine continues until the record is completed and the tone arm 44 is swung beyond the periphery thereof, whereupon the cam 95 is brought to a position to break the circuit through the switch 92 so as to stop the motor 52 and bring the machine to rest.

The tone arm 44 is so mounted upon the support 246 that the swivel support 46 extends at an angle to the vertical of about ten minutes, wherefore the tone arm is caused to swing in a plane extending at a similar angle to the horizontal, swinging downwardly toward the center of the record. This slight angular mounting and swinging movement of the tone arm tends to urge it toward the center of the record when in playing position so that the resistance of the tone arm and consequently the pressure between the needle and the side of the groove is lessened. This has a material effect upon the tone qualities and prevents over-running of the grooves.

The invention claimed is:

1. In a phonograph, having a turntable for receiving records of different diameters, the combination with a group of records suspended above said turntable, of a support for the edge of said records, means for discharging a record from the group onto the turntable, a member for moving said record support from a position to support smaller sized records to a position to support larger sized records, and a handle operatively connected therewith for indicating the size of the records to be supported thereby when in either position.

2. In a phonograph, having a turntable for receiving records of different diameters, the combination with a group of records suspended above said turntable, of a support for the edge of said records, means for discharging a record from the group onto the turntable, a member for moving said record support from a position to support smaller sized records to a position to support larger sized records, and yielding means for bringing said record support to one of said positions after passing its center of movement and holding it therein.

3. In a phonograph, having a turntable for receiving records of different diameters, the combination with a group of records suspended above said turntable, of a support for the edge of said records, means for swivelly and slidably mounting said support, and an actuating member for causing it to slide and swing from a position to support smaller sized records to a position to support larger sized records.

4. In a phonograph, having a turntable for receiving records of different diameters, the combination with a group of records suspended about said turntable, of a support for the edge of said records, means for slidably and swivelly mounting said support, a shaft, and a link connecting said shaft with said support for sliding and swinging it from one position to another upon rotating said shaft to accommodate it to smaller sized records when in one position and larger sized records when in the other position.

5. In a phonograph, having a turntable for receiving records of different diameters, the combination with a group of records suspended above said turntable, of a support for the edge of said records, means for slidably and swivelly mounting said support, a shaft, a link connecting said shaft with said support for sliding and swinging it from one position to another upon rotating said shaft to accommodate it to smaller sized records when in one position and larger sized records when in the other position, and a handle mounted on said shaft for turning the same provided with numerals to indicate the size record adapted to be supported when in either position.

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