May 23, 1939. P. H. SMYTH, JR 2,159,833

PHONOGRAPH

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Fig. 1.

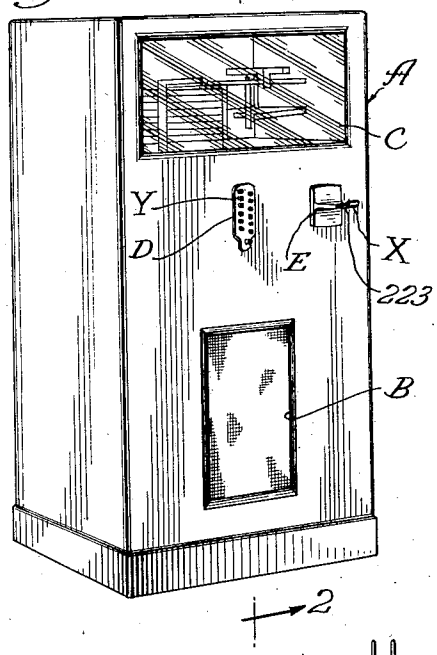


Fig. 2.

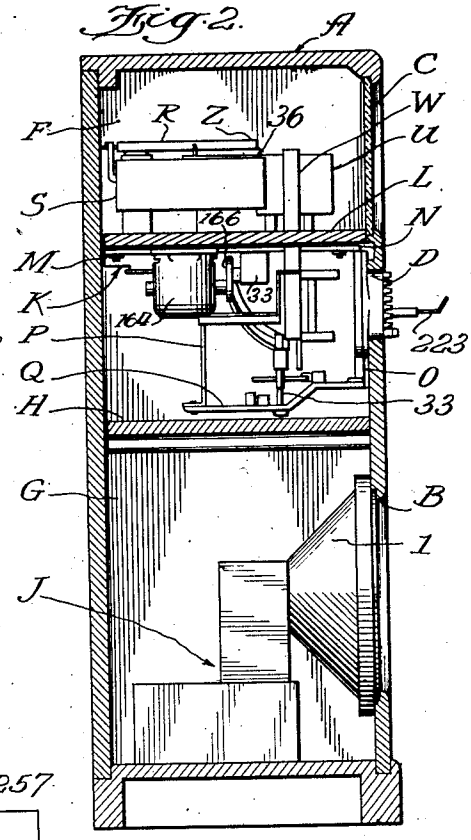
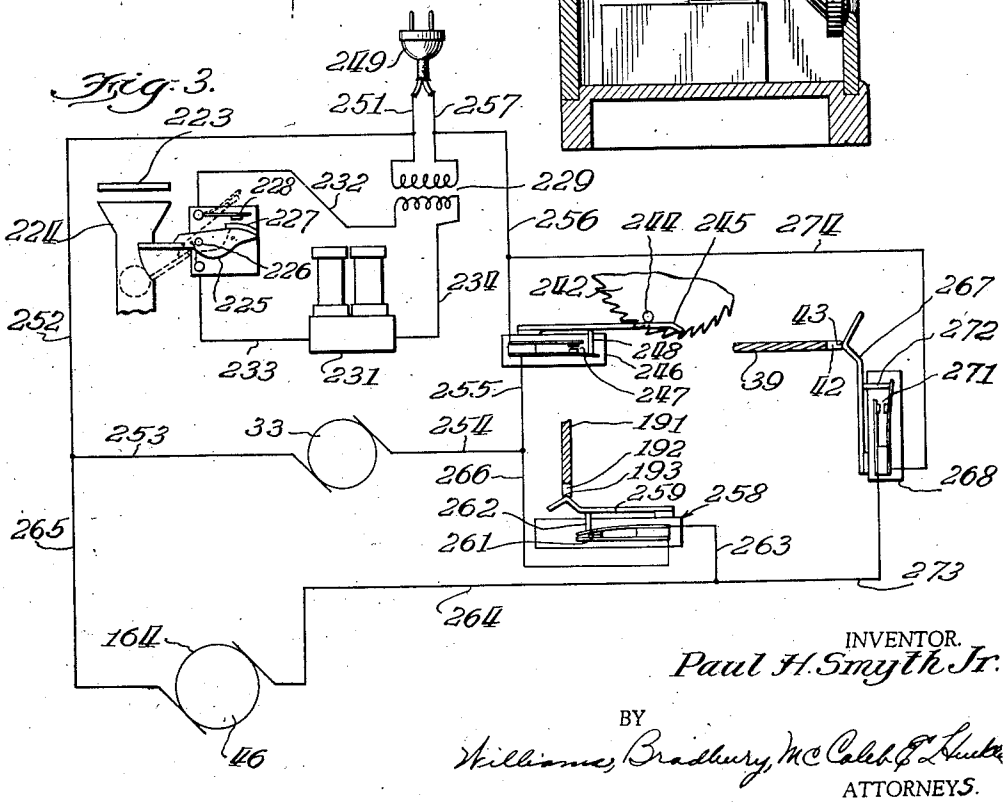


Fig. 3.



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Fig. 4.

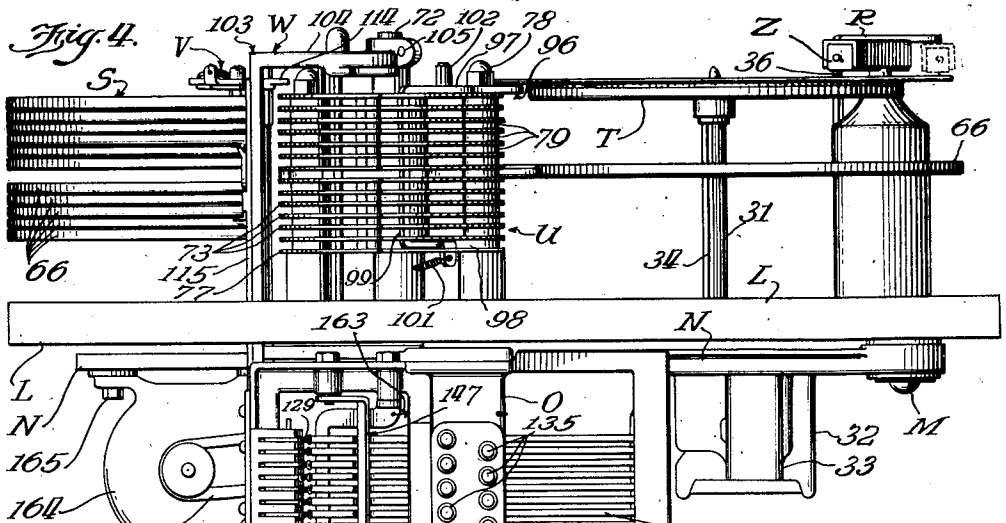


Fig. 10.

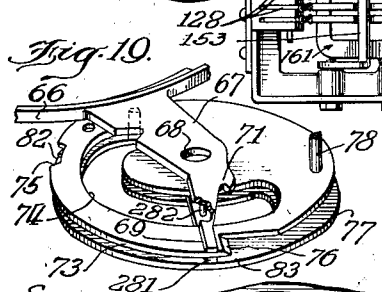


Fig. 5.

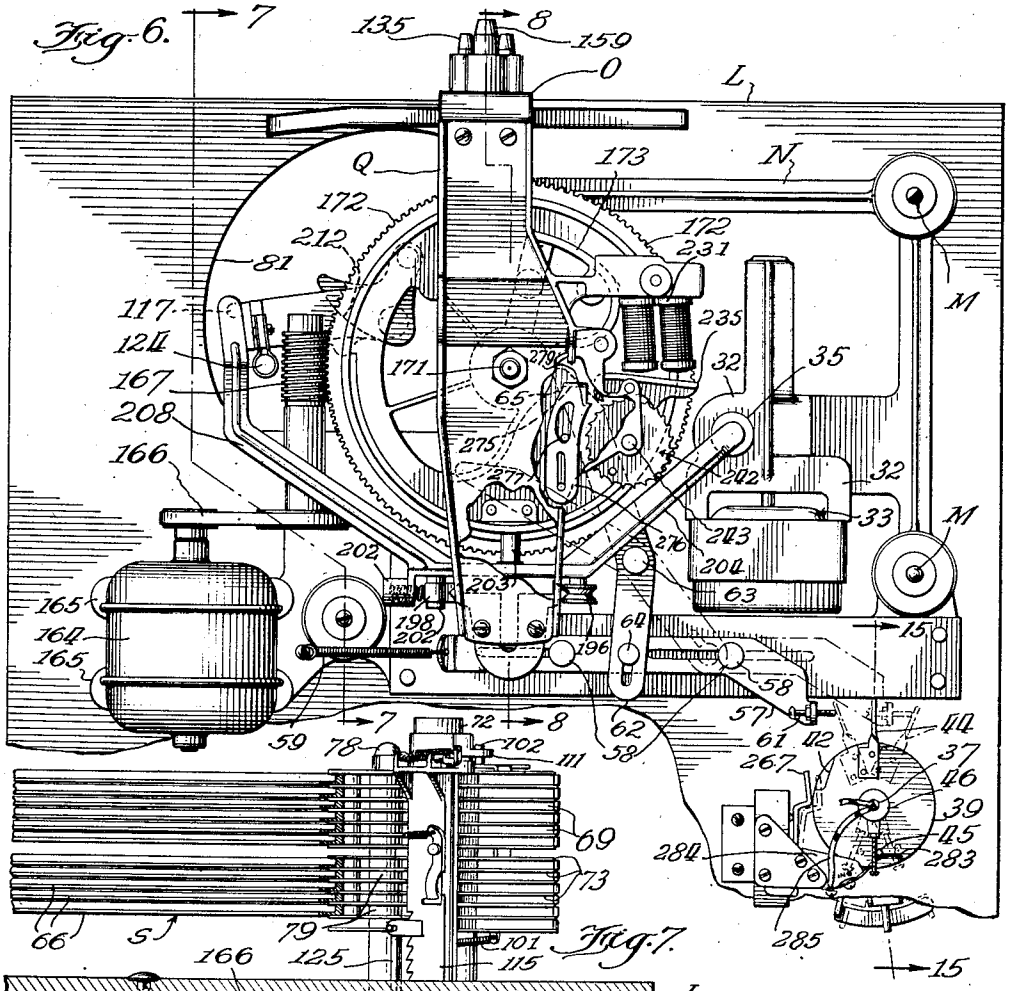
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Fig. 6.



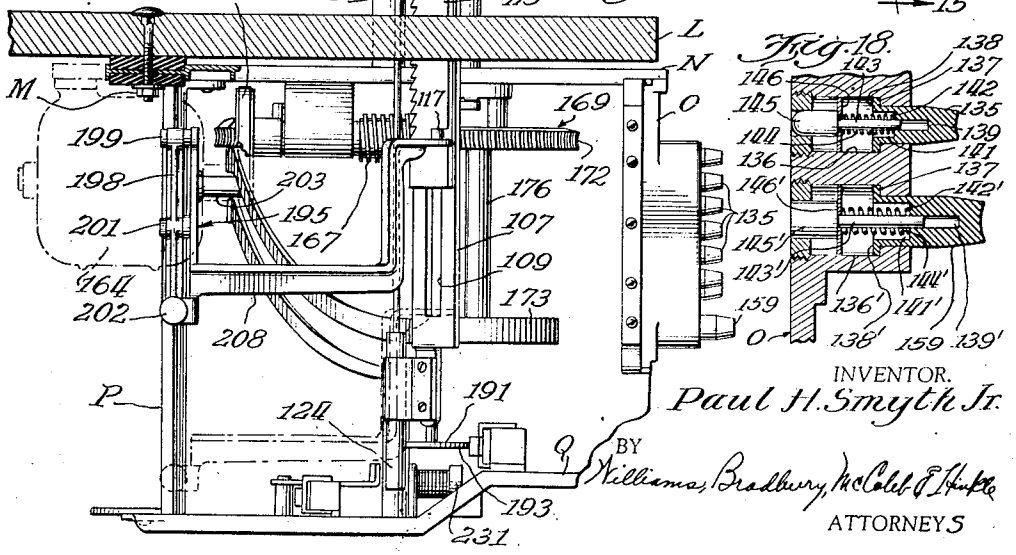


Fig. 18.

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Fig. 8.

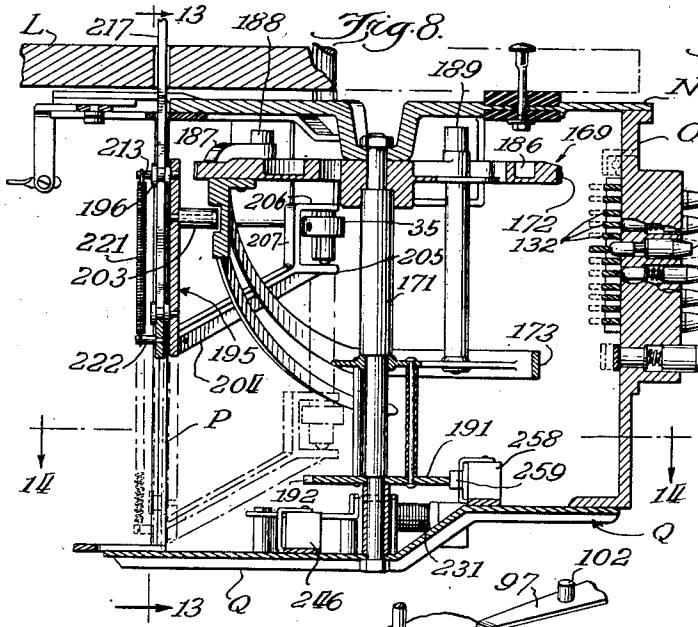


Fig. 9.

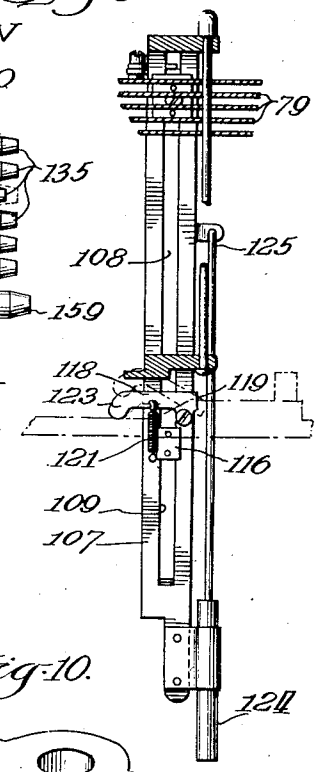


Fig. 10.

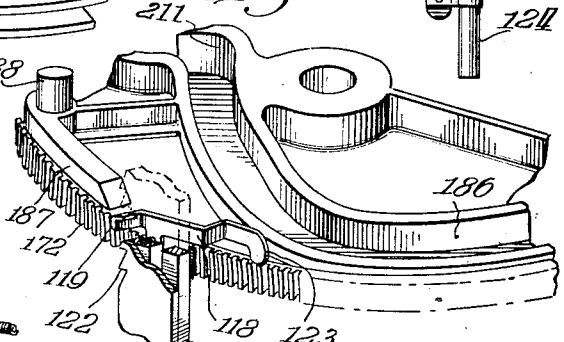


Fig. 11.

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Fig. 12.

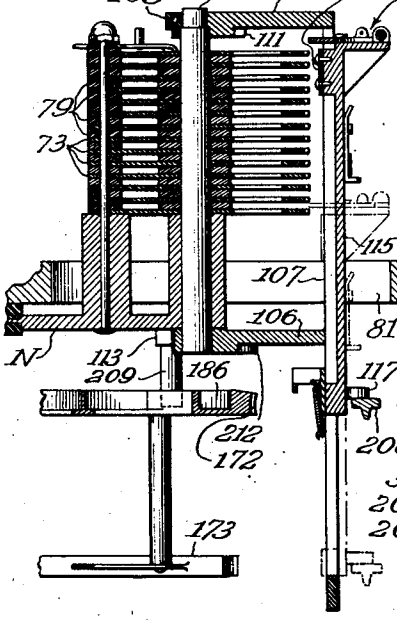


Fig. 13.

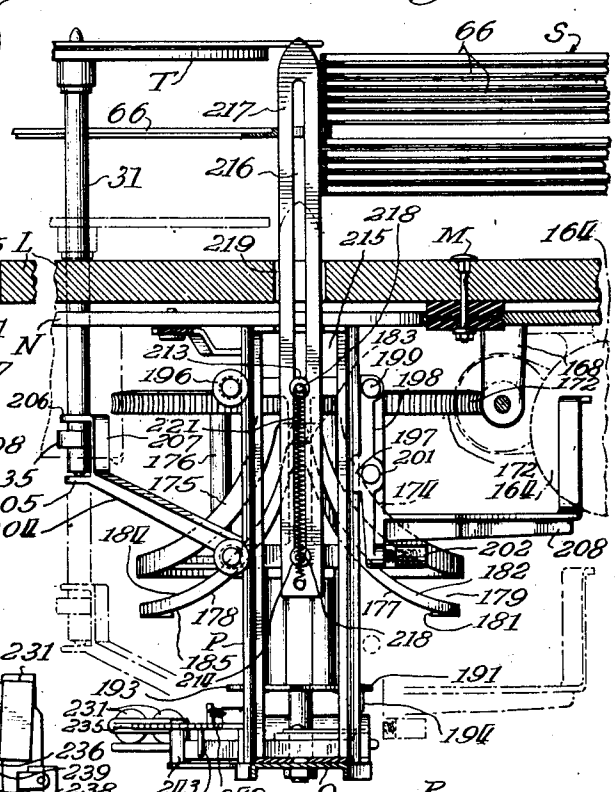


Fig. 14.

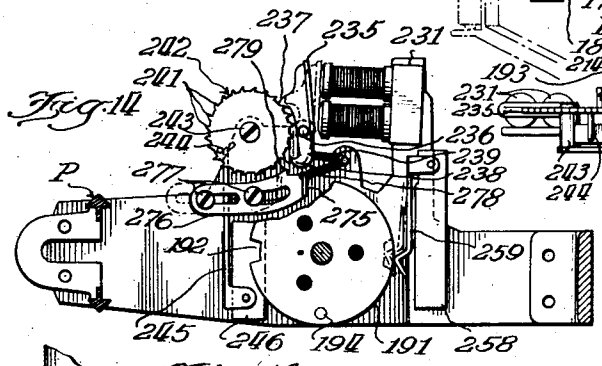


Fig. 16.

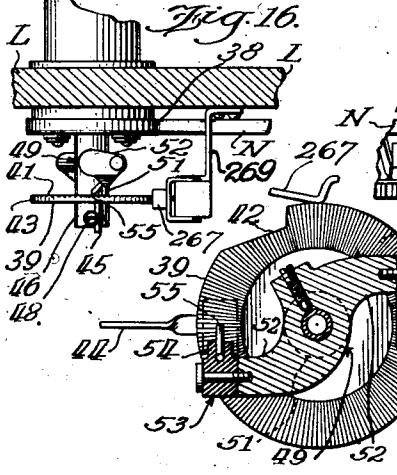


Fig. 15.

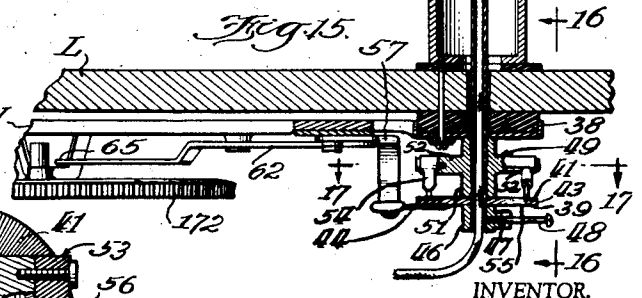


Fig. 17.

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Fig. 20.

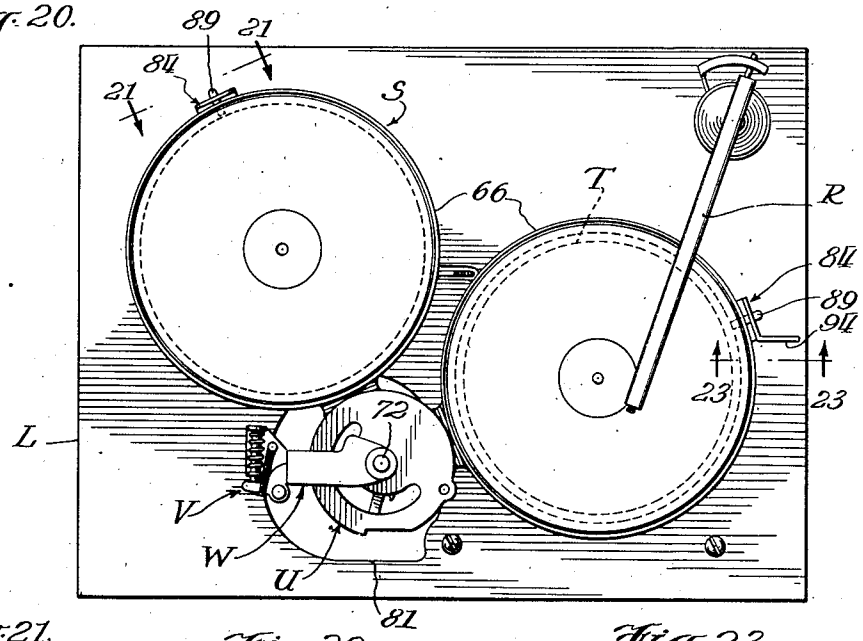


Fig. 21.

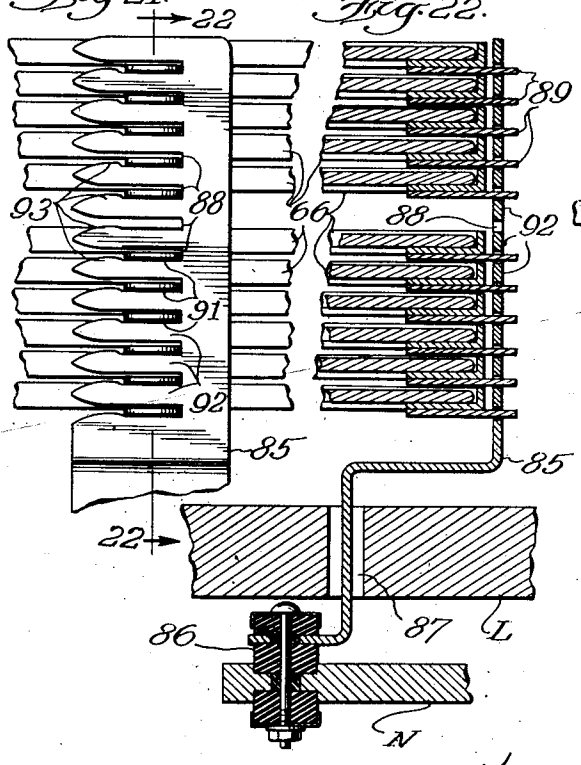
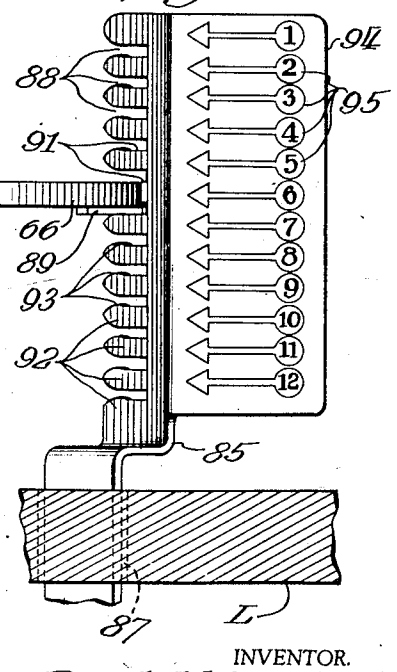


Fig. 22.

Fig. 23.



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Patented May 23, 1939 2,159,833

UNITED STATES PATENT OFFICE

2,159,833

PHONOGRAPH

Paul H. Smyth, Jr., Evanston, Ill., assignor to Rock-Ola Manufacturing Corporation, Chicago, Ill., a corporation of Delaware

Application May 22, 1935, Serial No. 22,701

22 Claims. (Cl. 274—10)

This invention relates to phonographs, and has more particular reference to a simplified phonograph construction for automatic reliable and positive operation in changing and playing records.

The novel phonograph of the invention is similar to those disclosed in my copending applications, Serial No. 568,610 (now U. S. Letters Patent No. 2,004,016) and Serial No. 735,936, and is adapted to carry a plurality of records. It is provided with a record changer which is controlled by selector means and selector control means operable prior to, after or during the playing of a record to select any one or more of the records for playing one at a time. By means of the novel phonograph the records carried thereby may be played one at a time in any sequence, including in seriatim, or predetermined groups of successive or non-successive records may be played one record at a time.

Included among the objects of the invention are the provision of the novel combinations and arrangements of elements hereinafter disclosed, as illustrated in the accompanying drawings, and as set forth in the appended claims; the simplification in the construction of automatic phonographs; the provision of a novel selector control and selection canceling means whereby one or more selections can be made before, during or after the playing of a record, the selection or selections may be canceled and the same or another record or the same or other records may be selected; the provision of novel and improved record changing means which is positive and reliable in action, which includes lock-out or retaining means for the records in the record storage means, and which releases the selected record to the record changing means when it is to be played; the provision of an operative separator for separating the record carrier bearing the selected record from the record storage means while the record carrier is in an active position; the provision of novel and improved operating or actuating means for the record changer for causing the return of the playing arm to a starting position and the removal of a played record from a playing position after any record has been played; the provision of a driven reciprocable member for reciprocating the turntable between playing and non-playing positions, operating the separator, and setting record selector means in timed relationship; and the direct and positive driving of the foregoing by improved driving means and connections for assuring accurate and reliable timing of the various operations of the novel phonograph apparatus.

Other objects and advantages of my invention will appear more fully from the following description and from the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

In the drawings:

Figure 1 is a perspective view of a novel phonograph embodying some of the features of the present invention;

Figure 2 is a cross section taken substantially along the lines 2—2 of Figure 1;

Figure 3 is a schematic wiring diagram showing the relationship between the control and driving means;

Figure 4 is an elevational view of the phonograph apparatus removed from its cabinet;

Figure 5 is a fragmentary plan view of the apparatus shown in Figure 4, showing the two positions of the record delivery means;

Figure 6 is a fragmentary bottom plan view of the apparatus shown in Figure 4;

Figure 7 is a fragmentary cross section taken substantially along the lines 7—7 of Figure 6 but showing the apparatus right side up instead of upside down;

Figure 8 is a cross section taken substantially along the lines 8—8 of Figure 6 and showing the two positions of the turntable reciprocating means;

Figure 9 is a cross sectional detail taken substantially along the lines 9—9 of Figure 5 to bring out certain details of construction of the record delivery and the record selecting means;

Figure 10 is a fragmentary perspective view showing certain construction details of a master cam member for driving the novel phonograph apparatus;

Figure 11 is a fragmentary perspective view, partially in section, showing the operation of the record changing means and its relationship to the record selecting means and the selecting control means;

Figure 12 is a cross section taken substantially along the lines 12—12 of Figure 5;

Figure 13 is a cross section taken substantially along the lines 13—13 of Figure 8 and shows the position of the various phonograph mechanisms when the turntable is in the raised position;

Figure 14 is a cross sectional detail taken substantially along the lines 14—14 of Figure 8;

Figure 15 is a fragmentary vertical cross section through the playing arm and its support and through a portion of the driving means to

show the actuating means for the return of the playing arm to a starting position;

Figure 16 is a cross section taken substantially along the lines 16—16 of Figure 15;

Figure 17 is a cross section taken substantially along the lines 17—17 of Figure 15;

Figure 18 is a fragmentary cross section taken substantially along the lines 18—18 of Figure 4 showing the operating means for the selector control means and the operating means for the selection cancellation means;

Figure 19 is a fragmentary perspective view of record supporting means and automatically actuated operating means for the multi-record selector;

Figure 20 is a plan view similar to that shown in Figure 5 and including supplemental record supporting means;

Figure 21 is a fragmentary elevation taken substantially along the lines 21—21 of Figure 20;

Figure 22 is a partial cross section taken substantially along the lines 22—22 of Figure 21; and

Figure 23 is a partial cross section taken substantially along the lines 23—23 of Figure 20.

The phonograph apparatus illustrative of the invention is provided, as shown in Figures 1 and 2, with a suitable cabinet generally indicated by the reference character A, which may have a sound opening or grille B, a sight opening or window C, a selector control means aperture D, and a coin or other control means aperture E. As illustrated, the cabinet A may be divided into upper and lower compartments F and G respectively by a cabinet partition H.

In the lower compartment a suitable speaker or sound converter I may be mounted adjacent the grille B and electrically connected with an amplifier J, also in the lower compartment. The upper compartment is adapted to receive a chassis or frame, generally denoted by the reference character K, serving as mounting means for the phonograph apparatus other than the speaker I and the amplifier J which are operatively associated therewith.

That chassis K comprises a supporting panel L, sometimes referred to in the art as a motor board, removably supported in the cabinet by any suitable means, and a substructure or frame suspended as at M from the supporting panel L and having a generally rectangular member N adjacent the panel L, spaced side members O and P depending from opposite sides of the rectangular member N, and a bottom member Q connecting the lower ends of the side members O and P and thereby spaced from the rectangular member N.

Generally speaking, the chassis K carries thereon, opposite or in such position as to be visible through the sight opening C, record reproducing or playing means R, record storage or carrying means S including bearing or supporting means U for the record carrying means S, a turntable T, record selecting means V, and record delivery means W. The driving, controlling, and timing means and connections for and with the foregoing apparatus, are carried by the chassis K below the supporting panel L.

It will be understood that the operation of a control member X (accessible through the aperture E), whether or not operating means Y (accessible through the aperture D) for the selector control means is operated, will cause the record delivery means W to operate, whereby a record from the storage means S will be supplied to the turntable T which coacts with the record reproducer R to play or to trace the record. The record, as will be understood by those skilled in this art, causes a needle to vibrate. The vibrations of the needle are converted into electrical impulses or oscillations by a pick-up Z, and those electrical impulses, after amplification by the amplifier J, are converted into sound by the speaker I.

The turntable T is of the reciprocable type, and as indicated in Figure 13 is reciprocable between a non-playing position shown in broken lines and a playing position shown in full lines, for cooperation with the record delivery means W to remove records from the record storage means S to playing position, and after the playing thereof to return the played record to the record storage means S. In other words, the reciprocable turntable and the record delivery means together provide record changing means for the phonograph of the invention.

That reciprocable turntable T is carried on a shaft 31 which is slidably journaled in a motor frame 32 of a turntable rotating motor 33 that is slidably coupled, as schematically indicated at 34, thereto for rotating the shaft to rotate the turntable. The shaft 31 has an enlargement or head 35 at its lower end by means of which the shaft may be reciprocated to move the turntable between a playing position with respect to the playing means R and the non-playing position illustrated in broken lines in Figure 13.

As will be understood, the playing means R includes a needle 36. In playing a record the needle 36 engages it near its periphery and follows the sound track on the record toward the center, thus swinging the tone or playing arm R from a starting position to a position overhanging a central portion of the record. Novel means are provided for automatically returning the tone arm R to its starting position as it completes the playing of each record supplied thereto by the record delivery means W and the reciprocable turntable T.

That novel tone arm return means comprises a rotatable spindle 37 journaled as at 38 in the chassis K and carrying at its upper end the tone or playing arm R and at its lower end, loosely mounted thereon, a disc 39 having an annular serrated portion 41 on its upper surface, a notch or slot 42 in its peripheral wall 43, a radially outwardly extending arm 44, and a depending lug or stud 45. That disc is held on the lower end of the spindle 37 by a retaining ring 46 secured on the end of the spindle to rotate therewith by any suitable securing means 47, and having a projection 48 extending radially therefrom sufficiently to engage the depending stud 45 for a purpose appearing more fully hereinafter.

A substantially T-shaped driving member 49 with its vertical arm 51 embracing the spindle 37 above the disc 39 and secured to the spindle as shown in Figure 17, cooperates with the retaining ring 46 for preventing movement of the disc 39 axially of the spindle. The T-shaped member 49 has oppositely extending arms 52 which overhang diametrically opposite portions of the annular serrated portion 41. Loosely pivoted at the end of each arm 52 is a bell crank lever 53 with a depending arm 54 having a knife edge 55, and with a laterally projecting arm 56 which, due to gravity, serves to urge the knife edge into engagement with the annular serrated portion 41 of the disc 39. The arrangement is such that when the arms 52 swing with the

spindle 37 in one direction (the direction caused by the tone arm swinging from a starting position toward the center of the record or turntable), the knife edges 55 have driving engagement with the serrated portion 41 of the disc 39, but when the arms 52 swing in the other direction (the direction caused by the tone arm returning to its starting position), the knife edges have sliding engagement with the serrated portion 41.

The tone arm is returned to its starting position by a slidable arm 57 slidably secured as at 58 to the under side of the chassis member N and yieldably held in retracted position by a spring 59. That slidable arm carries an adjustable member 61 engageable with the outwardly extending arm 44 for rotating the disc 39 in such a direction that the depending stud 45 drivingly engages the projection 48 and rotates it, and hence the retaining ring 46 which drives the tone arm toward its starting position. The direction of that rotation, it will be remembered, is such that there is driving engagement between the knife edges 55 and the serrated portion 41 of the disc 39. For effecting such movement an operative lever 62 is pivoted as at 63 to the chassis K, and has one end connected as at 64 to the slidable arm 57 and an end 65 by means of which the mechanism just described may be operated.

Thus, as the tone arm swings under the action of the record toward the central portion thereof, the projection 48 swinging with the tone arm spindle drivingly engages the depending stud 45, and the knife edges 55 drivingly engage the serrated portion 41, thereby causing the disc 39 and the T-shaped driving member 49 to rotate together with the in-swinging or playing tone arm. If the record is of the type which terminates with a circular groove, the driving engagement just described rotates the disc until the needle 36 reaches the circular groove. If the record terminates with the familiar eccentric groove, the tone arm is caused to oscillate. The oscillations of the tone arm are transmitted by the spindle 37 to the T-shaped driving member 49. When the tone arm during such oscillations is moved toward the center of the record or turntable, the knife edges 55, coacting with the serrated portion 41, drive or rotate the disc 39, and when the tone arm is moved in the opposite direction the knife edges slide over the serrated portion 41, the net result being rotation of the disc 39 intermittently a distance depending upon the throw of the eccentric finishing groove of the record.

The record storage means S is adapted to receive a plurality of phonograph records which are individually supported and latched therein and which may be removed therefrom one at a time for playing. As illustrated, the record storage means comprises a plurality of ring-shaped record bearers or trays 66, each adapted to carry a record and having a mounting arm 67 projecting outwardly from its periphery. The mounting arm 67 has intermediate its ends an aperture 68 and at the outer end thereof an operating finger 69 and a latching slot 71.

The apertures 68 permit loosely pivoting the trays 66 in aligned relationship or in stack on a rotatable spindle 72 secured to the chassis member N intermediate the ends of the spindle. The operating fingers 69 may be moved to swing the trays 66 between positions of alignment with the turntable T and respectively coplanar positions in stack laterally removed from the turntable.

To provide supporting, bearing, and guiding surfaces for the swingable trays 66, a plurality of bearing discs 73 having arcuate apertures 74 and peripheral shoulders or projections 75 and 76 are assembled on the spindle 72 in alternating relationship with the arms 67. The discs 73, together with a bottom disc 77, are held in assembled and spaced relationship on the spindle 72 by bolts 78 and spacers 79.

In that manner a cylindrical bearing hub is provided adjacent an arcuate aperture 81 in the chassis member L, and the aligned apertures 74 of the several discs constitute an arcuate passage extending longitudinally of the hub. The aligned peripheral shoulders or projections 75 and 76 respectively define the operating range of the operating fingers 69. The bottom disc 77 is of larger diameter than the discs 73 to provide an end flange for the hub assembly which has a portion 82 adjacent the aligned shoulders or projections 75 and a portion 83 adjacent the aligned shoulders or projections 76, serving as selector limiting surfaces when the phonograph is operated without any selection having been made or upon the cancellation of previously made selections.

If desired, individual tray supporting means 84, as shown more particularly in Figures 20 to 23, may be provided to supplement the bearing support afforded by the supporting means U. Two such supplemental supporting means may be provided to support the ring-shaped trays 66 at their peripheries diametrically opposite the mounting arms 67 when the trays are in stack and when any one of them is aligned with the turntable, but since the supplemental tray supporting means 84 are substantially identical in construction, only one of them will be described.

Each supplemental tray supporting means 84 comprises a bracket or arm 85 having a sound absorbing mounting 86 on the chassis member N and extending up through an aperture 87 in the chassis member L, in the one case adjacent the storage means S at a position diametrically opposite the tray mounting means 67, and in the other case adjacent the turntable T at a position diametrically opposite the mounting arm 67 of any tray 66 aligned with the turntable T. Each arm 85 is provided with a plurality of transverse slots 88 so spaced and positioned that each will receive a finger or projection 89 on a tray 66. The slots 88 provide supporting surfaces 91 for the fingers 89 on spaced arms 92 which have enlargements or beads 93 at the entrances of the slots to hold the fingers 89 therein but to permit the swinging of the individual trays 66 by the record delivery means W.

If desired, as shown in Figures 20 and 23, the arm 85 adjacent the turntable T may be provided with an angularly disposed plate or strip member 94 having indicia 95 thereon opposite each slot 83 and visible through the sight opening C in the cabinet for indicating the selected record which is aligned with the turntable.

The trays 66 are releasably retained in their stack position laterally of the turntable by latching means 96 of yokelike construction, with its upper arm 97 and its lower arm 98 swiveled on one of the bolts 78 and extending therefrom to positions outwardly spaced from but registering with the aligned latching slots 71, and with its connecting arm 99 extending into the passage provided in the bearing hub by the aligned arcuate apertures 74. A spring 101 normally urges the latching means 96 toward a latching position

in which the connecting arm 99 engages in the aligned latching slots 71 of the trays 66 in stack. A latch operating stud 102 is provided on the upper arm 97 of the latching means for swinging it out of latching engagement with the arms 67 of the trays 66 in the stack to permit the record delivery means W to deliver a record to the turntable for playing by the playing arm R.

For delivering records from the storage means S to the reciprocable turntable T and returning them to the storage means, the record delivery means W comprises a swingable yoke 103 fixed on the spindle 72 to rotate therewith by means of an uper arm 104 secured as at 105 to the upper end of the spindle 72 and a lower arm 106 fixed to the lower end of the spindle 72. The arms 104 and 106 are connected at their outer ends by a vertical yoke member 107 passing through the arcuate aperture 81 in the chassis member L and having an elongated aperture or slot 108 extending longitudinally of the yoke member 107 between the arms 104 and 106 and an elongated aperture or slot 109 extending longitudinally of the yoke member below the lower arm 106.

The upper arm 104 has a cam portion 111 adjacent the spindle 72 and engageable with the operating stud 102 for releasing the record trays 66 to permit swinging one of them to its position of alignment with the turntable. Restoring means 112 extending between the upper and lower arms 104 and 106 is swingable therewith in the arcuate passage provided by the aligned disc apertures 74 for engaging the operating finger 69 of any record tray while it is aligned with the turntable, and swinging that record tray to its position in stack.

The lower arm 106 has an operating portion or crank 113 for oscillating the rotatable spindle 72 and the yoke 103 rotatable therewith to cause the restoring means 112 to swing the record tray 66 from its position of alignment with the turntable to its position in the stack, and for oscillating a selector finger or projection 114 on the selector V with the vertical yoke member 107 to engage a record tray operating finger 69 between adjacent or successive discs 73 and to swing the record tray to a position of alignment with the turntable.

That selector finger or projection 114 forming a part of the selector V is slidable longitudinally of the yoke member 107 between the bottom disc 77 and a position above the top disc 73 (see Fig. 12). It is carried on a selector slide bar 115 slidably secured as at 16 outwardly adjacent the yoke member 107, and extends through the aperture 108 therein toward the cylindrical bearing hub a distance sufficient to engage any one of the tray operating fingers 69 which may be at the same level therewith. The slide bar 115 has an operating lug 117 near its lower end, as shown in Fig. 11, by means of which it may be raised to a position at which the projection or finger 114 adjacent the aligned shoulders 75 will clear the top disc 73 when the yoke 103 is in the full line position shown in Fig. 5.

As disclosed in my copending application, Serial No. 11,091, filed March 14, 1935, now United States Letters Patent #2,036,103, the slide bar 115 is held in that elevated position by means of a latch 118 pivoted to the yoke member 107 as shown in Fig. 11. That latch has a dogging or pawl portion 119 normally urged by a spring 121 toward dogging engagement with a serrated or toothed edge 122 of the slide bar. An operating portion 123 of the latch 118 permits releasing it from latching engagement with the slide bar 115.

With the slide bar thus elevated, the yoke 103 may be swung by the crank 113 toward the aligned shoulders 76 or toward the broken line position shown in Fig. 5. When the yoke has reached a position such that the selector finger 114 has passed beyond the aligned shoulders 76, the slide bar 115 may be released by operating the portion 123 of the latch 118. Upon releasing the slide bar in that position, it will gravitate so that the selector finger 114 is adjacent a predetermined record tray operating finger 69 or to the limiting surface 83 of the bottom disc 77, as will presently be explained, the descent of the slide bar 115 being substantially silent and gradual, due to a dash pot device 124 connected thereto as at 125.

In order to predetermine or to select the position to which the slide bar 115 thus gravitates, the front chassis member O is constructed as a dividing arm for a generally rectangular frame 126 integral with the chassis member or dividing arm O. The frame 126 is provided at a side thereof with a plurality of vertically spaced arms or lugs 127 extending therefrom laterally toward the dividing arm O for pivotally carrying a plurality of spring-urged retaining pins 128.

Each of the pivoted pins 128 is urged axially thereof by a spring 129 to engagement in a notch 131 at the end of a selector control arm 132 pivoted at its other end between vertically spaced mounting lugs 133 projecting laterally and rearwardly from the opposite side of the frame 126. As disclosed in my copending application, Serial No. 11,092, filed March 14, 1935, now United States Letters Patent #2,119,251, there are provided as many arms 132 as there are record trays 66, and each arm is supported intermediate its ends by vertically spaced, rearwardly extending lugs 134 on the dividing arm O. The selector control arms 132 are thus pivotally mounted at a level below the cylindrical tray supporting hub such that when the selector operating lug 117 rests upon any arm 132 (Fig. 11), the selector finger 114 will be at the same level as one of the operating fingers 69 of the record trays 66.

Those selector control arms 132 or any one or more of them may be individually swung in any sequence or simultaneously to a position for engaging the slide bar operating lug 117 to control or to predetermine the selecting position or positions of the selector finger or projection 114 by any suitable selector control operating means Y, for example, a plurality of selector buttons 135 that are slidably held in individual passages 136 provided in the chassis member O at a position registering with the selector operating aperture D in the cabinet.

The outer end of each passage 136 has an internal shoulder 137 engageable by an external shoulder or flange 138 on the button therein to limit the movement of the button in one direction. Each button has a central bore or depression 139 notched or countersunk as at 141 to provide an internal shoulder 142 therein. The bore 139 of each button is adapted to receive therein a stem 143 carrying a spring 144 and having an operating head 145 which is engageable with one of the arms 132, the spring 144 encircling the stem between the shoulder 142 and an abutment 146 on the stem adjacent the head 145. By that construction the buttons 135 are reciprocable in their respective passages 136, whereby the operating heads 145 will respectively engage the pivoted

arms 132 and swing them about their pivots into the path of the operating lug 117 as the latter gravitates with the slide bar 115 in the manner described above.

A plurality of selector control arms 132 may be automatically swung to their respective selecting positions in order that the records in the storage means S may be played successively. As illustrated, that is accomplished by a yoke-like member 147 having an operating finger 148 connected to its upper arm 149, which in turn is pivoted as at 151 on the frame 126 and having its lower arm 152 pivotally secured to the lower part of the frame 126 so that its connecting member 153 spans the pivoted arms 132 between the lugs 127 and 134 and is engageable with the arms when they are in their non-selecting positions.

For automatically operating all of the arms as just described, a pawl 154 is pivoted as at 155 on the slide bar 115 at such a position that when the slide bar gravitates until the selector finger 114 reaches the limiting portion 83 of the bottom disc 77 and swings with the record delivery means W from the broken line position of Fig. 5 to the record delivery position shown in full lines in Fig. 5, the pawl 154 engages the operating finger 148 and swings it in a direction to cause the connecting member 153 to move the arms 132 to their selecting positions. The pawl 154 is resiliently urged toward a stop lug 156 by a spring 157 on the slide bar 115, as shown in Fig. 11.

Each arm 132 is provided with a cam surface 158 engageable by the operating lug 117 when it has been stopped by that particular arm in its downward movement and during the swinging of the record delivery means W, as just described, toward a record delivery position to cam the arm 132 back to its non-selecting position.

A cancellation button 159 constructed like the buttons 135, the parts of the button 159 corresponding with those of the buttons 135 respectively bearing the primed reference characters thereof, is adapted to move a cancellation yoke 161 pivoted as at 162 to the upper and lower members of the frame 126 and spanning the arms 132 at the corresponding sides thereof opposite those spanned by the automatic multi-selecting yoke 147 for moving any or all of the arms 132 from selecting to non-selecting position. A spring 163 secured at one end to the chassis member O and at its other end to the upper arm of the pivoted cancellation yoke resiliently and yieldably holds the yoke in its normally non-canceling position.

A main operating motor 164 is suspended, as shown at 165, from the chassis member N and is drivingly coupled by a belt and pulley connector 166 or other suitable drive connections with a worm 167 journaled in a chassis member 168 depending from the chassis member N for driving cam means 169 of substantially barrel-like or cylindrical configuration carried on a shaft 171 journaled at its ends in the spaced chassis members N and Q, as shown best in Fig. 8.

That barrel-like cam means 169 has at one end thereof a worm wheel 172 driven by the worm 167, and an arcuate member 173 spaced from the worm wheel 172 by a pair of helix-like upper rails 174 and 175 diverging from near the periphery of the worm wheel toward the arcuate member 173, and connecting the worm wheel with the arcuate member. Reinforcing bars or arms 176 extend longitudinally of the barrel-like cam and connect the worm wheel and the arcuate member, as shown in Figs. 7, 8, and 13.

The cam means 169 is provided with a pair of lower rails 177 and 178, extending from the worm wheel 172 in spaced and substantially parallel relationship with the rails 174 and 175 respectively to below the arcuate member 173, providing a cam slot or track 179 with an entrance or mouth 181, a rise 182, a dwell 183, a fall 184, and an outlet 185.

The upper surface of the worm wheel 172 is formed with an irregularly curved cam groove or track 186 and an upstanding selector release member 187, a stud or finger 188 being provided adjacent the release member 187, and a tone arm return stud or finger 189 being spaced from the stud 188 on the worm wheel and adapted to engage the operating lever 65 for returning the tone arm R to its starting position. To the lower end of the cam means 169 a disc or plate member 191 is secured, as shown in Figs. 7, 13, and 14, to rotate therewith, and is provided with a notch or slot 192 in its peripheral wall 193 and a stud or finger 194 depending from its lower face.

For operating the reciprocable turntable T and the selector V from the cam means 169, a slide member 195 is reciprocably secured to the rear chassis member P by a pair of spaced rollers or pulleys 196 engaging a marginal edge of the chassis member and a notched lug 197 adjustably engaging the opposite marginal edge of the chassis member. That notched lug 197 is carried intermediate the ends of an arm 198 extending along the marginal edge of the chassis member P and having a pivotal connection 199 at one end with the slide member 195 and a loose connection 201 therewith at the notched lug 197. The end of the arm 198 opposite the pivotal connection 199 is engageable by adjusting means 202 for adjustably urging the notched lug 197 to slidable engagement with the chassis member P. The slide member 195 is provided with a cam follower 203 projecting from its front face and receivable in the cam track 179 for reciprocating the slide member along the rear chassis member P.

For operating the head 35 of the turntable shaft 31, whereby to move the turntable T to and from a playing position, the slide member 195 is provided with a laterally projecting arm 204 which is reciprocable with the slide member and which has a portion 205 engageable under the head 35 and a bifurcated portion 206 spaced from the portion 205 by an upstanding arm 207 and engageable about the shaft 31 above the head 35 whereby positively to drive the shaft against the turntable T in both directions of its reciprocable movement.

Projecting from the opposite side of the slide member 195 an arm 208, reciprocable therewith, extends slightly arcuately about but spaced from the barrel-like cam means 169, and is adapted to engage the operating lug 117 of the selector slide bar 115 when the swingable yoke 103 is in the position shown in full lines in Fig. 5. Thus, as the slide member 195 is raised by the cam track 179 and its follower 203, the slide bar 115 is raised to a position in which the selector finger or projection 114 clears the upper bearing disc 73, as shown in Fig. 12. At that position the cam follower 203 rides in the dwell 183 of the cam track 179 and the arm 204 has raised the turntable T to its playing position.

During the playing period, the cam follower 203 engaging in the dwell 183 causes the slide

member 195, and hence the arms 204 and 208, to remain in their upper or raised positions. Further rotation of the barrel-like cam means 169 causes the fall 184 of the cam track 179, by its action on the follower 203, to lower the arms 204 and 208, thus lowering the turntable, the selector finger 114 being supported in its raised position by the engagement between the toothed edge 122 of the slide bar 115 and its latch pawl 119.

As the rotation of the cam 169 continues, the follower 203 passes out of the outlet 185 from the cam track 179, whereupon the irregular cam groove 186 on the worm wheel 172 operates a cam follower 209 on the arm or crank 113 to swing the spindle 72 in such a direction as to move the swingable yoke 103 carrying the selector finger 114 toward the broken line position shown in Fig. 5. That cam groove 186, in thus swinging the cam follower 209, moves it toward a substantially "dead center" position 211 of the cam groove. At that position a cam portion 212 on the lower arm 106 of the swingable yoke 103 is engaged by the stud 188 on the worm wheel 172 and is cammed in a direction to rotate the spindle 72, and with it the crank 113, until the cam follower 209 on the crank 113 passes that "dead center" position 211 of the groove 186 and enters a communicating portion of the cam groove for resuming the operation of the swingable yoke 103 by the cam groove 186.

During that engagement between the stud 188 and the cam portion 212, the cam portion 111 on the upper arm 104 of the swingable yoke 103 engages the latch operating stud 102 and operates the latching means 96 to release the record carriers 66. Further rotation of the cam 169 brings the swingable yoke 103 to the broken line position shown in Fig. 5, at which position the upstanding selector release member 187 on the worm wheel 172 engages the latch 123 and operates it to release the slide bar 115. At that time the selector finger 114 has swung beyond the aligned shoulders or projections 76 so that the slide bar can gravitate silently until it is arrested by its operating lug 117 engaging on the topmost selector control arm 132, which has previously been moved to a selecting position by one of the buttons 135.

When the selector slide bar 115 is arrested in its downward movement by engagement between the operating lug 117 and a selector control arm 132 in its selecting position (see Fig. 8), the selector finger 114 is adjacent the operating finger 69 of the tray 66 carrying the record corresponding to the operated button 135. The cam groove 186 now acts on the follower 209 and through the crank 113 to reverse the direction of rotation of the spindle 72 whereby to swing the yoke 103 back toward its record delivery position shown in full lines in Fig. 5. During that swinging of the yoke 103 the selector finger 114 engages the operating finger 69 and swings the selected tray 66 to its position of alignment with the turntable T, the spring 101 returning the latching means 96 to the latched position when the cam portion 111 clears the latch operating stud 102 for holding the other trays 66 in stack.

On the face of the slide member 195, opposite the cam follower 203, is a pair of spaced studs 213 and 214 which pass through an elongated aperture or slot 215 in the rear chassis member P and an elongated aperture or slot 216 in a reciprocable separator 217 which is held on the studs 213 and 214 adjacent the chassis member P by any suitable retaining means 218, and which extends upward and through an aperture 219 in the chassis member L between the record storage means S and the turntable T. That separator 217 is arranged to reciprocate with the slide member 195 by a connector 221, preferably resilient, extending between the stud 213 and an anchorage 222 at the lower end of the separator 217.

When the selected record has been moved to its position of alignment with the turntable T, as just described, further rotation of the barrel-like cam 169 causes the entrance 181 of the cam track 179 to receive the cam follower 203 on the slide member 195. During the raising of the turntable T in the operation of the selector operating lug 117 by the slide member arms 204 and 208 respectively, the separator 217 is raised by virtue of its connection with the slide member 195 to a position between the storage means S and the tray 66 aligned with the turntable, whereby positively to separate the aligned tray from the storage means and to hold the aligned tray in alignment with the turntable.

If desired, as illustrated in Figs. 1, 2, and 3, the phonograph of the present invention may be controlled by coin or token operated mechanism, in which event the control means X will include a reciprocable coin receiver 223 which, when pushed in (Figs. 1 and 2), is adapted to deliver a coin to a coin chute or slide 224 for operating a switch arm 225 pivoted as at 226 and having one end extending into the coin chute 224, its other end carrying a switch contacting surface 227 associated with a switch contact 228.

That control switch is electrically connected in series with a suitable source of electrical energy diagrammatically indicated by the reference numeral 229, and an electromagnet 231, by electrical conductors 232, 233, and 234. Thus, when a coin operates the control switch the electromagnet 231 is energized until the coin falls beyond and releases the switch arm 225, permitting the pivoted switch arm to swing back to the normal position shown in full lines in Fig. 3.

The electromagnet 231 is mounted on the chassis member Q adjacent an armature or pawl 235 pivoted intermediate its ends as at 236 and having at opposite ends ratchet operating teeth 237 and 238. The pawl 235 is normally urged by a spring 239 away from the magnet 231. In that position the tooth 237 engages between adjacent teeth 241 of a ratchet 242 rotatably mounted as at 243 on the chassis member Q, and the tooth 238 is spaced from the tooth 237 a distance such that when the magnet is energized, the tooth 238 engages a ratchet tooth and cams or rotates the ratchet 242 slightly. Thus, when the magnet is deenergized and the spring 239 swings the pawl 235 from the magnet, the tooth 237 engages a ratchet tooth and cams the ratchet 242 a distance sufficient to make the combined rotation of the ratchet by both of the teeth 237 and 238 equal the distance between adjacent or succeeding ratchet notches.

The ratchet 242 has a switch operating stud 244 depending therefrom which normally engages a switch arm 245 of a switch 246, mounted as shown in Fig. 14 on the chassis member Q, to hold a pair of switch contacts 247 (Fig. 3) open against the action of a resiliently urged switch member 248 engaged by the switch arm 245. Thus, when a coin or token operates the switch arm 225 to energize the magnet 231, and the

pawl tooth 237, under the action of the magnet 231, disengages the ratchet 242, the resiliently urged switch member 248 operates the switch arm 245 to close the contacts 247 and to rotate the ratchet 242 one notch. Each subsequent coin or token operating the switch arm 225 to energize the magnet 231 before the ratchet is returned to its normal position, will result in the operation of the ratchet 242 by the pawl teeth 237 and 238 one additional notch in the same direction as produced by the resiliently urged switch member 248.

When the switch contacts 247 are thus closed, an electrical circuit is completed from a diagrammatically illustrated source 249 of electrical energy through conductors 251, 252, and 253, the turntable motor 33, conductors 254 and 255, the contacts 247 and conductors 256 and 257, back to the source of energy 249, thus energizing the turntable motor 33 and starting the turntable to rotate.

The closing of the switch contacts 247 also completes an electrical circuit through a switch 258 mounted on the chassis member Q adjacent the disc 191 secured to the lower end of the barrel cam 169. That switch has a switch arm 259 and switch contacts 261 which are normally held closed by the engagement between the peripheral disc wall 193 and the switch arm 259 against the action of a resiliently urged switch member 262. The switch 258 is electrically connected to the main motor 164 by conductors 263 and 264, and that motor and switch are connected in parallel with the turntable motor 33 by conductors 265 and 266. Thus, the motor 164 is also energized when the control device X is operated.

When the motor 164 is so energized, the record selector means V and the record delivery means W are elevated as shown in Fig. 4, and are just to the left of their position shown in broken lines in Fig. 5. All of the trays 66 are in stack. The turntable is in its lower or non-playing position, and the playing arm is at its starting position. The energized motor 164 rotates the barrel cam means 169 by means of the worm 137 and the worm wheel 172, causing the cam track 186, by its action on the cam follower 209 carried on the crank 113, to swing the record delivery means W to its broken line position in Fig. 5, whereupon the selector release member 187 on the worm wheel 172 operates the slide bar latch 118 to cause the latch pawl 119 to disengage the toothed edge 122 of the selector or slide bar 115.

When so released, the selector or slide bar 115 gravitates until the operating lug 117 engages that selector control arm 132 or the uppermost selector control arm 132, which may have been moved to the selecting position or positions (Figs. 8 and 11) by operation of one or more of the buttons 135, or until the selector finger 114 engages the limiting portion 83 of the bottom disc 77.

The cam track 186 on the worm wheel 172 now actuates the crank 113 to swing the record delivery means W in a record delivering direction toward the full line position shown in Fig. 5, thereby causing the finger 114 engaging an operating finger 69 of the tray 66 corresponding to the selector control arm 132 which arrested the descent of the selector or slide bar 115, to swing the tray 66 bearing the selected record to a position of alignment with the turntable T.

After the tray 66 bearing the selected record reaches its position of alignment with the turntable T, the barrel cam means 169 continues rotating, causing the entrance 181 and the rise 182 of the cam track 179 to engage the cam follower 203 for raising the slide member 195. As the slide member 195 is thus raised, the turntable reciprocating arm 204 of the slide member elevates the rotating turntable through the ring-shaped tray 66 aligned therewith to take the selected record therefrom and to present it to the playing arm R for playing.

It will be seen that while the slide member 195 is thus raising the turntable, it is also raising both the selector or slide bar 115 by the arm 208 engaging the operating lug 117 and the separator 217 connected to the slide member by the spring 221. The rotating turntable, the selector or slide bar 115, and the separator 217, are elevated in that manner until the turntable reaches the playing position (Fig. 4), and the selector or slide bar 115 moves the selector finger 114 above the top disc 73, as shown in Figs. 4, 5, and 12. The separator 217 is then at the raised position shown in Fig. 13 for holding the tray aligned with the turntable in its active position outside of the storage means S. When the rotating turntable reaches its playing position, the disc 191 secured at the lower end of the cam means 169 to rotate therewith has rotated to a position at which its notch 192 is in registration with the switch arm 259 of the switch 258, which is then opened by the resiliently urged switch member 262 urging the switch arm into the notch 192. Thus, the circuit of the main motor 164 is interrupted or opened and the motor is stopped, stopping the rotation of the barrel cam means 169 while the turntable T is in its raised or playing position. It will be observed, however, that the circuit including the turntable motor 33 and the switch 246 remains closed so that the motor 33 continues rotating turntable T. At that position the cam follower 203 rests in the dwell 183 of the cam track 179 to support the turntable arm 204 in its raised position, thereby providing supporting means for the rotating turntable while it is in its playing position.

In the playing position of the turntable, the needle 36 engages the sound track on the record rotating with the turntable to play the record. The needle following the record sound track causes the tone arm R to swing toward the center of the record. When the needle 36 reaches the end of the sound track, the tone arm has swung toward the center of the record and has rotated the disc 39 on the tone arm spindle 37 sufficiently to cause the stud 45 depending from the disc 39 to make electrical contact with a contact member 283 secured on an insulator 284 supported by a switch 268 secured as at 269 (Fig. 16) to the chassis member L adjacent the lower end of the spindle 37 (Fig. 6). That contact member 283 is electrically connected by a conductor 285 to the pick-up Z, and when it contacts with the depending stud 45 which is grounded to the chassis K, the pick-up Z is short-circuited so that the electrical impulses therefrom are not delivered to the amplifier J for amplification and subsequent conversion into sound by the speaker I. It will be seen that this "muting" of the pick-up Z will effectively prevent amplifier "hum" when the needle 36 reaches the end of the recorded sound on the record.

At the end of the sound track, whether it terminates in a circular groove or an eccentric groove, as explained above, the knife edges 55 move or drive the disc 39 on the tone arm spindle 37 to such a position that the notch 42 is in

registration with a switch arm 267 of the switch 268.

That switch 268 includes a pair of switch contacts 271 normally held open (Fig. 3) against the action of a resiliently urged switch member 272 by the peripheral wall 43 of the disc 39 engaging the switch arm 267. When the notch 42 in the peripheral wall 43 of the disc 39 registers with the switch arm 267, the resiliently urged switch member 272 urges the switch arm into the notch, thereby closing the switch contacts 271.

The closing of the contacts 271 closes an electrical circuit from the source 249 of electrical energy to the main motor 164 by way of the conductors 251, 252, and 265, through the motor 164 to the switch 268 by way of the conductor 264 and a conductor 273 (Fig. 3), through the switch contacts 271 to a conductor 274, and therefrom back to the energy source 249 by way of the conductors 256 and 257. In that manner, upon the completion of the playing of a record, the main motor 164 is restarted for resuming the driving of the barrel cam means 169, thus causing the peripheral wall 193 of the disc 191 at the lower end of the cam means 169 to close the switch contacts 261 of the switch 258.

When the cam means 169 is restarted, the dwell 183 of the cam track 179 leads the cam follower 203 in the fall 184, which causes the lowering of the slide member 195 and hence the separator 217, the turntable reciprocating arm 204 and the selector operating arm 206, the selector or slide bar 115 being retained in its elevated position (Figs. 4, 5, and 12) by the latch pawl 119 engaging the toothed edge 122. In moving toward its lower position, the turntable reciprocating arm 204 brings its bifurcated portion 206 against the operating enlargement 35 at the lower end of the turntable shaft 31 to lower the turntable. The turntable is thus moved away from its playing position downwardly toward a lower or non-playing position shown in broken lines in Fig. 13. The turntable in its downward movement passes through the ring-shaped tray 66 held in alignment therewith by the separator 217, and leaves the played record in the tray.

During the descent of the turntable T and the separator 217, the tone arm return stud 189 on the worm wheel 172 engages the operating end 65 of the lever 62 and swings the lever to move the slidable arm 57 against the action of the spring 59 in a direction to return the tone arm to its starting position, thus rotating the disc 39 so that the switch arm 267 no longer engages in the notch 42 but is engaged by the peripheral wall 43 of the disc to hold the switch contacts 271 open, and so that the depending stud 45 disengages the contact member 263 to remove the short-circuit from the pick-up Z. Opening the switch contacts 271 as just described does not stop the main motor 164 because the peripheral wall 193 of the disc 191 rotating with the cam means 169, has, as already described, previously closed the contacts 261 of the switch 258.

After the turntable T has deposited the played record in the tray 66 in the path of the turntable, the irregular cam track 186 on the worm wheel 172 swings the record delivery means W and the selector means V carried thereby from the record delivery position shown in full lines toward the broken line position shown in Fig. 5. During that movement of the record delivery means and selector means, the restoring means 112 engages the operating finger 69 of the tray 66 bearing the played record, and swings it with the played record back toward the stack or storage means S.

Just before the record delivery means W reaches its broken line position of Fig. 5, the stud 188 adjacent the selector release member 187 on the worm wheel 172 engages the cam portion 212 on the lower arm 106 of the record delivery means, and cams the rotatable spindle 72 and the operating crank 113 until the "dead center" portion 211 of the irregularly curved cam track 186 leads the cam follower 209 into a driving portion of the cam track 186, whereby the driving portion of the cam track 186 acting on the cam follower 209, and the stud 188 acting on the cam portion 212, cooperate to swing the record delivery means W and the selector means V to the broken line position of Fig. 5. Toward the end of the swinging movement of the record delivery means as just described, the cam portion 111 on the arm 104 engages the latch operating stud 102 and operates the tray latching means 96 to unlatch the trays 66 in the storage means S, whereby any one of them will be available for delivery to the path of the turntable T by the record delivery means W.

Just as the record swinging means W reaches the broken line position shown in Fig. 5, the depending stud 194 on the disc 191 at the lower end of the cam means 169 engages a cam portion 275 on a reciprocable arm 276, slidably mounted as at 277 on the chassis member Q, and urges the reciprocable arm 276 in a direction to energize a spring 278 which returns the reciprocable arm to its normal position after the stud 194 is rotated with the disc 191 sufficiently to disengage the cam portion 275. During that return movement of the reciprocable arm 276, a pawl or tooth 279 on the arm engages the ratchet 242 and rotates it in a direction opposite to that caused by the resiliently urged switch member 248 and the electromagnet 231 sufficiently to return the ratchet stud 244 to its engagement with the switch arm 245 if the control means X has been operated only once or to play only one record, thus opening the switch 246 and disconnecting or opening the circuit including the parallel connected motors 33 and 164. If, however, the control means X has been successively operated to call for the playing of more than one record, so that the resiliently urged switch member 248 and the electromagnet 231 have together rotated the ratchet 242 a plurality of notches from its normal position, the return rotation of the ratchet 242 by the pawl or tooth 279 will be intermittent after the playing of each record until all of the records called for by the control means X have been played, whereupon the pawl or tooth 279 engages the ratchet 242 after the playing of the last of said records and rotates it sufficiently to return the ratchet stud 244 to its engagement with the switch arm 245, thereby opening the switch 246 and disconnecting or opening the circuit including the parallel connected motors 33 and 164.

If the control means X is now operated, the turntable in its lower position (see broken line position of Fig. 13) will again begin to rotate as described above, and the motor 164 will resume the rotation of the barrel cam means 169, causing the selector release member 187 on the worm wheel 172 to engage the operating portion 123 of

the selector or slide bar latch 118 and to cam it in a direction to cause the latch pawl 119 to disengage the toothed edge 122 of the selector or slide bar 115 while the latter is in the position indicated in Fig. 5 by broken lines.

As pointed out above, when so released the selector slide bar gravitates until the operating lug 117 engages that selector control arm 132 or the uppermost selector control arm 132, which may have been moved to the selecting position by operation of one or more of the buttons 135 or until the selector finger 114 engages the limiting portion 83 of the bottom disc 77.

When the operating lug 117 is arrested by a selector control arm 132, the selector finger is adjacent the operating finger 69 of a tray 66 bearing the record corresponding to the operated selector control arm 132 or its operating button 135, so that when the record delivery means W is swung in a record delivering direction, that selected tray 66 will be swung to the position of alignment over the turntable.

The foregoing cycle may be repeated, and the next lower selector control arm 132 in the selecting position (whether or not it be the control arm 132 next adjacent the one previously operated) will serve to limit the selecting position of the selector finger 114 until all of the selected records have been played unless meanwhile the selection or selections have been cancelled by operation of the cancellation button 159.

If the control means X is operated without any selection having been made, and no selection is made before the selector or slide bar 115 reaches its lower position (i. e., where the selector finger 114 engages the limiting portion 83 of the bottom disc 77), the pawl 154 at that level of the bar 115, when the bar is swung in a record delivering direction, will engage the operating finger 148 on the multi-selecting yoke-like member 147 and will cause all or a plurality of the selector control arms 132 to be moved to their selecting positions. During that movement of the record delivering means W, the record selecting finger 114 engages an operating finger 281, which as shown in Fig. 19 is connected by a pin 282 to the operating finger 69 next above, which is the operating finger for and integral with the last or lowermost tray 66 in the storage means S. Thus, when no selection is made, on operation of the control means X the novel phonograph automatically selects a record and adjusts itself to play a plurality of records in seriatim.

It will be seen from the foregoing that a coin or token, or a plurality of coins or tokens successively, may be inserted in the coin receiver 223 and the control means X operated before or after the selector V is operated by the buttons 135 to select the number of records equaling the number of coins or tokens used or the number of times the control means X is operated. The novel phonograph of the present invention then proceeds automatically to play the selected record or records one at a time, and if more than one record has been selected to change the records upon completion of each record until all of the selected records have been played.

The multi-selecting yoke-like member cooperates with the selector V not only to assure the selection and playing of one record when the control means X is operated once without any selection being made, but also to adjust the selector control arms 132 so that a plurality of records may next be automatically selected for playing in seriatim if the control means X is subsequently operated before the cancellation button is operated, and without any further manual selections being made.

An important feature of the present invention is the various constructional arrangements such as those just summarized above for rendering the phonograph fool-proof and to assure its operation to reproduce a record for every operation of the control means X.

While I have illustrated and described a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details set forth but desire to avail myself of all changes within the scope of the appended claims.

I claim:

1. In a phonograph, a plurality of swingable record carriers, a reciprocable turntable, record playing means, means for swinging said record carriers selectively one at a time to and from the path of said reciprocable turntable, a separator movable to and from a position between the selected record carrier and the unselected record carriers, and means for conjointly operating said reciprocable turntable and said separator.

2. In a phonograph, record playing means, a plurality of swingable record carriers, a reciprocable turntable movable to and from playing relationship with said record playing means, means for moving said record carriers selectively one at a time into selected position in the path of said reciprocable turntable, and a separator movable into position between the selected record carrier and the unselected record carriers for holding the selected record carrier in the path of said reciprocable turntable during the playing of a record by said record playing means.

3. In a phonograph, record playing means, a reciprocable turntable for moving a record to and from record playing relationship with said record playing means, a plurality of swingable record carriers for delivering records to the path of said turntable, means for moving said record carriers selectively one at a time to cause them to deliver records to the path of said reciprocable turntable, a movable separator for separating the selected record carrier from the unselected record carriers, and means for simultaneously operating said movable separator and said reciprocable turntable upon the delivery of each record by a selected record carrier to the path of the reciprocable turntable.

4. In a phonograph, record playing means, a vertically reciprocable turntable movable to and from record playing relationship with said record playing means, a plurality of swingable record carriers for delivering records to and from the path of said reciprocable turntable, a reciprocable selector for selecting said record carriers one at a time to be moved to the path of said reciprocable turntable, a vertically reciprocable separator for separating the selected record carrier from the unselected record carriers, and means for simultaneously moving said selector to a selecting position, said turntable to a playing position, and said separator to its separating position.

5. In a phonograph, record playing means, a vertically reciprocable turntable movable to and from record playing relationship with said record playing means, a plurality of record carriers for delivering records to the path of said turntable, a selector adapted to be elevated, swung

horizontally, and moved to a selecting position for selecting said record carriers one at a time for delivery to the path of said reciprocable turntable, a vertically reciprocable separator for separating the selected record carrier from the unselected record carriers, a driven member for simultaneously elevating said turntable, said selector, and said separator, and cam means for driving said driven member and for swinging said selector.

6. In a phonograph for selectively playing a plurality of records one at a time in any desired sequence, a record changer including a plurality of horizontally swingable record carriers, and a vertically reciprocable turntable; means including a cam follower for selectively moving said record carriers to and from the path of said turntable; swingable record playing means including a cam operable member and coacting with said reciprocable turntable for playing records; means including a cam follower for reciprocating said turntable; and a multi-cam device for operating said cam followers and said cam operable member including a substantially helical track for operating the turntable reciprocating means, a horizontal cam groove for operating the record carrier moving means, and means for actuating said cam operable member to return the swingable record playing means to its starting position.

7. In a phonograph for selectively playing a plurality of records one at a time in any desired sequence, a record changer including a plurality of horizontally swingable record carriers, and a vertically reciprocable turntable; means including a cam follower for selectively moving said record carriers to and from the path of said turntable; swingable record playing means including a cam operable member and coacting with said reciprocable turntable for playing records; means including a cam follower for reciprocating said turntable; a multi-cam device for operating said cam followers and said cam operable member including a substantially helical track for operating the turntable reciprocating means, a horizontal cam groove for operating the record carrier moving means, and means for actuating said cam operable member to return the swingable record playing means to its starting position; and means movable with said record playing means for causing the actuation of said cam means when said record playing means completes each playing operation.

8. In a phonograph, a plurality of record carriers; a reciprocable turntable; means for selectively moving said record carriers one at a time into selected position in the path of said reciprocable turntable, including horizontally rotatable cam means having a horizontal cam track therein, a horizontally swinging carriage having a follower movable in said horizontal cam track, and a vertically movable slide bar carried by said swinging carriage and having a selector finger mounted upon the upper end portion thereof and adapted to be moved into registration and engagement with a preselected one of said record carriers; means for elevating said slide bar and said selector finger carried thereby into raised position, including a substantially helical cam track carried by said cam means below said horizontal cam track, and a vertically movable member having a follower engageable in said helical cam track; means for latching said slide bar and the said selector finger carried thereby in raised position; means carried by said cam means for releasing said latching means from latching engagement with said slide bar to permit said slide bar and said selector finger carried thereby to gravitate whereby said selector finger is in horizontal alignment with a preselected one of said record carriers; and means for limiting the downward movement of said slide bar and said selector finger carried thereby, including a lug on said slide bar and a bank of pivotally mounted and horizontally movable bars selectively and manually movable into the path of movement of said lug.

9. In a phonograph, a plurality of record carriers; a reciprocable turntable; means for selectively moving said record carriers one at a time into selected position in the path of said turntable including a horizontally swinging and vertically movable slide bar having a selector finger thereon, and means for lifting said slide bar and said selector finger thereon into raised position; means for latching the said slide bar and its selector finger in raised position; means for releasing said latching means from latching engagement with said slide bar to permit said slide bar and its selector finger to gravitate and thus move the said selector finger into horizontal alignment with a preselected one of said record carriers; and means for limiting the downward movement of said slide bar and its selector finger including a lug on said slide bar and a bank of horizontally movable bars selectively movable into the path of said lug, each said horizontally movable bar having a portion engageable by said lug during the horizontal swinging of said slide bar for returning said horizontally movable bar to its non-selecting position.

10. In a phonograph, a swingable playing arm having a phonograph pick-up for converting mechanical vibrations into electrical impulses convertible into sound, a relatively stationary electrical contact electrically connected to said pick-up, and an electrically grounded contact swingable with said playing arm into electrical contact with said relatively stationary electrical contact for grounding said pick-up at the end of a playing period whereby said pick-up is short-circuited during its idle period.

11. In a phonograph including swingable record playing means, record changing means, and driving means for playing a plurality of records one at a time, control means for said driving means, movable operating means for operating said control means, actuating means on and swingable with said playing means, said actuating means operatively engaging said operating means when said record playing means is swinging said actuating means in a record playing direction whereby said control means is operated upon the completion of the playing of each record, and means driven by said driving means to move said operating means for swinging said actuating means whereby to move said record playing means in the opposite direction.

12. In a phonograph including swingable record playing means, record changing means, and motor means, a motor control switch, means movable in one direction to close said motor control switch and movable in the opposite direction to swing said record playing means toward a playing position and to open said switch, means on and swingable with said record playing means for moving the movable means in the first said direction, and means driven from said motor means for moving said movable means in the opposite direction.

13. The combination in a multi-record phono-

graph with record changing means and swingabale record playing means movable between a starting position and an ending position, of means for selecting in advance of playing a plurality of records to be played, movable means automatically actuated upon the completion of each playing operation of a selected record for moving said record playing means from the ending position of each selected record played to the starting position for the next selected record to be played and driving means on and swingable with said record playing means for moving said movable means in the opposite direction.

14. The combination in a multi-record phonograph with record changing means and swingable record playing means movable between a starting position and an ending position, of means for selecting in advance of playing a plurality of records to be played, movable means automatically actuated upon the completion of each playing operation of a selected record for moving said record playing means from the ending position of each selected record played to the starting position for the next selected record to be played and driving means on and swingable with said record playing means for moving said movable means in the opposite direction, said driving means slidably engaging said movable means when said record playing means is swinging toward its starting position and drivingly engaging said movable means when said record playing means is swinging toward its ending position, whereby said record changing means is actuated upon the completion of a playing operation.

15. In a phonograph including swingable record playing means, record selecting means for selecting in advance of playing a plurality of records to be played, record changing means, and motor means for playing the selected plurality of records one at a time, a motor control switch, switch operating means movable from said record changing means in a switch opening direction to open said motor control switch and to swing said playing means toward a starting position for playing a selected record, and actuating means on and swingable with said record playing means, and slidably engaging said switch operating means when said actuating means is swinging with said record playing means in one direction and drivingly engaging said switch operating means when said record playing means is swinging said actuating means in a record playing direction whereby said motor control switch is closed upon the completion of playing of each selected record.

16. In a phonograph for playing a plurality of records one at a time, record delivery means for delivering records for playing comprising a spindle, cylindrical means coaxially secured on said spindle and having a plurality of peripheral slots spaced longitudinally of said cylindrical means, a plurality of record carriers individually and loosely pivoted on said spindle in said cylindrical means and extending outwardly through said slots for swinging between idle and delivery positions, and record carrier supporting and locking means for frictionally and supportingly engaging the outer end of each record carrier in its idle and delivery positions.

17. In a phonograph for playing a plurality of records one at a time including swingable record playing means, a plurality of horizontally swingable record carriers, and a reciprocable turntable, barrel-like cam means including a cam groove in an end face thereof and a cam follower engaged in said groove for swinging the record carriers one at a time to and from a position in the course of the reciprocable turntable, a substantially helical cam track in the peripheral side of said barrel-like cam means and a cam follower engageable in said track for moving the turntable to and from said swingable record playing means, and means for returning the swingable record playing means to its starting position.

18. In a phonograph for playing a plurality of records one at a time including swingable record playing means, a turntable reciprocable to and from playing relationship with said record playing means, means including a cam follower for reciprocating said turntable, and a plurality of pivotally mounted record carriers arranged in superposed relationship adjacent the course of said turntable, means including a cam follower for swinging said record carriers into the course of said turntable to deliver records one at a time to and to receive the same from the turntable, cam means including a circular end member parallel to the swinging paths of said record carriers and having a cam groove therein for engaging the last said follower to swing said carriers one at a time to and from the course of said reciprocable turntable, and a side member having therein a substantially helical cam track for engaging the first said cam follower to move said turntable to and away from playing relationship with said record playing means.

19. The combination in a multi-record phonograph with record playing means, and a turntable movable to and from playing relationship with said record playing means, of means including a cam follower for moving said turntable, a plurality of superposed pivotally mounted record carriers, means including a cam follower for swinging said record carriers into and away from the course of said movable turntable, cylindrical cam means engaging said followers and having its major axis parallel with the direction of movements of said turntable to and away from playing relationship with said record playing means for swinging said record carriers into and away from the course of said turntable and for moving said turntable to and from playing relationship with said record playing means, and means for driving said cylindrical cam means.

20. In a phonograph for playing a plurality of records one at a time including movable record playing means, a plurality of horizontally movable record carriers, and a reciprocable turntable, barrel-like cam means including a cam groove in an end face thereof and a cam follower engaged in said groove for moving the record carriers one at a time to and from a position in the course of the reciprocable turntable, a substantially helical cam track in the peripheral side of said barrel-like cam means and a cam follower engageable in said track for moving the turntable to and from said movable record playing means, and means for returning said movable record playing means to its starting position.

21. In a phonograph for playing a plurality of records one at a time including movable record playing means, a turntable reciprocable to and from playing relationship with said record playing means, means including a cam follower for reciprocating said turntable, and a plurality of movable record carriers arranged in superposed relationship adjacent the course of said turn-

table, means including a cam follower for moving said record carriers into the course of said turntable to deliver records one at a time to and to receive the same from the turntable, cam means including a circular end member parallel to the paths of movement of said record carriers and having a cam groove therein for engaging the last said follower to move said record carriers one at a time to and from the course of said receprocable turntable, and a side member having therein a substantially helical track for engaging the first said cam follower to move said turntable to and away from playing relationship with said record playing means.

22. The combination in a multi-record phonograph with record playing means, and a turntable movable to and from playing relationship with said record playing means, of means including a cam follower for moving said turntable, a plurality of superposed movable record carriers, means including a cam follower for moving said record carriers into and away from the course of said movable turntable, cylindrical cam means engaging said followers and having its major axis parallel with the direction of movements of said turntable to and away from playing relationship with said record playing means for moving said record carriers into and away from the course of said turntable and for moving said turntable to and from playing relationship with said record playing means, and means for driving said cylindrical cam means.

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