

July 12, 1949.

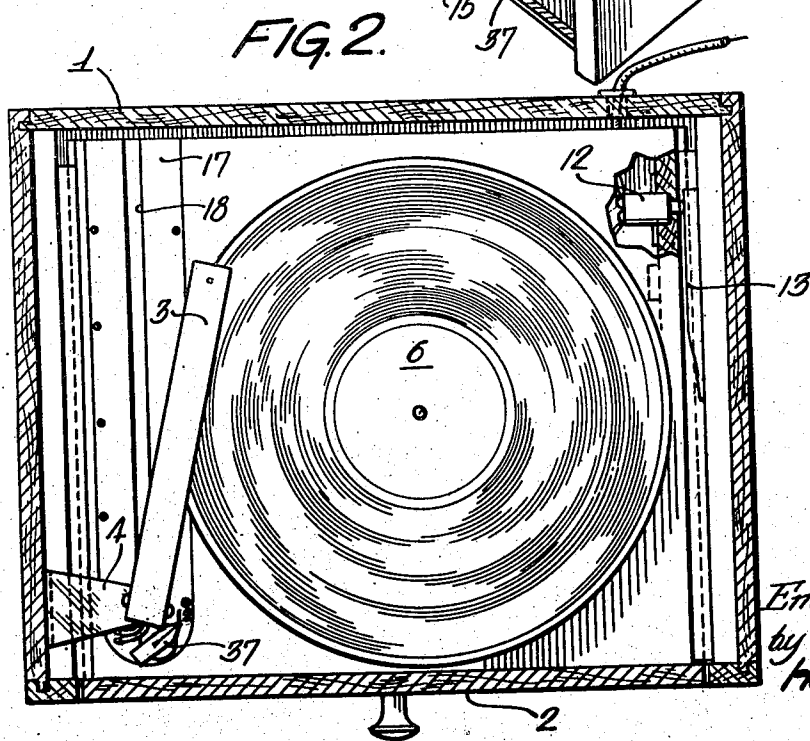
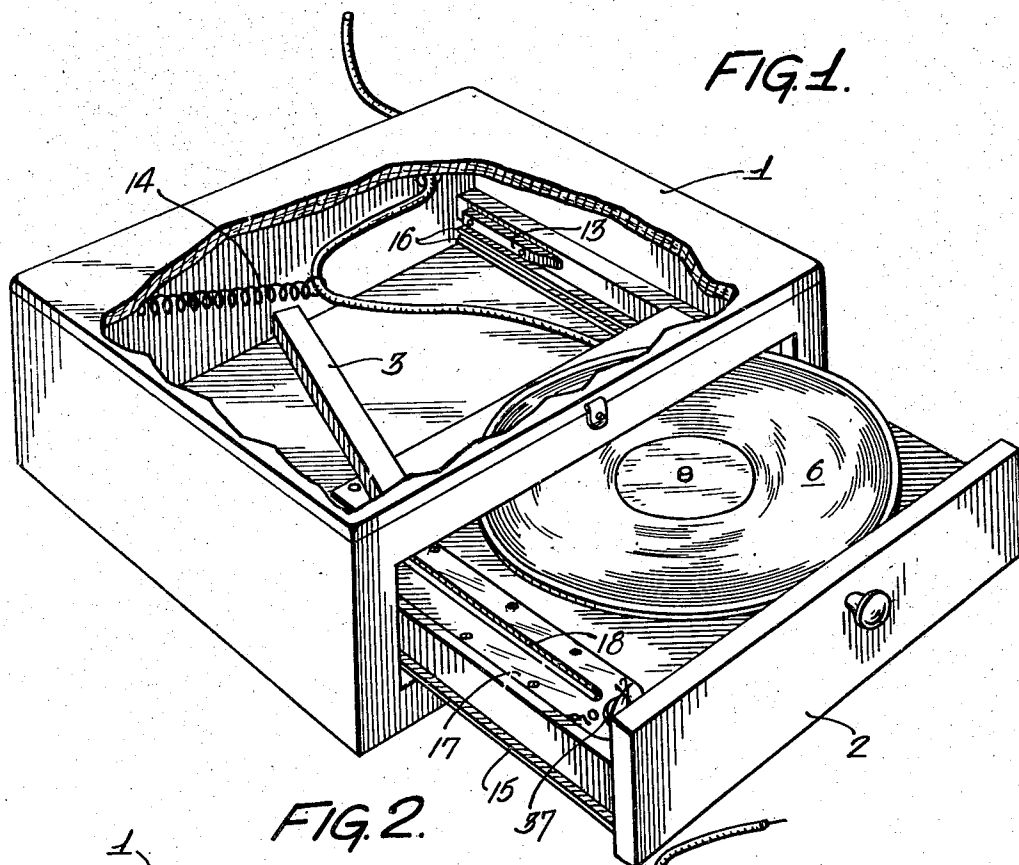
E. I. HARMAN

2,475,744

DRAWER OPERATED PHONOGRAPH

Filed Feb. 26, 1944

5 Sheets-Sheet 1



Inventor:
Emil I. Harman
by his Attorneys
Howard &
Howard

July 12, 1949.

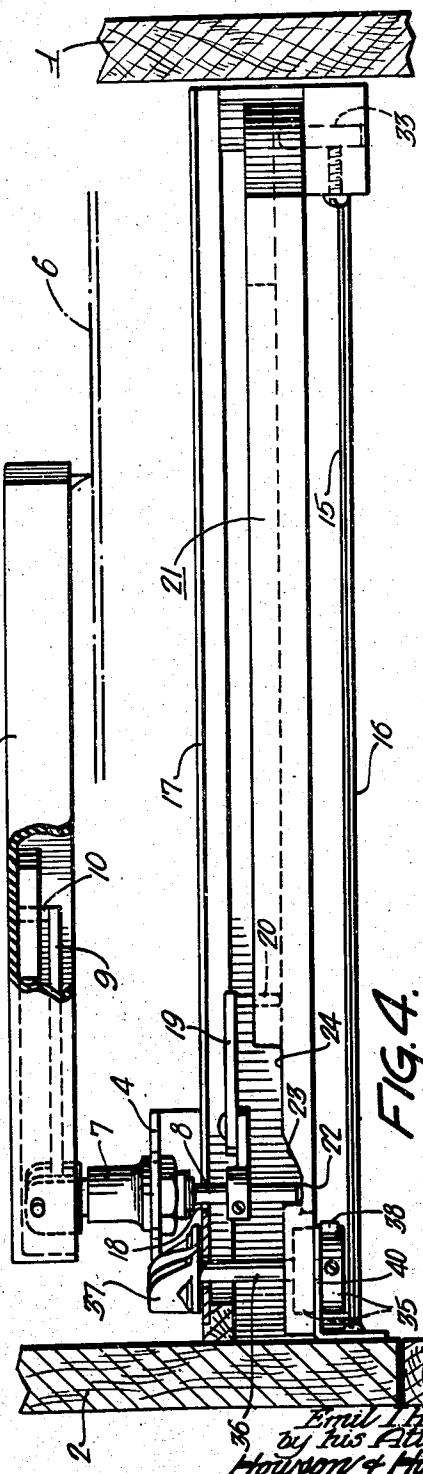
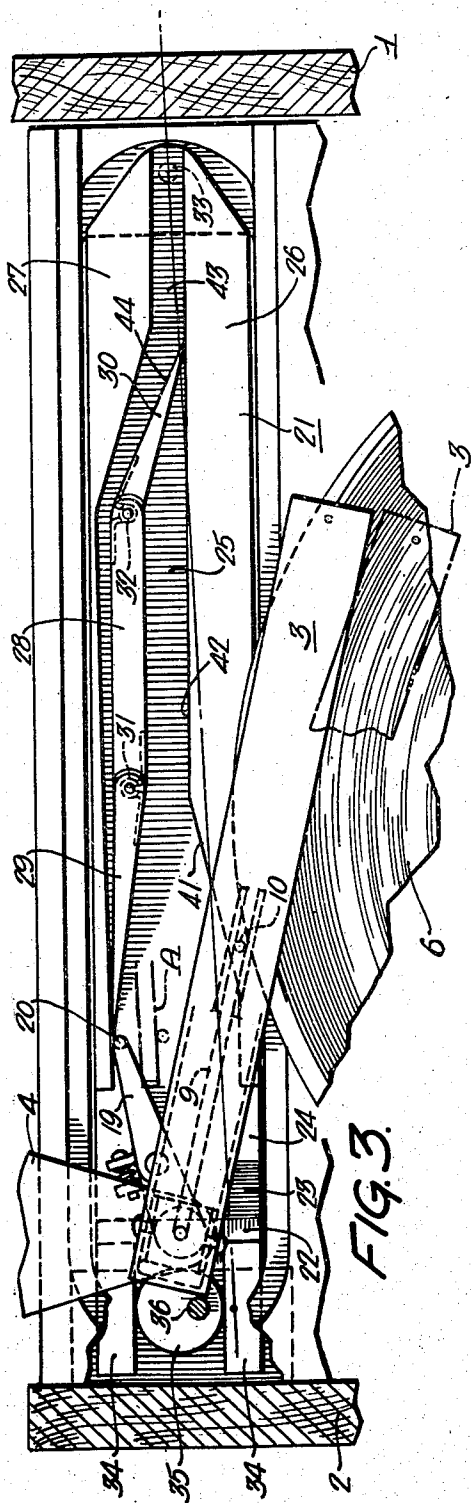
E. I. HARMAN

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DRAWER OPERATED PHONOGRAPH

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5 Sheets-Sheet 2



Inventor:
Emil I. Harman
by his Attorneys
Houder & Houder

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E. I. HARMAN

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DRAWER OPERATED PHONOGRAPH

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5 Sheets-Sheet 3

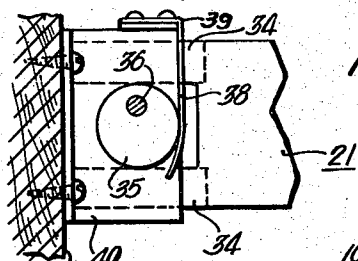


FIG. 5.

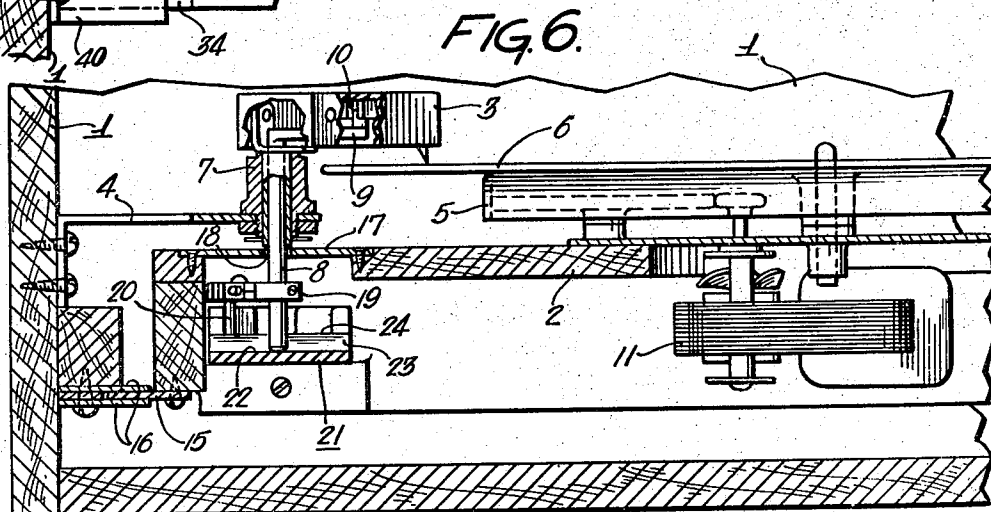


FIG. 6.

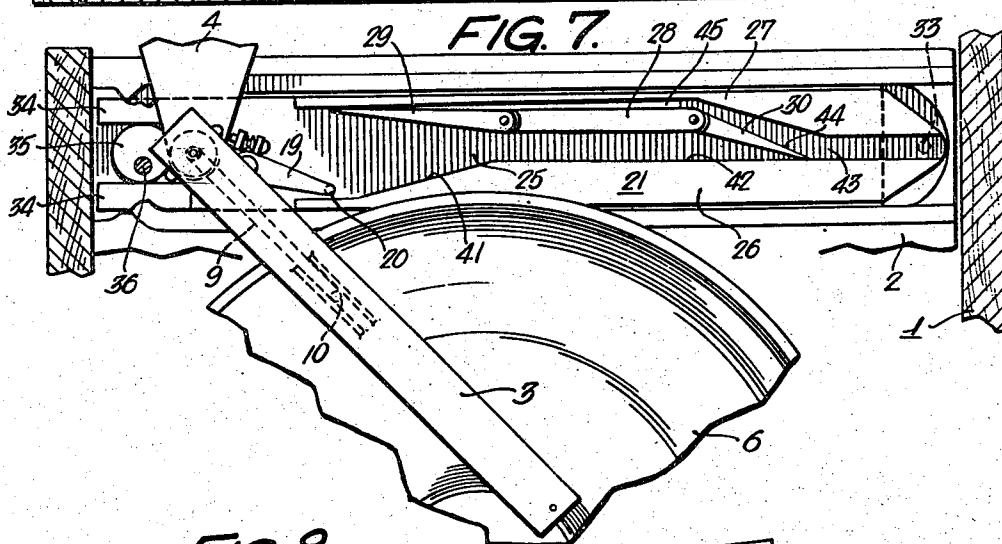


FIG. 7.

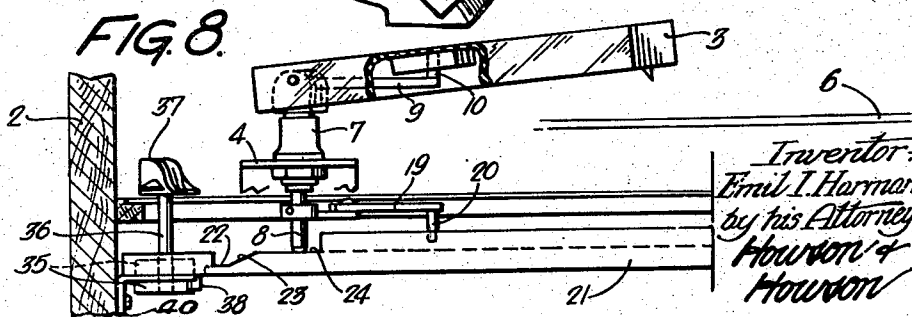


FIG. 8.

Inventor:
Emil I. Harman
by his Attorneys
Howdon &
Howdon

July 12, 1949.

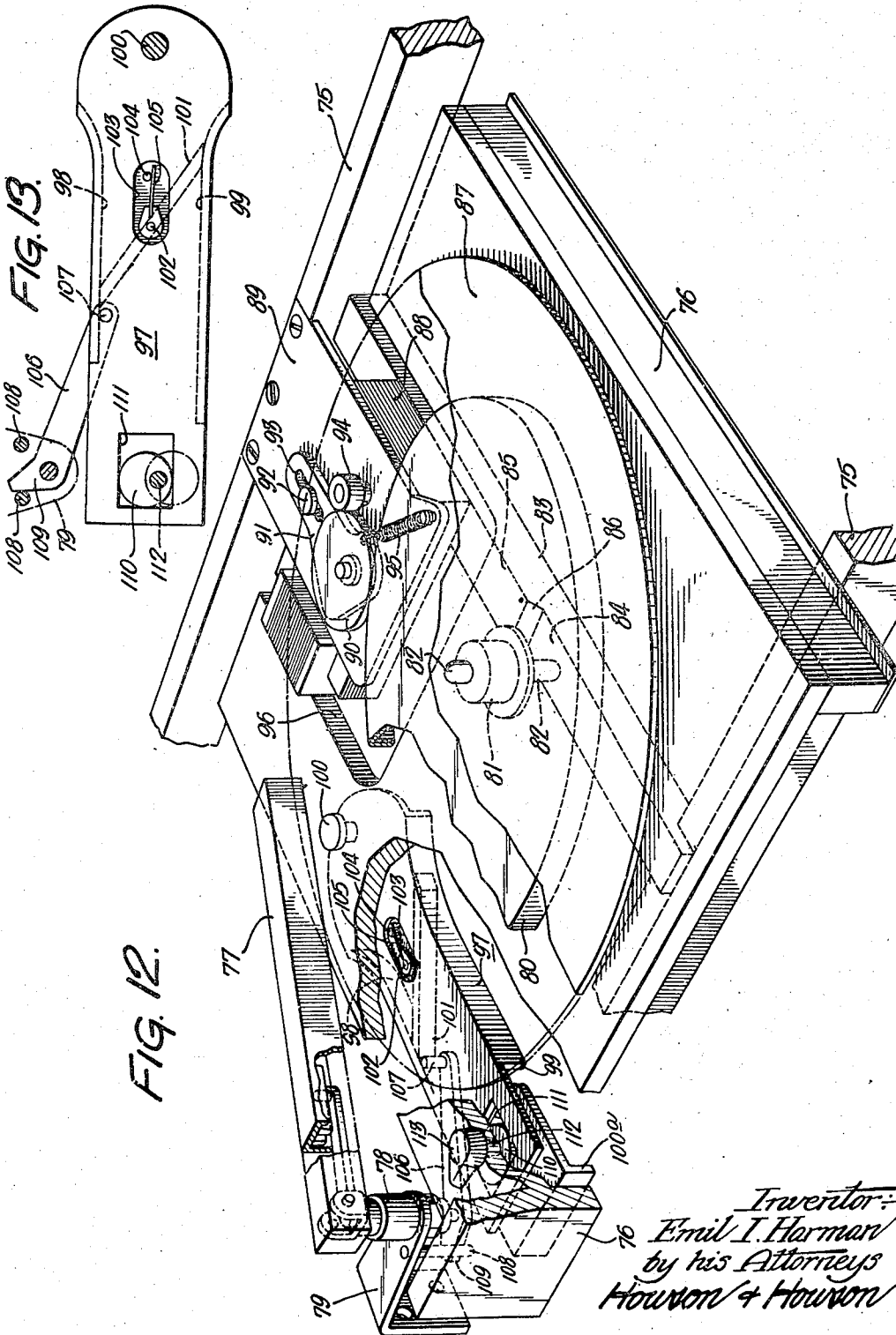
E. I. HARMAN

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DRAWER OPERATED PHONOGRAPH

Filed Feb. 26, 1944

5 Sheets-Sheet 5



UNITED STATES PATENT OFFICE

2,475,744

DRAWER OPERATED PHONOGRAPH

Emil I. Harman, Philadelphia, Pa., assignor, by
mesne assignments, to Philco Corporation,
Philadelphia, Pa., a corporation of Pennsyl-
vania

Application February 26, 1944, Serial No. 524,043

18 Claims. (Cl. 274-14)

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This invention relates to automatic phonographs and more particularly to a novel phonograph apparatus adapted for automatic operation in response to movement of a certain part or structure.

The principal object of the invention is to provide a novel phonograph apparatus in which the actuation of the parts between the playing of successive records is effected automatically by the movement of a movable structure.

Another object of the invention is to provide a novel phonograph apparatus comprising a stationary structure, preferably in the form of an enclosure for housing the operating parts, a movable structure, preferably of drawer-like form, movable into and out of the enclosure and adapted to support the phonograph turntable, thus permitting access to the turntable whenever the drawer structure is moved outwardly, and means for effecting automatic operation of the phonograph mechanism in response to movement of the drawer structure to change records.

More specifically, an object of the invention is to provide novel means, in an apparatus of this character, for effecting the necessary relative movements between the reproducing device and the turntable, and the starting and stopping of the turntable, in response to movement of the drawer structure, so that the operator is required to do nothing more than move the drawer structure and place each record on the turntable and remove the record therefrom.

A further object of the invention is to provide novel means for adjusting the apparatus for the playing of different sized records.

A still further object of the invention is to provide a phonograph apparatus in which the tone arm is concealed and is not readily accessible and therefore is not subject to possible damage, especially by children.

Other objects and features of the invention will appear hereinafter.

In the accompanying drawings:

Fig. 1 is a perspective view of one form of the apparatus with a portion of the stationary structure or housing broken away for the sake of illustration, and showing the movable drawer structure in its outward position;

Fig. 2 is a sectional plan view taken just below the top of the housing and showing a control switch for the turntable driving motor employed in this instance;

Fig. 3 is a fragmentary sectional plan view with certain parts removed to show the adjustable tone arm cycling mechanism;

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Fig. 4 is a sectional elevational view illustrating further the tone arm cycling mechanism;

Fig. 5 is a bottom view of the adjusting mechanism which adapts the apparatus for the playing of different sized records;

Fig. 6 is a fragmentary sectional elevational view showing the mounting of the drawer structure and also showing certain details of the tone arm actuating mechanism;

Fig. 7 is a fragmentary sectional plan view similar to Fig. 3 but showing the disposition of the tone arm and associated parts at the end of the playing of a record;

Fig. 8 is a fragmentary sectional elevational view showing the disposition of certain parts when the drawer structure has been moved outwardly after the playing of a record;

Fig. 9 is a fragmentary perspective view illustrating a modified form of the apparatus;

Fig. 10 is a fragmentary sectional view showing the tone arm actuating mechanism employed in the apparatus of Fig. 9;

Fig. 11 illustrates certain parts of the adjusting mechanism of this apparatus;

Fig. 12 is a perspective view of a further modification of the invention with certain parts broken away for the sake of illustration; and

Fig. 13 is a plan view of the adjustable indexing cam employed in the latter embodiment.

Referring particularly to Figs. 1 and 2, the apparatus shown comprises an enclosure or housing 1 and an associated drawer structure 2, which together serve to support the operating parts. A tone arm 3 is supported by a bracket 4 which is fixedly secured to a part of the housing 1. A reproducer or pick-up device of any known form may be provided on the tone arm. A turntable 5 (Fig. 6) is rotatably mounted upon the drawer structure 2 so that it is movable outwardly to an accessible position, as shown in Fig. 1, to permit the placement of a record on, and removal thereof from, the turntable. In the illustration a record 6 is shown on the turntable. As described hereinafter, the movement of the drawer structure effects the necessary relative movements between the pick-up device and the turntable between the playing of successive records, and also controls the rotation of the turntable.

The tone arm 3 is suitably mounted on a supporting post 7, as shown in Fig. 6, for vertical and horizontal movements with respect to a record on a turntable, as will be well understood. The supporting bracket 4, which carries the post 7, may be secured to a wall of the housing. The tone arm is actuated by a rod 8 which is slidable

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and rotatable within the hollow post structure 7 and which is actuated in response to movement of the drawer structure 2, as will be described in detail hereinafter. At its upper end the rod 8 has a laterally-extending arm 9 (Fig. 4) which is disposed within the hollow tone arm and which has an upwardly projecting finger 10 engaging the tone arm at a point spaced from its pivotal support. Consequently, when the rod 8 is moved upwardly it lifts the tone arm to remove the stylus 10 from a record, and conversely, when the rod is permitted to lower, the tone arm is lowered to place the stylus on a record.

The turntable 5 may be driven by a suitable motor 11 (see Fig. 6) carried by the drawer structure 2, as illustrated. To initiate and terminate the operation of the turntable, there may be provided a controlling switch for the motor 11, as shown at 12 in Fig. 2, mounted on the drawer structure 2 and arranged for actuation by a cam member 13 mounted within the housing 1. The switch 12 may be of conventional push button type and may be spring biased to its open position and arranged to be actuated to its closed position by the cam member 13. Thus, when the drawer structure member 2 is in its closed position, the switch will be held in its closed position by cam 13 to cause rotation of the turntable. But when the drawer structure is moved to its outer position, as shown in Fig. 1, the switch is opened under the influence of its biasing spring so that rotation of the turntable ceases. The cam member 13 should be so designed that the motor 11 is deenergized following the raising of the tone arm, as the drawer structure 2 is moved outwardly, and the motor is energized and the turntable is permitted to attain its proper operating speed before the tone arm is lowered into engagement with a record, as the drawer structure is moved inwardly.

In order to permit movement of the turntable driving motor outwardly of the cabinet, it is necessary of course to make some provision with respect to the supply conductor cord leading to the motor. As shown in Figs. 1 and 2 the portion of the supply cord within the housing 1 may be of sufficient length to permit the required movement of the turntable driving motor, and any suitable arrangement may be employed to take up the slack of the supply cord. For example, a light coil spring 14 may be employed for this purpose, as illustrated. Of course, it will be understood that any suitable arrangement may be made with respect to the supply cord for the driving motor.

The drawer structure 2 may be of any suitable construction. In the specific illustration as shown most clearly in Fig. 6, the drawer assembly is provided with extending flanges 15 on each side thereof, which are disposed in supporting guides 16 mounted on the housing 1, whereby the drawer assembly is suitably mounted for movement into and out of the housing. In Fig. 6, only one of the sliding support structures is shown, but it will be understood that the other one, on the other side of the drawer assembly, is identical with that shown.

As shown further in Fig. 6, the drawer assembly is conveniently composed of wooden and metallic parts, but the specific structure is unimportant so long as the drawer assembly is adapted for the purposes set forth herein. To accommodate the tone arm actuating rod 8, there is provided on the drawer assembly a metal plate 17 having a slot-like opening 18 therein through

which the rod 8 extends. Thus, the slot-like opening 18 permits the drawer assembly to be moved outwardly or inwardly with respect to the housing and the tone arm structure, including the lift rod 8.

The tone arm is moved both vertically and horizontally, in response to movement of the drawer structure 2, by means of the parts now to be described. The rod 8 carries an extending arm 19 (see Fig. 4) which in turn carries a depending finger 20 at its outer end. Mounted on the drawer assembly beneath plate 17 and in cooperative relation with rod 8 and pin 20 is a cycling cam designated generally by reference character 21. The floor portion of the cam structure 21 has a lower level 22 (Figs. 3 and 4) at its forward end and a rise or incline 23 leading to an upper level 24. The purpose of this structure is to elevate the tone arm in response to outward movement of the drawer assembly. The cam structure 21 (see Figs. 3 and 7) also has a track portion 25 which serves to move the tone arm laterally through the medium of pin 20 and the arm 19. Specifically there are provided on the cam structure 21 outer rails 26 and 27 whose inner vertical walls serve to move the pin 20 which extends downwardly between the said walls. Between the rails 26 and 27, and closely adjacent to the latter, is a guide rail 28 to the ends of which there are pivotally attached moveable tapered guide members 29 and 30. Associated with the respective movable guide members 29 and 30 are springs 31 and 32 which serve to maintain these members normally in the positions shown in Fig. 3.

In order that the apparatus shall be adjustable for the playing of different sized records, the cam structure 21 is pivotally mounted on the drawer assembly at its rearward end as shown at 33. The forward end of the cam structure is supported by bracket 40 and is formed to provide spaced projecting fingers 34 between which there is disposed an eccentric disc 35 carried by a rotatable spindle 36, also supported by bracket 40 and having a knob 37 at its upper end. It will be seen from Fig. 4 that the knob 37 is disposed for access by the user, and by rotating this knob the cam structure 21 may be moved to different positions through the action of the eccentric disc 35. In the specific illustration the mechanism is designed for use with ten or twelve inch records, and therefore the adjusting knob 37 has two positions of adjustment. In order to maintain the adjusting mechanism in either of its positions, there is associated with eccentric disc 35 a spring finger 38 (see Fig. 5), which is secured at 39 to the supporting bracket 40.

The above described apparatus of Figs. 1 to 8 may be more fully understood from a description of a complete operating cycle of the apparatus. Assuming that the adjusting knob 37 is set for twelve inch records and assuming further that the user has just finished the "loading" operation, having moved the drawer structure inward to its innermost position, the parts will be as shown in Figs. 3 and 4. At this time, the stylus carried by the tone arm is in engagement with the marginal portion of the record, and the pin 20 is in the position shown in Fig. 3. As the tone arm moves inward during the playing of the record, the pin 20 moves away from the position shown in Fig. 3 toward the cam rail 26. When the stylus reaches the end of the sound groove of the record, the pin 20 will have moved to a

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position adjacent to the wall of cam rail 25 as shown in Fig. 7. Since the playing of the record is now finished, the user or operator moves the drawer structure outwardly to the position shown in Fig. 1. During the initial outward movement of the drawer structure, the lower end of the tone arm lift rod 8 engages the inclined surface 23 (Fig. 4) and rides upward therealong to the upper floor level 24 of the cam structure 21. This causes the tone arm to be elevated, moving the stylus out of engagement with the record. Shortly afterward, the switch 12 (Fig. 2) is permitted to open in the manner above described, thus deenergizing the driving motor for the turntable and causing the turntable to come to a stop.

In the meantime the outward movement of the drawer structure brings the wall portion 41 (Fig. 7) of cam rail 26 into engagement with pin 20, and as the pin rides along the surface 41 the tone arm is swung outwardly with respect to the record. Continued movement of the drawer structure causes the pin 20 to move along the wall surface 42 of cam rail 26, and when the drawer structure nears the limit of its outer movement, the pin 20 engages the movable cam member 30 and deflects the latter sufficiently to permit the pin to enter the track 43 defined by the adjacent cam members. The drawer structure is now in its outermost position, and the operator removes the played record and places another record upon the turntable, and then moves the drawer structure inwardly.

During the inward movement of the drawer structure, the pin 20 is guided by the surface 44 (Fig. 7) of cam member 30 into the narrow passage or track 45 between rails 27 and 29. Subsequently the pin 20 enters the space between rail 27 and the movable cam member 29 and deflects the latter sufficiently to permit the pin to move to the position shown in Fig. 3. At this time, the tone arm is properly indexed for placement upon the marginal portion of the record.

In the meantime the inward movement of the drawer structure will have caused the switch 12 to be closed by the cam member 13, thus initiating rotation of the turntable and the supported record. During the latter portion of the inward movement of the drawer structure, the lower end of lift rod 8 rides downward along the inclined surface 23 (Fig. 4), thereby lowering the tone arm and bringing the stylus into engagement with the record. By the time this occurs, the turntable will have been brought up to speed and the tone arm will have been properly indexed, as shown in Fig. 3. The operating cycle is now completed and the playing of the record commences.

From the foregoing description, it will be seen that the apparatus of Figs. 1 to 8 operates automatically in response to movement of the drawer structure by the operator. It will be apparent of course that the movement of the tone arm, in response to manual movement of the drawer structure, is the most important feature of the above described apparatus. While it is preferable that the apparatus shall embody suitable means for controlling the operation of the turntable in response to movement of the drawer structure, it will be apparent that this function could be performed by means of a manual switch instead. However, this would require operation of such a switch in addition to the manual movement of the drawer structure.

The operation of the apparatus during the playing of ten inch records is the same as above described, the only difference being that the cam

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structure 21 is differently positioned to index the tone arm properly. When the adjusting mechanism is set for the playing of ten inch records the indexing portion of cam member 27 will be positioned as shown in dot and dash outline at A in Fig. 3. Consequently the stylus end of the tone arm will be properly indexed with respect to the smaller sized record, as also shown in dot and dash outline in Fig. 3.

While the specific form of the cam structure 21 is preferred because it assures proper cycling of the tone arm even if the apparatus is jarred or tilted during the cycling operation, it is not necessary to employ this specific structure. That is to say, any structure having a suitable cam track may be employed.

In Figs. 9 to 11, there is shown a modification in which the cam structure and the adjusting mechanism take different forms than those of the above described embodiment. Referring to Fig. 9, a portion of the stationary housing is shown at 46, while the drawer structure is designated generally by reference character 47. In this instance, a cam gear 48 is rotatably mounted on a spindle 49 carried by a bracket 50 which is secured to the housing 46. The drawer structure is provided with an elongated slot opening 51 to accommodate the spindle 49, and there is provided on the drawer structure a gear rack 52 which meshes with the cam gear as shown. The parts are shown in the positions which they assume when the drawer structure is in its innermost position, and as the drawer structure is moved outwardly the rack 52 moves in the direction indicated causing the cam gear 48 to rotate clockwise as viewed in Fig. 9, as indicated by the arcuate arrow.

The tone arm mounting is similar to that previously described and comprises a hollow post 53 supported on a bracket 54. The tone arm actuating rod 55 is also similar to that of the previously described embodiment but, in this instance, the lower end of the rod engages the peripheral portion of the cam gear 48, which has a depression at 56 for lowering the tone arm onto the record. An arm 57, carried by rod 55, has a depending pin 58, which is actuated by the cam gear in a manner which will be presently described.

In order to adapt the apparatus for the playing of different sized records, the cam gear 48 is provided with selectable tracks 59 and 60, in which the pin 58 is adapted to ride. A pivotal selector member 61 is arranged as shown and is normally spring-biased into the position shown in Fig. 9. A shoe 62 is carried by the pivot of member 61 below the cam gear and serves to actuate member 61 when the apparatus is adjusted for the playing of twelve inch records. The adjustment is effected by means of the mechanism now to be described.

Rigidly secured to the housing structure is a bracket 63 carrying a vertical rod 64. Slidably mounted on rod 64 is an actuator 65 (see Fig. 11) which is adapted to be positioned to engage shoe 62 when adjustment is made for the playing of twelve inch records. An adjusting lever 66 (see Fig. 11) is pivotally mounted on bracket 63 at 67 and has a cam slot 68 engaging a projection 69 on the actuator 65. The lever 66 extends upward through a slot 70 within an escutcheon plate 71 mounted in the top of the housing.

In the illustration of Fig. 9, the lever 66 is shown adjusted for the playing of twelve inch records and the parts are shown just after the

drawer structure has been moved inward to initiate operation. At this time the pin 58 is disposed as shown in Fig. 9 and the tone arm is in its lowered position with the stylus engaging the marginal portion of the record 72. Owing to the adjustment of lever 66 the actuator 65 is positioned to engage shoe 62 during the cycling operation, as will be presently shown.

During the playing of the record, the tone arm moves inward and the pin 58 moves inward in the cam recess 73. When the end of the record is reached, the operator moves the drawer structure outwardly, causing the cam gear to rotate as previously mentioned. This causes the lift rod 55 to rise out of the depression 56, thereby lifting the tone arm from the record. As the cam gear rotates, the pin 58 follows the inner track or recess 73 until it engages a pivoted element 74 which is spring-biased to the position shown. The pin 58 deflects this element and enters the track 74a. At this time the drawer structure is in its outermost position and rotation of cam gear 48 ceases.

After having changed records, the operator moves the drawer structure inward, causing the cam gear to rotate in the reverse direction. In the meantime, the shoe 62 will have been engaged by the actuator 65, causing member 61 to move inward. Consequently the pin 58 enters the outer track 60 and moves therein until it reaches the position shown in Fig. 9. When the drawer structure has almost reached its innermost position, the pin 58 drops into the depression 56 and lowers the tone arm to bring the stylus into engagement with the marginal portion of the record. This occurs immediately prior to the time that pin 58 reaches the position shown in Fig. 9. The operative cycle has now been completed and a new cycle commences.

When it is desired to play ten inch records, the operator moves lever 66 to the ten inch position. In this position the cam slot 58 permits the actuator 65 to drop to a lower position in which it is ineffective to actuate the shoe 62. Therefore, during the operating cycle, member 61 remains in the position shown and the pin 58 traverses the inner track 59 instead of the outer track 60. This indexes the tone arm in proper relation to the smaller record. Otherwise the operating cycle is the same as above described.

It will be understood that the rotation of the turntable in the embodiment just described may be controlled in the same manner as in the first-described embodiment. That is to say, the turntable driving motor may be controlled by a switch actuated in response to movement of the drawer structure.

In Figs. 12 and 13, there is disclosed a further modification of the invention in which the turntable is moved to effect engagement and disengagement of the pick-up stylus and a record on the turntable. Referring particularly to Fig. 12, portions of the stationary structure or housing are indicated by reference character 75, while the movable drawer structure is shown at 76. As before, the tone arm 77 is suitably mounted on a supporting post 78 which, in turn, is mounted on a bracket 79 secured to the stationary housing. However, the tone arm actuating mechanism is somewhat different than in the previous embodiments, as will be presently described.

In this instance, the turntable 80 is rotatably supported by a suitable bearing structure 81 carried by the drawer structure 76 and the turn-

table is also movable vertically, its supporting spindle 82 being movable axially within the bearing 81. The lower end of spindle 82 engages a cam rail 83 carried by the stationary housing structure 75. This cam rail has surfaces 84 and 85 of different elevation and a rise or incline 86 between said surfaces. When the drawer structure 76 is in its innermost position, the lower end of spindle 82 engages the surface 85 of the cam rail 83, but when the drawer structure is moved outwardly the spindle 82 is permitted to drop by virtue of the incline 86 and the lower surface 84, thereby causing the turntable to be lowered and disengaging the record 87 from the pick-up stylus.

In this instance also, the driving motor 88 for the turntable is mounted on the stationary housing structure 75 by means of a suitable supporting plate 89. The motor is intended to run continuously during the operation of the apparatus, and the driving of the turntable is effected by moving the latter into and out of engagement with a driving wheel 90 arranged to engage the peripheral edge portion of the turntable. The wheel 90 is carried by a plate 91 which is movably mounted on the plate 89 by means of pin 92 on the latter and a slot 93 in the plate 91. A small driving pulley 94 connected to the motor shaft serves to drive the wheel 90. A spring 95 has one end connected to plate 91 and its other end anchored to plate 89, as shown, and serves to urge the driving wheel 90 into engagement with the turntable and the driving pulley 94. When the turntable is moved during outward movement of the drawer structure 76, it is disengaged from the driving wheel 90, thereby interrupting the rotation of the turntable. The drawer structure is suitably recessed, as shown at 96, to accommodate the turntable driving assembly.

Since the turntable is moved in the manner above described, it is unnecessary to move the tone arm vertically but it is necessary to move it laterally. Therefore, there is provided a suitable mechanism for moving the tone arm laterally in response to movement of the drawer structure. A cam plate 97, having depending side portions 98 and 99, is pivotally mounted at 100 on the drawer structure 76 and is supported at its other end by a shelf 100a. A cam member 101 in the form of a deflecting bar is pivotally mounted at 102 on the underside of the cam plate 97. The upper surface of plate 97 is recessed at 103 and carries a short pin or stud 104. A spring finger 105 is secured to the upper end of the pivot pin 102 and engages the stud 104. This spring finger serves to urge the bar 101 into engagement with the sides 98 and 99 of the cam plate 97, as clearly shown in Fig. 12.

The tone arm actuating member is of the same general form as in the preceding embodiments and has an extending arm 106 carrying an up-standing pin 107 which extends into the space between the sides of the cam plate 97. Stop pins 108 are provided on the tone arm supporting bracket 79, and a cooperating extension 109 is provided on arm 106 to limit the lateral movement of the tone arm.

The adjustment of the apparatus for different sized records is effected by means of an eccentric disc 110 disposed within a rectangular opening 111 at the end of plate 97 opposite its pivotal support. The disc 110 is carried by a rotatable shaft 112 supported by the drawer structure 76. A knob 113 is provided on the shaft 112 for rotat-

ing the disc 110. When the disc 110 is moved between the solid line and dot-and-dash positions of Fig. 12, the cam plate 97 is adjusted for the different sized records.

Considering the operation of the apparatus, when the drawer structure is in its innermost position, the turntable is in driving relationship with the driven wheel 90 and is also in position for engagement with the pick-up stylus. Assuming that the apparatus is adjusted for twelve inch records and that the drawer structure has just been moved to its innermost position, the pin 107 will be in the position shown in Fig. 12, thereby properly indexing the stylus with respect to the marginal portion of a record on the turntable. During the playing of the record, the pin 107 moves toward side 99 of the cam plate 97 as the tone arm moves inwardly over the record. When the stylus reaches the end of the sound groove, the pin 107 will be disposed closely adjacent to side 99.

When the playing of the record is completed, the operator moves the drawer structure 76 outwardly and this immediately causes the turntable to drop downward out of engagement with the stylus, owing to the location of the incline 82 on the cam rail 83. The turntable is also moved out of engagement with the driving wheel 90, thereby interrupting the drive and causing the turntable to come to a stop. In the meantime, the movement of the cam plate 97 with the drawer structure causes the pin 107 to engage and deflect the bar 101 so that the pin is now on the rear side of the said bar.

When the operator moves the drawer structure inwardly, after having placed a new record on the turntable, the pin 107 is caused to ride along the rear side of the bar 101, which deflects the pin in a manner to cause outward movement of the tone arm. Finally, the pin 107 deflects the bar 101 and reaches the position shown in Fig. 12, at which time the tone arm is indexed for the commencement of the new record. In the meantime, the turntable is elevated by the cam rail 83, bringing the record into engagement with the stylus, and the turntable is also moved into engagement with the driving wheel 90. Consequently, the playing of the new record commences and the cycle is repeated.

When it is desired to use the apparatus in conjunction with ten inch records, the knob 113 is rotated to move the eccentric disc 110 to the dot-and-dash position shown in Fig. 12. Such adjustment moves the cam plate 97 so as to change the indexing position of the pin 107 and thus effect proper indexing of the stylus for the playing of ten inch records. In operation, the apparatus functions in the same manner as it does with twelve inch records, as already described.

From the foregoing description, it will be seen that the invention provides a novel phonograph apparatus in which the operating elements are automatically controlled by the movement of a movable drawer structure or the like during the changing of records. Moreover, the tone arm is concealed within the housing and is not readily accessible and therefore it cannot be tampered with, especially by children. It will be apparent that the phonograph apparatus provided by the invention may be employed in conjunction with a radio receiver or other apparatus, in which case a common housing may be employed, as in the well-known radio-phonograph combination. Further, the invention is not limited to the particular embodiments illustrated and described

but is susceptible of various other modifications and embodiments.

I claim:

1. In a phonograph apparatus, an enclosure, a pick-up device movably mounted within said enclosure, a drawer structure normally disposed within said enclosure and adapted to be moved outwardly thereof, a turntable rotatably mounted on said drawer structure, and means responsive to movement of said drawer structure for effecting such relative movement between said pick-up device and said turntable as to cause engagement of the pick-up device and the marginal portion of a record on the turntable when said drawer structure is moved inwardly, and to cause disengagement of the pick-up device and the record when said drawer structure is moved outwardly.

2. In a phonograph apparatus, an enclosure, a pick-up device movably mounted within said enclosure, a drawer structure normally disposed within said enclosure and adapted to be moved outwardly thereof, a turntable rotatably mounted on said drawer structure, means responsive to movement of said drawer structure for effecting such relative movement between said pick-up device and said turntable as to cause engagement of the pick-up device and the marginal portion of a record on the turntable when said drawer structure is moved inwardly, and to cause disengagement of the pick-up device and the record when said drawer structure is moved outwardly, and manually-adjustable means for controlling the relative movement between the pick-up device and the turntable so to adapt the apparatus for reproduction of different sized records.

3. In a phonograph apparatus, an enclosure, a pick-up device movably mounted within said enclosure, a drawer structure normally disposed within said enclosure and adapted to be moved outwardly thereof, a turntable rotatably mounted on said drawer structure, and means including a cam member movable by said drawer structure for effecting engagement and disengagement between said pick-up device and a record on said turntable.

4. In a phonograph apparatus, an enclosure, a pick-up device movably mounted within said enclosure, a drawer structure normally disposed within said enclosure and adapted to be moved outwardly thereof, a turntable rotatably mounted on said drawer structure, and means including a cam member movable with said drawer structure for effecting engagement and disengagement between said pick-up device and a record on said turntable.

5. In a phonograph apparatus, an enclosure, a pick-up device movably mounted within said enclosure, a drawer structure movable into and out of said enclosure, a turntable rotatably mounted on said drawer structure, driving means for said turntable including a motor mounted on said drawer structure, a control switch for said motor, means operable by movement of said drawer structure to actuate said switch, and means operable by movement of said drawer structure to effect engagement and disengagement of said pick-up device and a record on said turntable.

6. In a phonograph apparatus, an enclosure, a pick-up device movably mounted within said enclosure, a drawer structure movable into and out of said enclosure, a turntable mounted on said drawer structure for movement toward and away from said pick-up device, means for driving said turntable when it is in cooperative relation with said pick-up device, means responsive to move-

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ment of said drawer structure to move said turntable into and out of cooperative relation with said pick-up device and said driving means, and means operable by the movement of said drawer structure to move said pick-up device to its record-commencing position.

7. In a phonograph apparatus, an enclosure, a pick-up device movably mounted within said enclosure, a drawer structure normally disposed within said enclosure and adapted to be moved outwardly thereof, a turntable rotatably mounted on said drawer structure, and means including a cam member on said drawer structure and an associated cam follower operatively connected to said pick-up device for effecting movement of the latter into and out of engagement with a record on said turntable when said drawer structure is moved inwardly and outwardly.

8. In a phonograph apparatus, an enclosure, a pick-up device movably mounted within said enclosure, a drawer structure normally disposed within said enclosure and adapted to be moved outwardly thereof, a turntable rotatably mounted on said drawer structure, a rotatable cam member within said enclosure and an associated cam follower operatively connected to said pick-up device for effecting movement of the latter into and out of engagement with a record on said turntable, and means on said drawer structure for rotating said cam member when said drawer structure is moved inwardly and outwardly.

9. In a phonograph record reproducing device, an enclosed casing having a withdrawable wall portion, a rotatable record holding member and a drive motor therefor mounted on and movable with said wall portion, so that said record holding member may be withdrawn from said casing for application or removal of a record, reproducing mechanism including a tone arm enclosed in said casing in cooperative relation with said record holding member when said wall portion is in fully closed position, and electric control means in cooperative relation with said wall responsive to the closing of said wall portion with a record on said record holding member for starting the operation of said record drive motor.

10. In a phonograph apparatus, an enclosure, a movable pick-up device permanently confined within said enclosure, a drawer movable into and out of said enclosure, a turntable mounted on and movable with the drawer, so that said turntable may be withdrawn from the enclosure for the insertion and removal of a record and may be returned into the enclosure to bring an inserted record into cooperative relation with the pick-up device, an electric motor mounted on said drawer and operable to drive said turntable, a control switch for said motor, and means in cooperative relation with said drawer for effecting closure of said switch in response to closure of said drawer.

11. In a phonograph apparatus, an enclosure, a movable pick-up device permanently confined within said enclosure, a drawer movable into and out of said enclosure, a turntable mounted on and movable with the drawer, so that said turntable may be withdrawn from the enclosure for the insertion and removal of a record and may be returned into the enclosure to bring an inserted record into cooperative relation with the pick-up device, and means in cooperative relation with said drawer and dependent upon the closure thereof for positioning said pick-up device in starting relation to a record on said turntable.

12. In a phonograph apparatus, an enclosure, a movable pick-up device permanently confined

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within said enclosure, a drawer movable into and out of said enclosure, a turntable mounted on and movable with the drawer, so that said turntable may be withdrawn from the enclosure for the insertion and removal of a record and may be returned into the enclosure to bring an inserted record into cooperative relation with the pick-up device, an electric motor mounted on said drawer and operable to drive said turntable, a control switch for said motor, means in cooperative relation with said drawer for effecting closure of said switch in response to closure of said drawer, and means in cooperative relation with said drawer and dependent upon the closure thereof for positioning said pick-up device in starting relation to a record on said turntable.

13. In a phonograph apparatus, an enclosure, a movable pick-up device permanently confined within said enclosure, a drawer movable into and out of said enclosure, a turntable mounted on and movable with the drawer, so that said turntable may be withdrawn from the enclosure for the insertion and removal of a record and may be returned into the enclosure to bring an inserted record into cooperative relation with the pick-up device, means in cooperative relation with said drawer and dependent upon the closure thereof for positioning said pick-up device in starting relation to a record on said turntable, and means for adjusting said last-named means to effect positioning of said pick-up device for different sized records.

14. In a phonograph apparatus, an enclosure, a movable pick-up device permanently confined within said enclosure, a drawer movable into and out of said enclosure, a turntable mounted on and movable with the drawer, so that said turntable may be withdrawn from the enclosure for the insertion and removal of a record and may be returned into the enclosure to bring an inserted record into cooperative relation with the pick-up device, an electric motor mounted on said drawer and operable to drive said turntable, a control switch for said motor, means in cooperative relation with said drawer for effecting closure of said switch in response to closure of said drawer, means in cooperative relation with said drawer and dependent upon the closure thereof for positioning said pick-up device in starting relation to a record on said turntable, and means for adjusting said last-named means to effect positioning of said pick-up device for different sized records.

15. In a phonograph apparatus, an enclosure having an open side, a pick-up device confined within said enclosure, a closure member arranged for opening and closing movements in relation to said open side, a record supporting turntable arranged for movement by said member so that the turntable may be withdrawn from the enclosure for the insertion and removal of a record and may be returned into said enclosure to bring an inserted record in cooperative relation with the pick-up device, and means in cooperative relation with and responsive to the closing movement of said member for effecting engagement of said pick-up device and the marginal portion of a record on the turntable, and responsive to opening movement of said member for effecting disengagement of the pick-up device and the record.

16. In a phonograph apparatus, an enclosure having an open side, a pick-up device confined within said enclosure, a closure member arranged for opening and closing movements in relation to said open side, a record supporting turntable ar-

ranged for movement by said member so that the turntable may be withdrawn from the enclosure for the insertion and removal of a record and may be returned into the enclosure to bring an inserted record in cooperative relation with the pick-up device, driving means for said turntable, means responsive to closing movement of said member for starting the rotation of the turntable and responsive to opening movement of said member for stopping the rotation of the turntable, and other means in cooperative relation with and responsive to the closing movement of said member for effecting engagement of the pick-up device and the marginal portion of a record on the turntable, and responsive to the opening movement of said member for effecting disengagement of the pick-up device and the record.

17. In a phonograph apparatus, an enclosure having an open side, a pick-up device confined within said enclosure, a closure member arranged for opening and closing movements in relation to said open side, a record supporting turntable arranged for movement by said member so that the turntable may be withdrawn from the enclosure for the insertion and removal of a record and may be returned into said enclosure to bring an inserted record in cooperative relation with the pick-up device, means in cooperative relation with and responsive to the closing movement of said member for effecting engagement of said pick-up device and the marginal portion of a record on the turntable, and responsive to opening movement of said member for effecting disengagement of the pick-up device and the record, and means for adjusting said last-mentioned means to effect positioning of said pick-up device for different sized records.

18. In a phonograph apparatus, a record-supporting turntable, a pick-up device arranged for vertical and lateral movements relative to said

turntable, a rectilinearly movable cam structure having a floor portion provided with two levels and an incline therebetween, and also having a track portion provided with outer guide rails and an inner guide rail defining passages and pivoted guide members at the ends of the inner guide rail, means operatively connected with said pick-up device and engaging said portions of the cam structure to effect vertical and lateral movements of the pick-up device in response to rectilinear movement of said cam structure, said cam structure being pivotally mounted so as to be adjustable to vary the extent of lateral movement of said pick-up device for the playing of different sized records, and manually-adjustable means for adjusting said cam structure to different positions according to the size of records to be played.

EMIL I. HARMAN.

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