

Sept. 28, 1937.

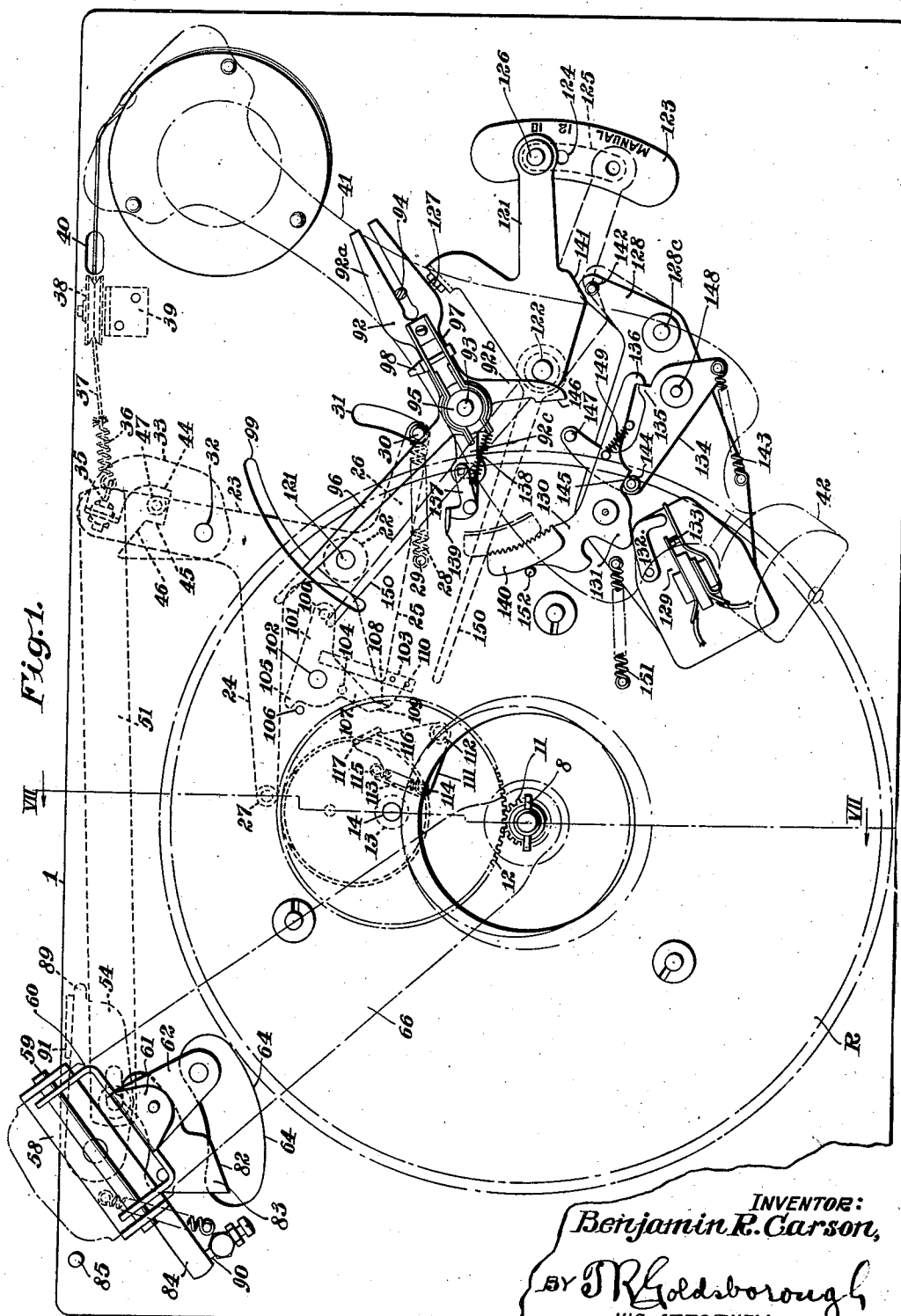
B. R. CARSON

2,094,255

AUTOMATIC PHONOGRAPH

Filed Dec. 1, 1933

5 Sheets-Sheet 1



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AUTOMATIC PHONOGRAPH

Filed Dec. 1, 1933

5 Sheets-Sheet 2

Fig. 3.

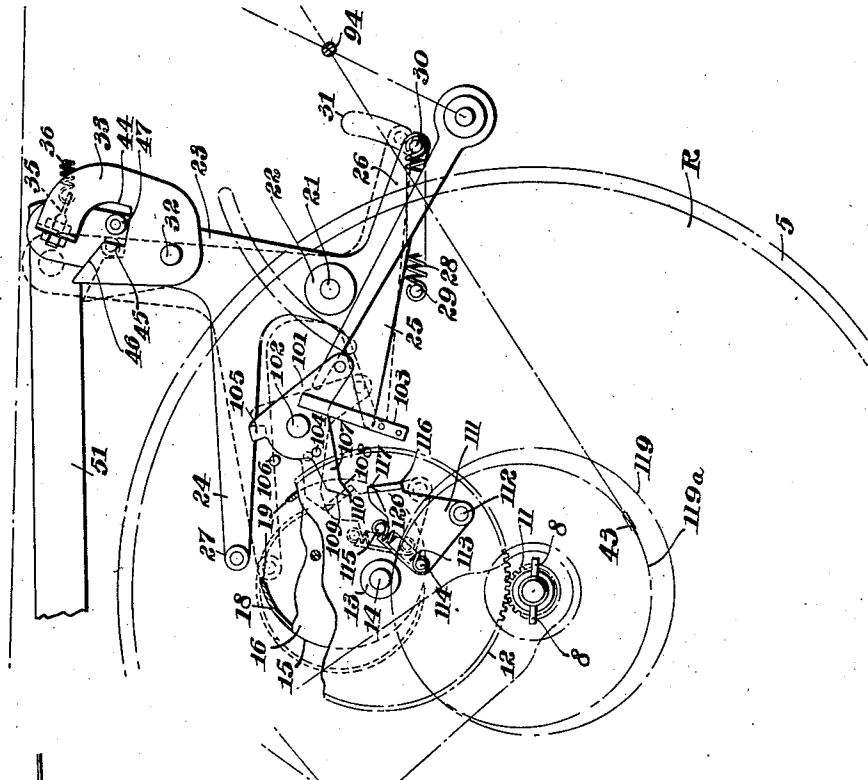
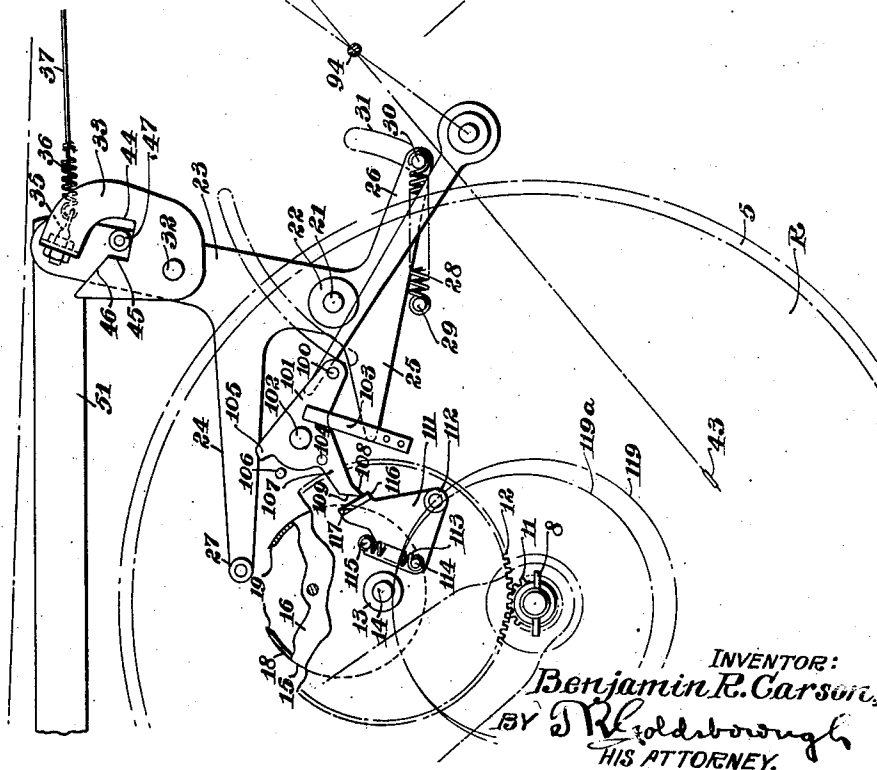


Fig. 2.



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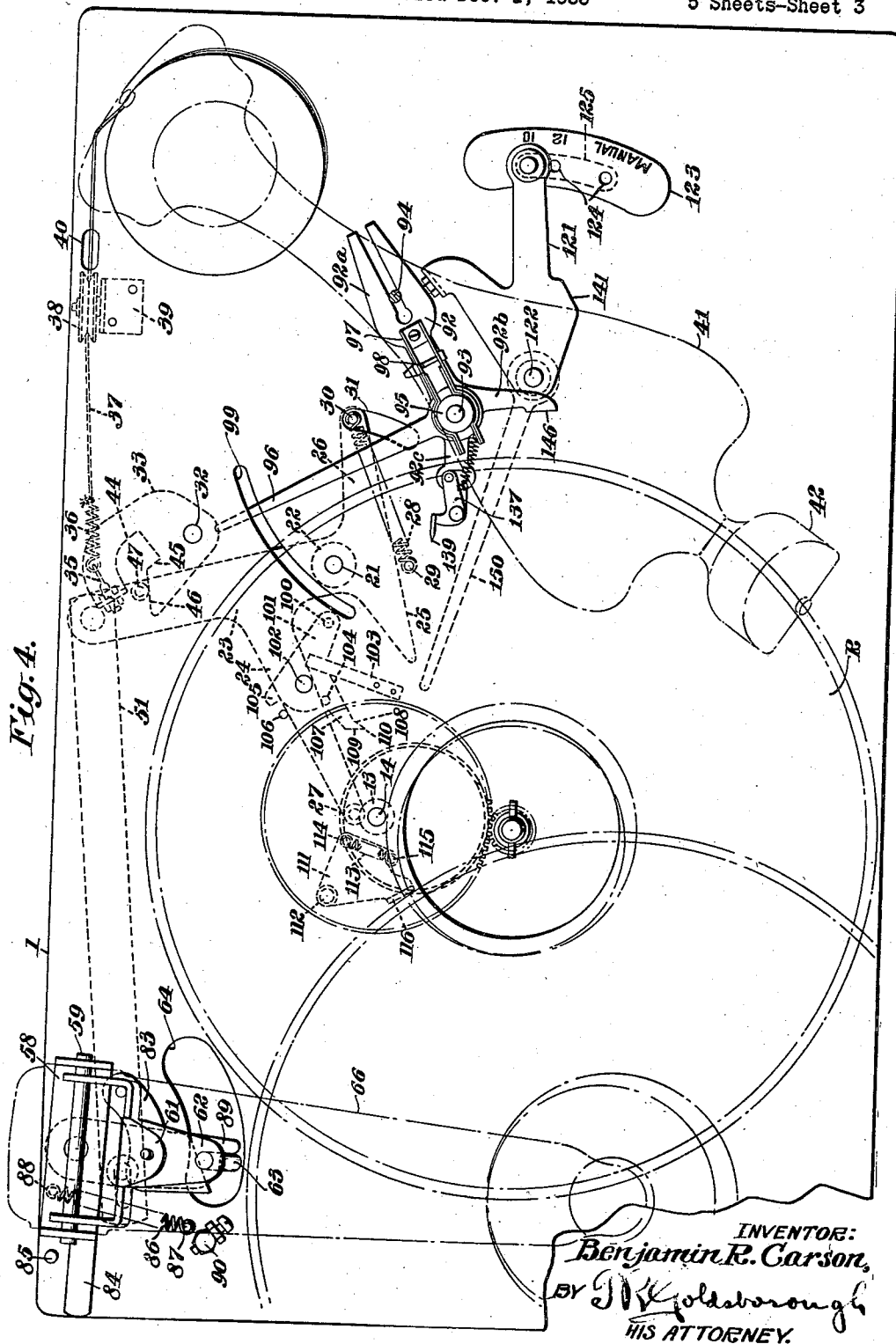
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5 Sheets-Sheet 3



Sept. 28, 1937.

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Filed Dec. 1, 1933

5 Sheets-Sheet 4

Fig. 5.

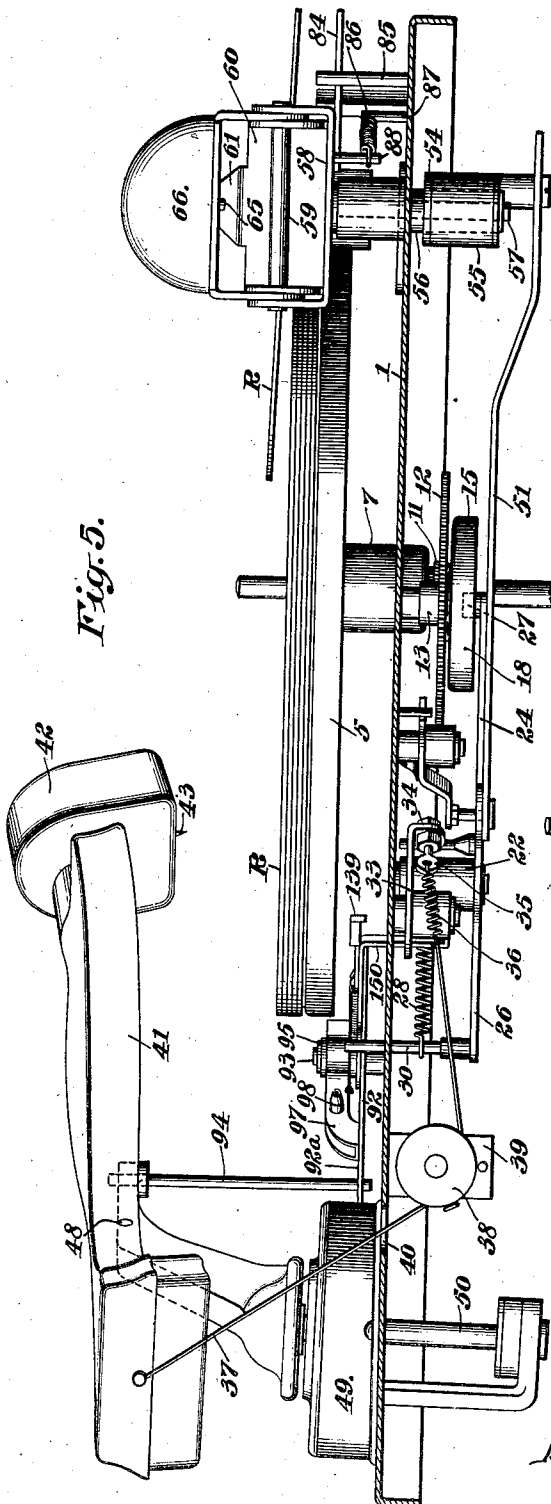
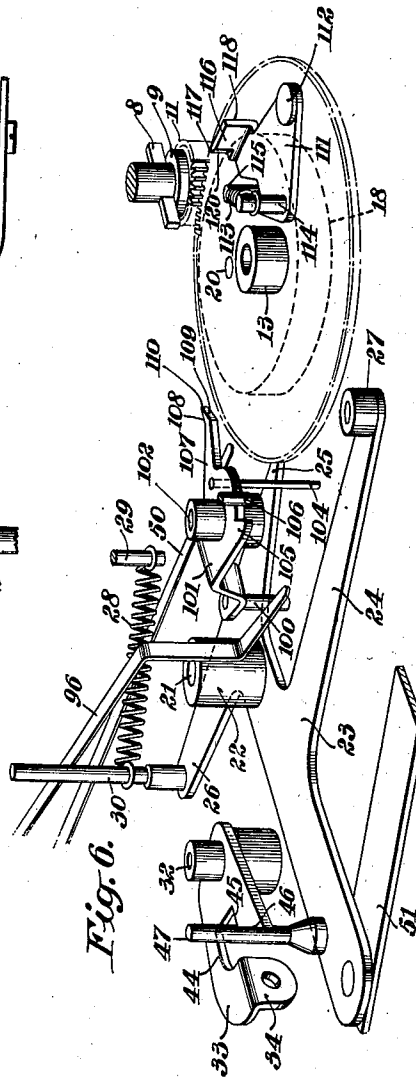


Fig. 6.



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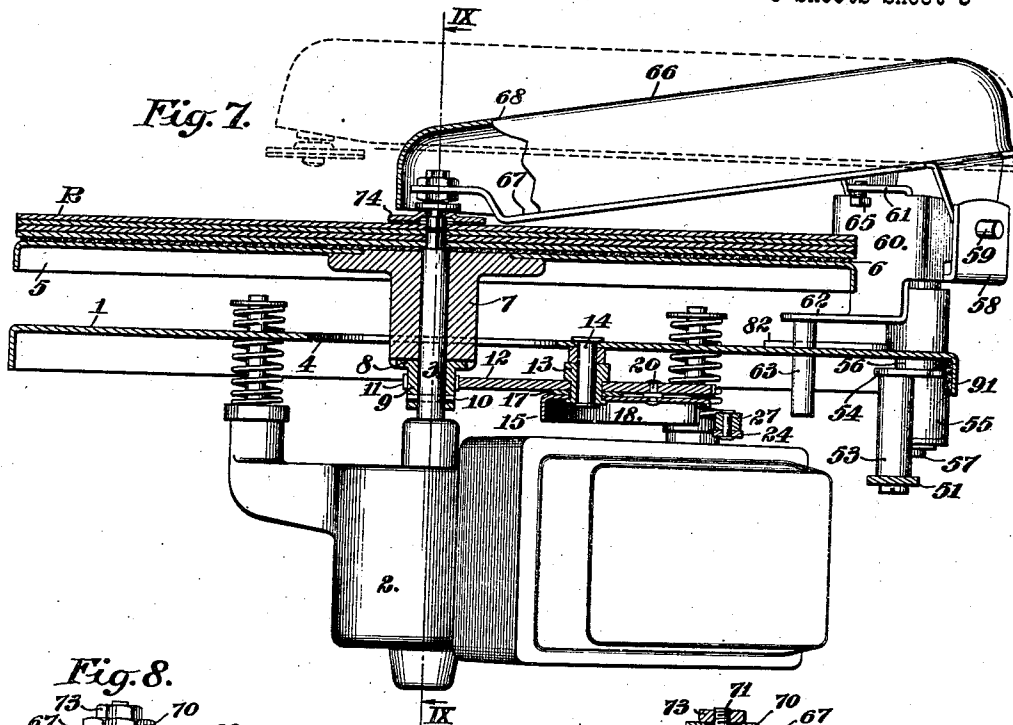
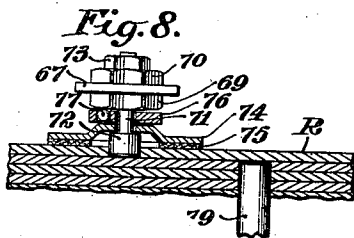
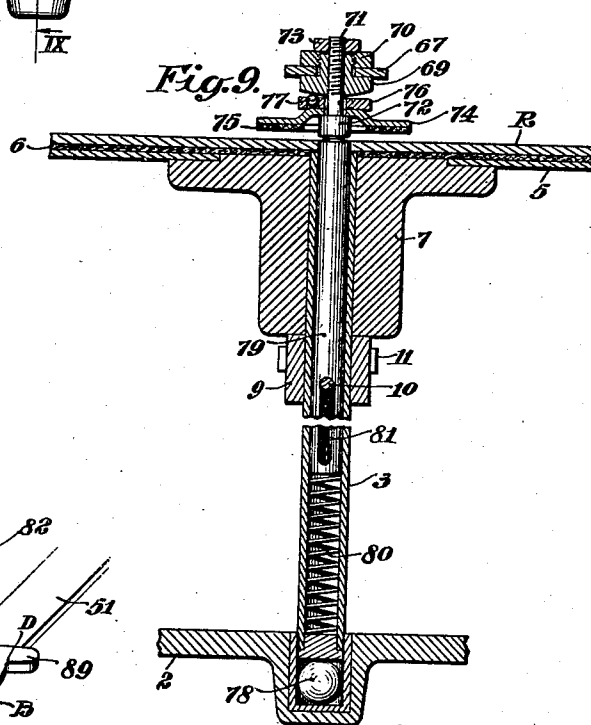
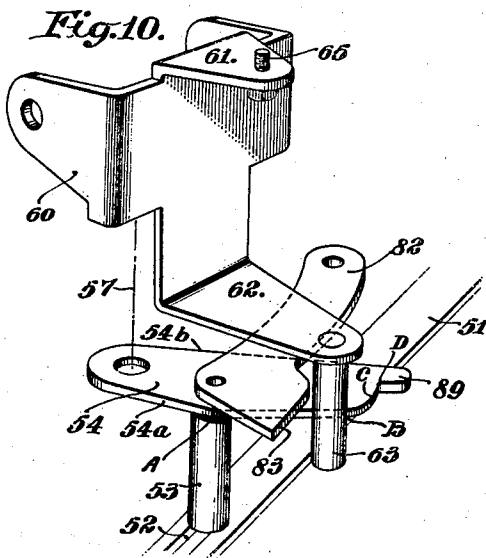
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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,094,255

AUTOMATIC PHONOGRAPH

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Application December 1, 1933, Serial No. 700,492

39 Claims. (Cl. 274—10)

This invention relates to phonographs, and more particularly to an automatic phonograph of the type wherein a plurality of records are stacked upon the turntable for successive reproduction and subsequent removal to a record receptacle.

The primary object of my invention is to provide an improved phonograph of the type specified which may be operated either automatically, to reproduce a plurality of records in succession without interruption and without attention on the part of the user after having once been set into operation, or which may, at will, be operated manually to reproduce a single record at a time.

A more specific object of my invention is to provide an improved phonograph as aforesaid which can very easily be changed from an automatically operable machine to a manually operable machine, and vice versa.

Another object of my invention is to provide an improved phonograph of this type which will play different size records, either automatically or manually.

Still another object of my invention is to provide an improved phonograph of the type described which, when operated automatically, will remove but one record at a time from the stack.

A further object of my invention is to provide an improved phonograph of this type which, when operated automatically and once set into operation, will continue to operate indefinitely, or until the machine is shut off, and with a minimum time interval between the end of playing of one record and the commencement of playing of the next record.

An additional object of my invention is to provide an improved phonograph of the type set forth which, when operated as an automatic machine, will give audible notice that the playing of the entire repertoire of records in the stack has been completed.

Still a further object of my invention is to provide an improved phonograph of the type referred to which will automatically repeat any desired record indefinitely.

It is another object of my invention to provide, in a phonograph of the type specified, means for insuring a suitable gripping action between the several records of the stack so that there will be no slipping between the respective records and so that obnoxious variations in pitch of the reproduced sound resulting from such slipping will be eliminated.

Another object, yet, of my invention is to provide, in a phonograph of the type specified, im-

proved and simplified means for raising the tone arm from the played record at the end of reproduction thereof, returning it to a position above starting position on the next record, and then gently, but positively, lowering the tone arm onto that record in readiness for the needle to enter the starting groove thereof.

Still another object of my invention is to provide an improved phonograph of the type mentioned wherein all the automatic operations are controlled and set into operation by a single, simplified control device.

A further object of my invention is to provide an improved phonograph of this type in which the playing level of the turntable will remain constant regardless of the number of records stacked thereon.

It is still a further object of my invention to provide an improved phonograph of this type wherein the turntable spindle will readily accommodate itself to receive any number of records thereon within a predetermined limit, but which will yield sufficiently to permit each successive topmost record to be freely displaced therefrom upon completion of reproduction thereof.

Another object of my invention is to provide an improved phonograph of the type set forth which, in automatic condition, will operate satisfactorily with records having any type of terminal groove now employed as a standard groove in commercial records.

Still another object of my invention is to provide an improved phonograph of the type set forth which is compact and may be housed in a cabinet within a very small space.

It is a further object of my invention to provide an improved phonograph of the type set forth which is extremely accurate and efficient in operation, which comprises a minimum number of parts, and which is relatively inexpensive to manufacture.

One improved form of phonograph according to my present invention comprises a turntable mounted on a motor driven spindle and rotatable thereby in a fixed horizontal plane. The spindle has a retractable center pin which is constantly spring-urged outwardly toward its elevated position and is adapted to threadedly receive thereon a plurality of phonograph records within a predetermined number. A record ejector arm is mounted on the motor board in a position such that the free end thereof is adapted to rest upon the uppermost record of the stack with sufficient pressure to prevent the records from slipping relative to one another, a depending finger on said

free end engaging the center opening of the topmost record and depressing the aforementioned center pin the thickness thereof.

To one side of the turntable, there is mounted, also on the motor board, an index mechanism which may be set for either automatic operation of the machine to automatically play a repertoire of records of a selected one of several sizes, or for manual operation thereof. In the automatic condition, a single control element operated from the spindle effects automatic removal of the tone arm from a played record and almost immediately causes the ejector arm to remove only the topmost record of the stack. Thereafter, the ejector arm is replaced on the next succeeding record, the tone arm is deposited thereon for playing, and the cycle is repeated, being initiated again, at the end of playing of the new record, by means of a tone arm controlled pawl mechanism associated with said control element.

When the index mechanism is moved to manual position, the aforesaid pawl mechanism is rendered inoperative, and a second pawl mechanism, also controlled by the tone arm, is substituted in its place. This second pawl mechanism, which is entirely independent of the first pawl mechanism and which is itself rendered inoperative when the first pawl mechanism is rendered operative, is adapted to control the motor and causes the motor to stop automatically upon completion of playing of each individual record.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claims. However, the invention itself, both as to its organization and method of operation, together with additional objects as well as the advantages thereof, will best be understood from the following description of a specific embodiment, when read in connection with the accompanying drawings, in which

Figure 1 is a plan view of my improved phonograph showing the motor board and all parts mounted thereon in full lines, all parts thereabove in dot-and-dash lines and all parts therebelow in dotted lines, with the phonograph set for automatic reproduction and at the beginning of playing of a record,

Figure 2 is a fragmentary plan view showing a position occupied by the parts during the playing of a record,

Figure 3 is a fragmentary plan view similar to Figure 2 but showing, in full lines, the parts in the position occupied by them immediately prior to the commencement of the automatic record changing cycle, and in dotted lines, the position of the parts immediately after the cycle has commenced,

Figure 4 is a view similar to Figure 1 but showing the position of the parts half way through the automatic record changing cycle,

Figure 5 is a rear elevation of my improved phonograph showing the position of the parts at approximately the time when the record ejector arm is about to be disengaged from a record being removed thereby from the stack,

Figure 6 is a detailed perspective view of the mechanism for carrying out the automatic cycle, Figure 7 is a sectional view taken on the line VII—VII of Figure 1 and looking in the direction of the arrows,

Figure 8 is a fragmentary detail view showing the relative positions of the turntable spindle, records, and record engaging disc on the ejector arm during removal of a played record from the stack,

Figure 9 is a central section through the turntable spindle on the line IX—IX of Figure 7 and looking in the direction of the arrows but showing the relation of the record engaging disc and spindle when there is only one record left on the turntable, and

Figure 10 is a detailed perspective view of the ejector arm supporting and operating mechanism.

Referring to the drawings more in detail, and particularly to Figs. 7 and 9, I have shown a motor board 1 supporting a motor 2 which drives a hollow spindle 3 extending through an opening 4 in the motor board and supporting a turntable 5 on which a plurality of records R may be stacked, the turntable being preferably provided with a felt surface 6 to prevent damage to the lowermost record of the stack. The turntable 5 is driven through its hub 7 from a cross-pin 8 on a sleeve 9, in turn driven from the spindle 3 by means of a cross-pin 10.

Formed on the sleeve 9 is a gear 11 which continuously drives a gear 12, the latter gear acting as a control device for effecting operation of the parts to carry out a cycle of automatic operations. The gear 12 is staked to a sleeve 13 which is mounted for rotation on a stub shaft 14 fixed to the motor board 1, and it supports a cam member 15 on the underside thereof. The cam member 15 is also mounted on the sleeve 13 and is in the form of a cylindrical cup-shaped member having a flat face 16 slightly spaced from the bottom face of the gear 12 by a washer 17 and a downwardly extending peripheral flange 18 broken away at 19 for a purpose hereinafter described. A rivet or the like 20 serves to lock the cam member 15 to the gear 12 so that, as both rotate in unison, the flange 18 will function as a cam relative to the axis of rotation of the control gear 12.

Pivoted at 21 to the underside of the motor board 1 through a sleeve 22 to which it is staked is an actuating member 23 comprising a lever having a lateral extension 24 and terminating in a pair of branches 25 and 26 (Fig. 6). A roller 27 is mounted on the extension 24 for cooperation, as a cam follower, with the inner surface of the flange 18 whereby the cam member 15 is adapted to impart rotation to the actuating lever 23 in a counter-clockwise direction about its pivot 21. Return of the lever 23 to its normal position is effected by a coil spring 28 having one end thereof connected to a pin 29 fixed to the underside of the motor board and the other end thereof connected to a pin 30 upstanding from the branch 26 through an arcuate slot 31 in the motor board, the spring 28 insuring contact between the follower 27 and the flange 18 during return movement of the lever 23 and its associated parts.

Slightly to one side of the main portion of the actuating lever 23, there is pivoted, at 32, a substantially C-shaped cable lever 33 having a downwardly offset portion 34 apertured for the reception of an adjustable eye-bolt to which one end of a coil spring 36 is secured. A cable 37, having one end thereof secured to the other end of the coil spring 36, passes around a guide roller 38 mounted on a bracket 39 and through an opening 40 in the motor board 1, being secured at its other end to a tone arm or the like support 41 for a sound reproducing instrumentality 42 carrying a stylus 43.

The cable lever 33 is provided with two substantially parallel inner side portions 44 and 45, the latter terminating in an angularly disposed cam face 46. Upstanding from the actuating lever 23 is a pin 47 which, during reproduction of

a record, occupies a position substantially mid-way between the side portions 44 and 45 (Figs. 1, 2, and 3). As soon, however, as the lever 23 begins its initial counter-clockwise rotation under the influence of means hereinafter described, the pin 47 engages the side portion 45 and rotates the cable lever 33 also in a counter-clockwise direction (Fig. 3). This first causes the lever 33 to take up the tension on the spring 36 and then to exert a pull on the tone arm 41 first to raise it from the played record about its horizontal pivot 48 and then, almost immediately, to swing the tone arm outwardly to starting position over the next record to be played. As the pin 47 passes from the side portion 45 over onto the cam portion 46, it retains the cable lever 33 in its extreme counter-clockwise position (Fig. 4) thus holding the tone arm elevated above the record. When, however, the pin 47 is returned to its normal position, the tone arm is permitted to drop down onto the record and exert a pull on the cable 37 which returns the cable lever 33 to its normal position. The spring 36, of course, prevents a sudden drop of the tone arm onto the record, while movement of the tone arm toward the starting groove of the record once it has engaged the unrecorded peripheral portion thereof, at which time the cable becomes quite slack, is insured by reason of the fact that the tone arm mounting 49 is inclined a few degrees from the vertical toward the turntable, as is also the pin 50 about which the tone arm pivots in its movement over the record. The slack in the cable 37 then permits unrestrained movement of the tone arm over the record during reproduction.

Pivoted to the actuating lever 23 is a link 51 having a slot 52 therein for the reception of a pin 53 which extends downwardly from an actuating cam plate 54. The cam plate 54 is provided with a hub 55 by means of which it is pivoted on a bushing 56 extending through and staked to the motor board 1, the bushing 56 receiving a pivot pin 57 extending downwardly from a yoke 58 on which a pin 59 is supported horizontally (Fig. 5). A second yoke 60 is mounted on the pin 59 for swinging movement in a vertical plane and is provided with a pair of vertically-spaced, lateral extensions 61 and 62. The lower extension 62 is provided with a pin 63 which extends down through an arcuate opening 64 in the motor board 1 into the path of movement of the cam plate 54, while the upper extension 61 is provided with an adjustable screw 65 adapted to cooperate with an ejector arm 66 for a purpose hereinafter described. The ejector arm 66 is also mounted on the pin 59 and, when engaged by the screw 65 during upward travel of the yoke 60, is forced upwardly to partake of vertical movement in response thereto.

The ejector arm 66 consists of a bottom plate 67 supporting a cover 68, the free end of the plate 67 being apertured to receive a hollow, internally threaded bolt 69 secured to the plate 67 by means of a nut 70. A center pin depressing finger 71 having an enlarged head 72 is threaded into the bolt 69 and locked therein by a nut 73 in desired relation to the rounded head of the bolt 69. The head 72 is spaced from the head of the bolt 69 a distance sufficient to accommodate a friction disc 74 provided with a facing 75 of felt or other suitable material and a spacing plate 76 which serves also as a ball race for the ball bearings 77.

The spindle 3 is supported on a thrust bearing 78 in the bottom of the motor casing 2 and has

a retractable center pin 79 which is constantly urged upwardly by a spring 80. The limit of vertical movement of the center pin 79, both upwardly and downwardly, is determined by a slot 81 therein through which the pin 10 passes. When stacked on the turntable for playing, the records R are threaded on the center pin 79 and the free end of the ejector arm is permitted to rest upon the topmost record of the stack with the arm inclined downwardly toward the records. Thus, most of the weight of the ejector arm is concentrated upon the records through the friction disc 74 which directly engages the topmost record of the stack and through which sufficient pressure is applied to the stack to prevent slipping of the records relative to each other during reproduction. The head 72 of the finger 71 is so adjusted that, when the friction disc 74 is in engagement with the topmost record of the stack, the head 72 will depress the center pin the thickness of only one record (Fig. 7). It will be noted that the diameter of the head 72 is the same as that of the center pin 79 and also the same as the diameter of the center openings of the records. This, of course, is to keep the topmost record properly centered since it rotates, during reproduction, about the head 72, although deriving its rotary motion from the records below it by reason of the pressure applied through the disc 74.

At the completion of playing of a record, the actuating lever 23 is caused to rotate in a counter-clockwise direction by means presently to be described, which causes the link 51 to move to the left, as viewed in Fig. 1. During the time that the pin 47 rides over the side portion 45 and the cam portion 46 of the cable lever 33 to actuate the cable 37 for removing the tone arm from the played record, the link 51 has no effect on the pin 53 because the play in the slot 52 is first taken up. The slot 52 is of such a length, however, that immediately upon the return of tone arm to the desired position free of the played record, the right hand end of the slot as viewed in Figs. 1-4 will have engaged the pin 53 to impart clockwise rotation to the cam plate 54 to engage the pin 63. Further clockwise movement of the cam plate 54 causes the yokes 58 and 60 as well as the ejector arm 66 to rotate in a clockwise direction, and, since the center pin depressing finger 71 keeps the center pin 79 depressed just below the topmost record, that record is free to move to the left, as viewed in Fig. 1, in response to the ejector arm, although the remaining records of the stack are retained in place by the center pin 79. As soon as the topmost record has cleared the center pin 79, the center pin will move upwardly under the influence of the spring 80.

In order that the pressure of the disc 74 on the top record may be reduced so that the friction between the two topmost records may be lessened while the played record is being removed, the front edge 54a of the actuating plate 54 is slightly inclined relatively to the rear edge 54b thereof from the point A to the point B. Thus, when first engaging the pin 63, the cam plate 54 not only moves the pin 63 counter-clockwise, but also exerts a force on the pin 63 to slightly swing the yoke 60 and the ejector arm 66 upwardly about the pin 59, whereby pressure of the disc 74 on the topmost record is gradually reduced.

A second cam plate 82 having a cam edge 83 overlapping a portion of the slot 54 is so fixed to the motor board that the cam edge 83 lies in the path of movement of the pin 63. At about the

time that the ejector arm 66 has moved the played record to a position where its center is just past the peripheral edge of the next lowest record (Figs. 4 and 5), the pin 63 engages the cam edge 83 and, as it is forced thereover by the cam plate 54, the pin 63 is raised rather rapidly forcing the yoke 60 and the ejector arm 66 upwardly also. The actuating plate 54 still continues to move the ejector arm outwardly a little, and the combined effect of the cam plates 54 and 82 on the ejector arm 66 is to cause it to partake of a sort of "whipping action" whereby it "whips" the played record off into a played record receptacle (not shown). By this time, an extension 84 on the yoke 58 has reached a fixed stop 85 on the motor board, thus limiting further movement of the yoke 58 in a clockwise direction. However, as the cam plate 54 continues to advance, the cam portion B—C thereof (see Fig. 10) rides under the pin 63 raising it away from the cam edge 83, whereupon a spring 86, fixed at one end to a pin 87 on the motor board 1 and at the other end to a pin 88 extending downwardly from the yoke 58, pulls the yoke 58 back slightly in a counter-clockwise direction and forces the pin 63 into the dwell D of the cam plate 54 and against a finger 89 extending from the plate 54.

At this time, the cam member 15 has completed half a revolution and the actuating lever 23 has begun its clockwise return movement under the influence of the spring 28, pulling the link 51 back with it. As the link 51 returns, the spring 86 pivots the yoke 58 back in a counter-clockwise direction toward its normal position and the counter-clockwise movement is transmitted thereby to the cam plate 54 through the yoke 60 and its depending finger 63. The ejector arm 66 is, of course, at the same time also returned in a counter-clockwise direction until the extension 84 abuts against an adjustable stop 90, adjustable to permit return of the ejector arm 66 to a position where its center pin depressing finger 71 is in axial alignment with the center pin 79.

During the movement just described, the extreme right hand end of the slot 52 as viewed in Figs. 1 and 4 is still in engagement with the pin 53. Further movement of the link 51 has no effect upon the ejector arm 66 but permits the slot to move relative to the pin 53 until the extreme left hand end thereof engages the pin 53. Thereafter, continued movement of the link 51 moves the cam plate 54 in further counter-clockwise direction, and, as the pin 63 can no longer follow this movement, the cam portion B—C is removed from under the pin 63, whereupon the yoke 60 is free to drop with the ejector arm 66 following the yoke 60 until the next record is engaged by the friction disc 74. The cam plate 54 is then returned to its normal position against a buffer 91 and the tone arm is allowed to drop onto the next succeeding record. The tone arm controlling mechanism and record removing mechanism are so related that that portion of the automatic cycle which takes place between the completion of playing of one record and the commencement of playing of the next record requires only approximately three and one-half seconds. As compared to approximately three-quarters of a minute required by some of the most efficient automatic phonographs of the prior art, it can be readily appreciated that a substantial saving in time may be realized by my present invention.

The automatic cycle previously described will continue indefinitely so long as current is sup-

plied to the motor 2. However, when the last record in the stack has been reached, the center pin 79 can no longer be depressed by the finger 71 because the upper end of the slot 81 is in engagement with the pin 10, and the head 72 merely rests on top of the center pin 79 with the friction disc 74 out of engagement with the record, as clearly shown in Fig. 9. Consequently, when the foregoing described automatic operations take place, the last record will not be removed and the tone arm will be returned to the same record to replay it. In this manner, the last record will be repeated indefinitely and its constant repetition will give audible notice to the listener that the last record of the stack has been reached. If desired, the last record may be a specially recorded one on which some suitable warning may be recorded, such as "This is the last record—this is the last record—this is the last record—" whereby the audible notice that the entire repertoire has been played may be even more apparent to the user.

As the records are removed from the stack, it will be noted that the angle of inclination of the ejector arm 66 with respect to each next succeeding record increases. Since it is essential that the friction disc engage each record (except the last one, of course) flatly, provision must be made whereby the plane of the disc 74 should change correspondingly with respect to the plane of the plate 67. It is for this reason that the head of the bolt 69 is rounded and the center openings in the ball race 76 and the disc 74 are made larger than the diameter of the reduced portion of the finger 71. Thus, the disc 74 can partake of universal movement on the pin 71 and can always accommodate itself to the new record. At the same time, the ball bearings 77 permit the disc 74 to rotate freely with the record with which it is engaged so that no unnecessary load will be applied to the motor 2.

For the purpose of initiating a cycle of automatic operations as previously described, a trip lever 92 is pivotally mounted on a pin 93 on the motor board 1, the lever 92 having three arms 92a, 92b, and 92c and the arm 92a being forked for the reception of a pin 94 extending downwardly from the tone arm 41. Also pivoted on the pin 93 through a hub 95 and supported by the trip lever 92 is an arm or member 96 which is frictionally coupled to the lever 92 by means of a friction clutch spring 97 fixed to the lever 92 and engaging the hub 95 at diametrically opposite points, as clearly shown in Figs. 1 and 4. The frictional force applied to the hub 95 by the clutch spring may be adjusted by means of a nut and bolt assembly 98 so that the member 96 will retain any angular relation with respect to the lever 92 in which it is temporarily set.

The free end of the member 96 is downwardly offset to pass through an arcuate slot 99 in the motor board 1 and then forwardly a distance sufficient to extend into the path of movement of a pin 100 extending downwardly from a cycle initiating pawl 101 pivoted to the underside of the motor board on a pin 102 and restrained against free movement by a leaf spring 103. The pawl 101 is also provided with a second pin 104 extending down into the path of movement of the branch 25 of the actuating lever 23, a shoulder 105 adapted to abut against a fixed pin 106 on the motor board 1 to limit counter-clockwise rotation of the pawl 101, and a forwardly extending arm 107 terminating in a pair of angularly dis-

posed faces 108 and 109 that meet to form a knife edge 110 (see Fig. 6).

Cooperating with the pawl 101 is a tripping member 111 pivoted at 112 on the upper face of the gear 12 eccentrically thereto and constantly urged in a clockwise direction by a spring 113 connecting a pin 114 on the tripping member 111 and a second pin 115 on the gear 12. The tripping member 111 is provided with an upwardly extending trip 116 which terminates in a second knife edge 117 adapted to cooperate with either the face 108 or the face 109, depending upon whether the knife edge 117 slips by the knife edge 110 on the right or the left thereof, as viewed in Figs. 2 and 3.

When the tone arm is deposited on a record for playing, the member 96 has a predetermined angular relation to the lever 92 such that movement of the tone arm across the record will cause the free end of the member 96 to engage the pin 100 on the pawl 101. As the tone arm moves across the record, the pin 94 will impart counter-clockwise rotation to the lever 92 which, in turn, imparts counter-clockwise rotation to the member 96 by reason of the frictional coupling therebetween. In its turn, the member 96 will impart clockwise rotation to the cycle initiating pawl 101 tending to bring the knife edge 110 into line with the knife edge 117 as the tripping member 111 rotates with the continuously rotating gear 12. However, during the time that the stylus 43 is in engagement with the sound groove of a record, its forward advance across the record for each revolution thereof is so slight that the tone arm 41 causes the member 96 to advance the pawl 101 a distance insufficient to dispose its knife edge 110 in the path of the knife edge 117. The knife edge 117 will, therefore, pass to the left of the knife edge 110 as viewed in Figs. 2 and 3 and the outer face 118 of the trip 116 will, by engagement with the face 109, cam the pawl 101 back slightly in a counter-clockwise direction, this being permitted by the member 96 since it is only frictionally coupled to the lever 92. Thus, the predetermined angle between the member 96 and the lever 92 is gradually reduced.

The foregoing action takes place continuously until the stylus enters the lead-in groove 119 (Figs. 2 and 3) connecting the sound groove with the terminal groove 119a in the record. Since the lead-in grooves of practically all standard records have a much coarser pitch than the sound grooves, it will be apparent that the lead-in groove 119 of any standard record will advance the tone arm a greater distance in one revolution of the record than the sound groove. The pawl 101 is, therefore, also advanced a greater distance than normally and, in fact, is advanced to a point where the knife edge 117, on the next revolution of the gear 12, passes to the right of the knife edge 110 as viewed in Figs. 2 and 3. When this occurs, the angular face 120 of the trip 116 will engage the face 108 and impart a further quick and somewhat sudden clockwise rotation to the pawl 101 whereupon its pin 100 will engage the branch 25 and turn the actuating lever 23 in an initial counter-clockwise direction to initiate a cycle of automatic operations.

As a result of the initial clockwise movement of the lever 23 in response to the pawl 101, the follower 27 is caused to enter the broken-away portion 19 of the flange 18 whereby the follower 27 is enabled to engage the inner surface of the flange 18. The parts are, of course, so timed and the broken-away portion 19 is of such a length

that the broken-away portion will be opposite the follower 27 at the time that the pawl 101 imparts initial counter-clockwise movement to the lever 23 to initiate the cycle. Once the cam flange 18 and the follower 27 are in engagement, the automatic cycle will proceed as hereinbefore described to remove the played record and to replace the tone arm and the ejector arm on the next record. Meanwhile, as the lever 23 advances in a counter-clockwise direction, the lateral extension 24 engages the pin 104 to return the pawl 101 to its normal, or starting, position as determined by the shoulder 105 and the pin 106, and the lever 92, returning to its normal position under the influence of the tone arm, carries the member 96 back with it in a clockwise direction. In order, however, that the member 96 will not follow the lever 92 all the way back, so that upon playing of the next record it will not fall short of engaging the pin 100 and actuating the pawl 101, the member 96 is caused to abut against the pin 30 during its return movement, and thus the predetermined angular relation between the member 96 and the lever 92 is restored.

The apparatus and operation thus far described deal only with the automatic feature of my invention. For controlling the phonograph to operate either as an automatically-operable machine or a manually-operable machine, an index member 121, pivotally mounted on a pin 122 extending through and staked to the motor board, is adapted to cooperate with a dial plate 123 on which are marked the legends "10", "12" and "Manual". With each of the legends is associated an aperture 124 located over an arcuate slot 125 in the motor board for receiving a locking pin 126 on the index member 121 by means of which the index plate may be releasably locked in any desired position. The "10" position is the one in which the index member 121 is set for automatically playing 10 inch records; the "12" position for automatically playing 12 inch records; and the "Manual" position for playing single records manually. An adjustable stop 127 on the index member insures proper location of the tone arm 41 when returned to starting position by reason of engagement of the arm 92a therewith.

Associated with the index member 121 is a switch plate 128 which is pivoted on the motor board at 128c and on which are mounted a motor controlling switch 129 and switch operating mechanism for automatically opening the switch 129 at the end of playing of a single record manually. This switch operating mechanism is disclosed and claimed in my copending application, Serial No. 580,650 and comprises, briefly, a detent member 130 including a shoulder 131 for operating an L-shaped lever 132 which serves to open the spring switch-contacts 133 of the switch 129, and a latch member 134, the toe 135 of which is adapted to latch the detent member 130, by engaging the hooked end 136 thereof, to hold the shoulder 131 against the lever 132 whereby the switch contacts are held open.

On the arm 92a of the lever 92 is mounted a pawl 137 constantly urged in a counter-clockwise direction by a spring 138 and terminating in a knife edge 139 which is adapted to cooperate with a ratchet plate 140 on the detent member 130. When the index member 121 is set in the "Manual" position (the dotted position in Fig. 1), a shoulder 141 thereon engages a pin 142 on the switch plate 128 and forces it, together with the ratchet plate 140, into the dotted line position of

Fig. 1. In this position, the ratchet plate 140 is disposed in the path of movement of the knife edge 139 which, because of the spring 138, can yieldably ride over the teeth of the ratchet plate 140 as the tone arm moves across the sound groove of the record. When, however, the stylus enters the eccentric terminal groove 119a of a record of the type disclosed in the Squibb Patent No. 1,303,125, the tone arm 41 receives a backward, counter-clockwise movement which is imparted to the pawl 137 also, the latter then exerting a camming action on the ratchet plate 140 to force the detent 130 in a counter-clockwise direction. Thereupon, under the influence of a tension spring 143, a pin 144 on the latch plate 134 engages a shoulder 145 on the detent 130 and forces it in a further counter-clockwise direction to force the shoulder 131 to engage the longer of the two switch blades 133 to open the contacts and break the motor circuit whereby the motor is stopped.

Upon returning the tone arm manually to starting position, a shoulder 146 on the lever arm 92b engages a pin 147 on the latch member 134 and forces the latch member around its pivot 148 in a counter-clockwise direction. A tension spring 149 then pulls the detent 130 back until its ratchet plate 140 is in substantially the dotted line position of Fig. 1, whereupon the toe 135 can again engage the hook 136 to latch the detent 130 temporarily in this position and to permit the lever 132 to yield under the spring action of the longer contact 133 whereupon the motor circuit is again closed, the tone arm meanwhile having returned the pawl 137 to the position shown in Fig. 1.

In order to render the cycle initiating pawl 101 inoperative to initiate a cycle of automatic operations when the index member 121 is set in the "manual" position, an index finger 150 is mounted on the pin 122. In the "manual" position of the index member 121, the finger 150 assumes the dash line position shown in Fig. 1 and in this position it locks the pawl 101 against movement by the member 96. When, however, the index member 121 is set in the "10" position, the finger 150 assumes the dotted line position shown in Fig. 1 (or a position closely adjacent thereto corresponding to the "12" position of the index member 121). The pawl 101 is then free to move toward cycle initiating position in response to the member 96 while a tension spring 151 pulls the switch plate 128 counter-clockwise about its pivot 128a until the ratchet plate 140 is in the solid line position of Fig. 1 out of the path of movement of the knife edge 139. Thus, when the index member 121 is set in the "manual" position, the index finger 150 renders the pawl 101 inoperative to initiate a cycle of automatic operations, while the motor stopping mechanism is placed in position to automatically stop the motor when the playing of a record is completed. On the other hand, when the index member 121 is set in any one of the automatic positions, the motor stopping mechanism is rendered inoperative to stop the motor at the completion of playing of a record, while the pawl 101 becomes operative to initiate a cycle of automatic operations at the proper time. It will also be noted that when the index member 121 is in any one of the automatic positions, the ratchet plate 140 abuts against a pin 152 on the motor board whereby, as the switch plate is moved counter-clockwise by the spring 151, the ratchet plate is given a slight clockwise movement about the pivot of the latch member 130 sufficient to substantially free the shoulder 131 from the lever 132 so that the contacts 133

are closed and energy is continuously supplied to the motor.

When using my present invention as a manually operable phonograph, it is, obviously, desirable to move the ejector arm to a position where it will not interfere with the placing of records upon and the removal thereof from the turntable. The user may, therefore, swing the ejector arm about its pivotal support 59 until the ejector arm extends substantially vertically upwardly from its support, and, in this position, it will not interfere with the record depositing and removing operations. However, should the ejector arm be accidentally swung about the pin 57 so that, when returned to its normal position, the pin 72 will be to one side of the center pin 79, and the ejector arm accidentally be permitted to drop to its lowered position the head 72 might easily break the record then on the turntable or, if there be no record on the turntable, it might injure the felt surface 6. It is to prevent this possibility that the screw 65 is provided in the upper extension 61 of the yoke 60. The screw 65 may be so adjusted that, even if the ejector arm 66 were accidentally dropped on the record or the turntable, as the case may be, the plate 67 will engage the screw 65 before the head 72 reaches the parts which it might damage.

From the foregoing, it will be apparent to those skilled in the art that I have provided an improved phonograph which is very efficient in operation, which is comprised of a minimum number of parts, and which is so compact that it may easily be housed within a small cabinet. In fact, my improved phonograph occupies so little space that it requires hardly any more room than most well-known manually operated portable phonographs. Moreover, because of the simplicity of the mechanism and the relatively few parts employed in my present invention, there is very little to get out of order and the necessity for servicing phonographs according to this invention is, therefore, practically dispensed with.

It will also be noted that, since the turntable rotates in a fixed plane and each record is removed from the stack along its own level, the load upon the motor is substantially constant. This greatly contributes to the efficiency of my present invention. Furthermore, since the cycle initiating pawl 101 is rendered effective to initiate a cycle of automatic operations by a quick clockwise movement into the path of the tripping member 111, advantage may be taken thereof to reject any record not desired to be played. Thus, if a record in the stack is found to be unsatisfactory, it is merely necessary to raise the tone arm therefrom and give it an appreciable movement toward the center of the record. This will at once cause the pawl 101 to be interposed in the path of the tripping member and a cycle of operations will be initiated to reject the undesired record by removing it from the stack. The tone arm will then, of course, be automatically placed on the next record for playing.

While I have shown and described a certain specific embodiment of my invention, it will be apparent to those skilled in the art that many modifications thereof and changes therein are possible without departing from the spirit thereof. For example, if desired, the turntable 5, instead of being provided with a felt surface 6, may have a record composition molded thereto in which the audible warning that the repertoire has been completed may be recorded. Other changes will also suggest themselves to those skilled in the art. My invention, therefore, is not to be limited

except insofar as is necessitated by the prior art and by the spirit of the appended claims.

I claim as my invention:

1. In a phonograph, the combination of a turntable rotatable in a fixed horizontal plane and adapted to support a plurality of records in stacked relation, means for reproducing sound from the topmost record of the stack, means engageable with the center opening of a record for removing each topmost record from the stack in its turn, said means including a member for centering each topmost record on the turntable during reproduction, and means controlled by said sound reproducing means for actuating said record removing means when the reproduction of each record is completed.

2. In a phonograph, the combination of a turntable rotatable in a fixed horizontal plane and provided with a retractable center pin, said turntable being adapted to support a stack of records threaded on said center pin, means for depressing said center pin clear of each topmost record of the stack during reproduction and in succession, and means including said last named means for removing the respective topmost records from the turntable.

3. In a phonograph, the combination of a turntable rotatable in a fixed horizontal plane and provided with a retractable center pin, said turntable being adapted to support a stack of records threaded on said center pin, means engageable in the center opening of the topmost record of the stack for depressing said center pin clear of said record during reproduction, and means including said last named means for removing said topmost record from the turntable.

4. In a phonograph, the combination of a turntable rotatable in a fixed horizontal plane and provided with a retractable center pin, said turntable being adapted to support a stack of records threaded on said center pin, means engageable in the center opening of the topmost record of the stack for depressing said center pin during reproduction, means associated with said first named means for insuring that the latter will depress said center pin only the thickness of a single record, and means including said first named means for removing the respective topmost records from the turntable.

5. In a phonograph including a tone arm, the combination of a turntable rotatable in a fixed plane and provided with a retractable center pin, said turntable being adapted to support a stack of records threaded on said center pin, means for preventing slipping of the individual records of the stack relative to each other when said turntable is rotating and said tone arm is in cooperative engagement with the topmost record of the stack, said means including a center pin depressing finger engageable in the center opening of the topmost record of the stack and a friction disc in pressing engagement with the surface of said topmost record, and means effective upon completion of playing of a record to actuate said first named means to remove said topmost record from the stack.

6. In a phonograph including a tone arm, the combination of a turntable rotatable in a fixed plane and provided with a retractable center pin, said turntable being adapted to support a stack of records threaded on said center pin, and means for preventing slipping of the individual records of the stack relative to each other when said turntable is rotating and said tone arm is in

cooperative engagement with the topmost record of the stack, said means including a center pin depressing finger engageable in the center opening of the topmost record of the stack and a friction disc in pressing engagement with the surface of said topmost record, said friction disc also serving to limit the distance that said finger depresses said center pin to the thickness of a single record, and said means being swingably mounted whereby it is adapted to remove the respective topmost records from the turntable.

7. In a phonograph including a tone arm, the combination of a turntable rotatable in a fixed plane and provided with a retractable center pin, said turntable being adapted to support a stack of records threaded on said center pin, means for preventing slipping of the individual records of the stack relative to each other when said turntable is rotating and said tone arm is in cooperative engagement with the topmost record of the stack, said means including a center pin depressing finger engageable in the center opening of the topmost record of the stack and a friction disc in pressing engagement with the surface of said topmost record, said friction disc also serving to limit the distance that said finger depresses said center pin to the thickness of a single record, and said means being swingably mounted whereby it is adapted to slide the respective topmost records off the turntable, and means for gradually decreasing the pressure of said friction disc on said topmost record as it is being slid off the turntable.

8. In a phonograph of the type wherein a plurality of records are stacked upon a turntable for successive playing and subsequent removal, a tone arm, a record ejector arm, a continuously rotatable control device, an actuating member associated with said control device, means responsive to said actuating member for controlling said tone arm, means also responsive to said actuating member for controlling said ejector arm, means for effecting cooperative engagement between said actuating member and said control device, and means having connection with said last named means and responsive to movement of said tone arm over a record for moving said last named means into position to effect said engagement when the tone arm reaches a predetermined point on the record.

9. In a phonograph of the type wherein a plurality of records are stacked upon a turntable for successive playing and subsequent removal, a tone arm, a record ejector arm, a continuously rotatable control device including a cam member, an actuating member associated with said control device and including a follower, means responsive to said actuating member for controlling said tone arm, means also responsive to said actuating member for controlling said ejector arm, means for effecting positive engagement between said follower and said cam member, and means having connection with said last named means and responsive to movement of said tone arm over a record for moving said last named means into position to effect said engagement when the tone arm reaches a predetermined point on the record.

10. In an automatic phonograph including a tone arm and a record ejector arm, means for actuating said arms, means for imparting initial movement to said actuating means to commence a cycle of automatic operations, means having connection with said second named means and responsive to movement of said tone arm over a

record for moving said second named means into position to impart said initial movement when the tone arm has reached a predetermined point on the record, and means for thereafter continuing the movement of said actuating means to complete the cycle of automatic operations.

11. In an automatic phonograph including a tone arm and a record ejector arm, means for actuating said arms, means for imparting initial movement to said actuating means to commence a cycle of automatic operations, means having connection with said second named means and responsive to movement of said tone arm over a record for moving said second named means into position to impart said initial movement when the tone arm has reached a predetermined position on the record, and means independent of said initial movement imparting means for thereafter continuing the movement of said actuating means to complete the cycle of automatic operations.

12. In an automatic phonograph including a tone arm and a record ejector arm, means for actuating said arms, means for imparting initial movement to said actuating means to commence a cycle of automatic operations, means having connection with said second named means and responsive to movement of said tone arm over a record for moving said second named means into position to impart said initial movement when the tone arm has reached a predetermined position on the record, and means for thereafter continuing the movement of said actuating means for completing the cycle of automatic operations and for controlling the return of said actuating means to its normal position, said actuating means including an element for resetting said initial movement imparting means as it is returned to normal position.

13. In an automatic phonograph including a tone arm and a record ejector arm, means for actuating said arms, means constantly urging said actuating means toward its normal position, means for imparting initial movement to said actuating means to commence a cycle of automatic operations, means having connection with said last named means and responsive to movement of said tone arm over a record for moving said last named means into position to impart said initial movement when the tone arm has reached a predetermined position on the record, and means for thereafter continuing the movement of said actuating means for completing the cycle of automatic operations and for controlling the return of said actuating means to its normal position under the influence of said second named means, said actuating means including an element for resetting said initial movement imparting means as it is returned to normal position.

14. In an automatic phonograph including a tone arm, a continuously rotatable control device, an actuating member associated with said control device, means for bringing said actuating member into cooperative engagement with said control device to effect a predetermined cycle of automatic operations, means having connection with said first named means and responsive to movement of said tone arm over a record for moving said first named means into position to effect said engagement when the tone arm reaches a predetermined point on the record, and means on said actuating member for resetting said

first named means in normal position during the cycle.

15. In an automatic phonograph including a tone arm, a continuously rotatable control device, said device including a tripping member, an actuating member associated with said control device, a pawl associated with said tone arm and controlled by the movement thereof across a record during playing, said pawl being movable by said tone arm into the path of movement of said tripping member to be tripped thereby, and means on said pawl for bringing said actuating member into engagement with said control device upon being tripped by said tripping member to effect a predetermined cycle of automatic operations.

16. In an automatic phonograph including a tone arm, a continuously rotatable control device, said device including a tripping member, an actuating member associated with said control device, a pawl associated with said tone arm and controlled by the movement thereof across a record during playing, said pawl being movable by said tone arm into the path of movement of said tripping member to be tripped thereby, means on said pawl for bringing said actuating member into engagement with said control device upon being tripped by said tripping member to effect a predetermined cycle of automatic operations, and means on said actuating member for resetting said pawl in normal position during the cycle.

17. In an automatic phonograph including a tone arm, a continuously rotatable control device, said control device including a tripping member and a cam member, an actuating member associated with said cam member, a cam follower on said actuating member, a pawl associated with said tone arm and controlled by the movement thereof across a record during playing, said pawl being movable by said tone arm into the path of movement of said tripping member to be tripped thereby, means on said pawl for bringing said cam follower into engagement with said cam member upon being tripped by said tripping member to render said actuating member effective to bring about a predetermined cycle of automatic operations, and means on said actuating member for resetting said pawl in normal position during the cycle.

18. In an automatic phonograph including a tone arm, the combination of a control device comprising a rotatable member, a tripping member mounted on the upper face thereof and a cam member on the lower face thereof, a driving element for continuously driving said rotatable member, an actuating member associated with said cam member and including a lateral extension and a branch, a cam follower on said lateral extension, a pivoted pawl associated with said tone arm, said pawl being controlled by movement of the tone arm across a record during sound reproduction and being movable into the path of movement of said tripping member to be tripped thereby, a pin on said pawl adapted to engage said branch when tripped by said tripping member to bring said cam follower into engagement with said cam member whereby to render said actuating member effective to bring about a predetermined cycle of automatic operations, and a second pin on said pawl, said extension effecting a return of said pawl to normal position during the cycle by engagement thereof with said second pin.

19. In an automatic phonograph, a cycle con-

trolling device comprising a rotatable member, a tripping member mounted on the upper surface thereof eccentrically to its axis of rotation, a circular member mounted on the lower surface thereof also eccentrically to its axis of rotation, said circular member having a depending flange thereon adapted to effect a camming action relative to said axis upon a member contacting therewith, and means associated with said tripping member for effecting contact between said flange and said last named member.

20. In an automatic phonograph, a cycle controlling device comprising a rotatable member, a tripping member mounted on the upper surface thereof eccentrically to its axis of rotation, a circular member mounted on the lower surface thereof also eccentrically to its axis of rotation, said circular member having a depending flange thereon adapted to effect a camming action relative to said axis upon a member contacting therewith, means associated with said tripping member for effecting contact between said flange and said last named member, and means for continuously driving said rotatable member.

21. In an automatic phonograph of the type wherein a plurality of records are stacked upon a turntable for successive reproduction, a tone arm, means including a lever and a cable connecting said lever with said tone arm for effecting removal of the tone arm from a record at the end of reproduction thereof, a record ejector arm, means including a link member for effecting operation of said ejector arm to remove the played record, and means connected to said link member and cooperatively associated with said lever for actuating both said tone arm removing means and said ejector arm operating means.

22. The invention set forth in claim 21 characterized in that the means connected to the link member is so associated with the lever that it actuates said lever just prior to actuating said ejector arm operating means whereby the tone arm is removed from the played record just prior to the removal of said record by the ejector arm.

23. In an automatic phonograph of the type wherein a plurality of records are stacked upon the turntable for successive reproduction, a supporting member for a sound translating device, a record ejector arm independent of said supporting member and adapted to engage the topmost record of the stack during playing of said record, said arm being mounted for movement both in horizontal and vertical planes, means effective to cause said arm to move horizontally at the end of reproduction of the record and to carry the record therewith, and means effective to cause said arm to move vertically at a predetermined point in its horizontal movement whereby to free said arm from engagement with said record.

24. In an automatic phonograph of the type wherein a plurality of records are stacked upon the turntable for successive reproduction, a supporting member for a sound translating device, a record ejector arm independent of said supporting member and adapted to engage the topmost record of the stack during playing of said record, said arm being mounted for movement both in horizontal and vertical planes, means effective to cause said arm to move horizontally at the end of reproduction of the record and to carry the record therewith, and means effective to cause said arm to move vertically at a predetermined point in its horizontal movement without effecting further movement of said arm horizon-

tally, whereby said arm is removed from engagement with the record while the record is still moving horizontally.

25. The invention set forth in claim 24 characterized in that the means for causing vertical movement of said arm is so related to the means for causing horizontal movement thereof that vertical movement is imparted to said arm relatively rapidly.

26. In an automatic phonograph, a supporting member for a sound translating device, a record transfer device comprising a record engaging arm independent of said supporting member, means supporting said arm for swinging movement in a vertical plane, a mounting for said means permitting pivotal movement thereof in a horizontal plane, means mounted on said first named means whereby movement may be imparted thereto about its pivot and whereby movement may be imparted to said arm about its support, and actuating means for actuating said last named means.

27. In an automatic phonograph, a record transfer device comprising a yoke mounted for pivotal movement in a horizontal plane, a second yoke mounted on said first yoke for swinging movement in a vertical plane, a record engaging arm also mounted on said first yoke for swinging movement in a vertical plane in response to movement of said second yoke, and an actuating member associated with said second yoke for effecting horizontal movement of both said yokes and said arm about the pivot of said first yoke and for effecting vertical movement of said second yoke and said arm about their mounting on said first yoke.

28. In an automatic phonograph, a record transfer device comprising a yoke mounted for pivotal movement in a horizontal plane, a second yoke mounted on said first yoke for swinging movement in a vertical plane, a record engaging arm also mounted on said first yoke for swinging movement in a vertical plane in response to movement of said second yoke, an actuating member associated with said second yoke for effecting horizontal movement of both said yokes and said arm about the pivot of said first yoke and for effecting vertical movement of said second yoke and said arm about their mounting on said first yoke, and means independent of said actuating member for imparting only vertical movement to said second yoke and said arm.

29. In an automatic phonograph, a record transfer device comprising a yoke mounted for pivotal movement in a horizontal plane, a pin supported on said yoke, a second yoke mounted on said pin for movement in a vertical plane, said second yoke having a pair of vertically-spaced, lateral extensions, a record engaging arm also mounted on said pin and resting upon the upper of said extensions whereby said arm is movable in response to movement of said second yoke, a second pin depending from the lower of said extensions, an actuating member normally located to one side of said second pin and movable into engagement therewith to effect horizontal movement of both said yokes and said arm about the pivot of said first yoke, a cam plate located in the path of movement of said second pin for effecting vertical movement of said second yoke and said arm as said second pin is moved thereover, and means on said actuating member adapted to engage said second pin to effect further movement of said second yoke and arm after the limit of vertical movement thereof

effected by said cam plate has been reached.

30. The invention set forth in claim 29 characterized in that said upper extension is provided with adjustable means for limiting the downward movement of said arm relative to a predetermined plane.

31. In an automatic phonograph, the combination of a record receiving center pin, a record transfer arm having a finger thereon adapted to engage said center pin, a yoke supporting said transfer arm and having a member extending therefrom, said yoke being mounted for pivotal movement in a horizontal plane, and a pair of stops associated with said member for limiting the range of pivotal movement of said yoke, one of said stops being adjustable to permit movement of said yoke and arm to a point where said finger is in axial alignment with said center pin.

32. In an automatic phonograph, the combination of a record transfer device comprising a yoke mounted for pivotal movement in a horizontal plane, said yoke having a member extending therefrom, a stop associated with said member for limiting the range of pivotal movement of said yoke in one direction, a second yoke mounted on said first yoke for swinging movement in a vertical plane, said second yoke having a pair of vertically-spaced, lateral extensions, a record engaging arm also mounted on said first yoke for swinging movement in a vertical plane and resting on the upper of said extensions whereby said arm is movable in response to movement of said second yoke, a pin depending from the lower of said extensions, an actuating member normally located to one side of said pin and movable into engagement therewith to effect horizontal movement of both said yokes and said arm about the pivot of said first yoke and until limited by the engagement of said member with said stop, a cam plate located in the path of movement of said pin for effecting vertical movement of said second yoke and said arm as said pin is moved thereover, and means on said actuating member adapted to engage said pin to effect further vertical movement of said yoke and arm to free said pin from engagement with said cam plate after said member has engaged said stop.

33. In an automatic phonograph of the type adapted to play a plurality of records in succession and embodying mechanism for changing records and shifting the sound reproducing instrumentality from a played record to an unplayed record, means adapted to initiate a cycle of automatic operations for effecting shifting of the sound reproducing instrumentality and for changing records, a member adapted to effect movement of said means into cycle initiating position, means pivotally supporting said member whereby said member is adapted to be moved relative to said supporting means under the influence of a resistive force applied thereto by said first named means, means frictionally coupling said member and said supporting means for controlling the relative movement therebetween, a tone arm, and means interconnecting said tone arm and said supporting means whereby movement of said tone arm over a record during playing effects movement of said member in a direction to engage said first named means and move it toward cycle initiating position.

34. In an automatic phonograph of the type adapted to play a plurality of records in succession and embodying mechanism for changing records and shifting the sound reproducing in-

strumentality from a played record to an unplayed record, means adapted to initiate a cycle of automatic operations for effecting shifting of the sound reproducing instrumentality and for changing records, a member adapted to effect movement of said means into cycle initiating position, means pivotally supporting said member whereby said member is adapted to be moved relative to said supporting means under the influence of a resistive force applied thereto by said first named means, means frictionally coupling said member and said supporting means to normally occupy a predetermined angular relation but permitting yielding movement between said member and said supporting means to change the angular relation therebetween when a resistive force is applied to said member, a tone arm, means interconnecting said tone arm with said supporting means whereby movement of said tone arm over a record during playing effects movement of said member in a direction to engage said first named means and move it toward cycle initiating position, means for periodically applying a resistive force to said cycle initiating means while permitting the tone arm to continuously advance said supporting means whereby to change the angular relation between said member and said supporting means, means for removing said member from engagement with said cycle initiating means at the completion of playing of a record, and means for restoring said predetermined angular relation between said member and said supporting means prior to the commencement of playing of the next succeeding record.

35. The invention set forth in claim 34 characterized in that said frictional coupling means is provided with means for adjusting the frictional force applied thereby.

36. In a phonograph adapted for either automatic operation to play a plurality of records in succession or for manual operation and embodying mechanism for changing records and shifting the sound reproducing instrumentality from a played record to an unplayed record when set for automatic operation, means for initiating a cycle of automatic operations when the phonograph is in automatic condition to effect shifting of the sound reproducing instrumentality and to change records, a supporting plate movable to operative and inoperative positions, means on said plate for stopping the phonograph at the completion of playing of a record when the phonograph is in manual condition, an index member movable to any one of several positions to render the phonograph automatically operable, means associated with said index member and movable therewith to render said cycle initiating means temporarily inoperative when said index member is moved to manual position, and means on said index member for simultaneously moving said supporting plate into operative position when said cycle initiating means is rendered temporarily inoperative.

37. In a phonograph adapted for either automatic operation to play a plurality of records in succession or for manual operation and embodying mechanism for changing records and shifting the sound reproducing instrumentality from a played record to an unplayed record when set for automatic operation, means for initiating a cycle of automatic operations when the phonograph is in automatic condition to effect shifting of the sound reproducing instrumentality and to change records, a supporting plate movable to operative or inoperative positions, means on said plate for

5 stopping the phonograph at the completion of
playing of a record when the phonograph is in
manual condition, an index member movable to
any one of several positions to render the phono-
graph automatically operable and movable to
5 another position to render the phonograph man-
ually operable, means associated with said index
member and movable therewith to render said
cycle initiating means temporarily inoperative
when said index member is moved to manual
10 position and also movable therewith to render
said cycle initiating means operative when said
index member is moved to any one of said several
positions, means on said index member for simul-
15 taneously moving said supporting plate into oper-
ative position when said cycle initiating means is
rendered temporarily inoperative, and means for
simultaneously returning said plate to inopera-
tive position when said index member is moved to
20 any one of said several positions and said cycle
initiating means is rendered operative.

38. In an automatic phonograph of the type

wherein a plurality of records are stacked upon
the turntable for successive reproduction, a rec-
ord ejector arm for removing the respective top-
most records from the stack, said arm being sup-
ported in angular relation to the records in the 5
stack, means on said arm including a flat record
engaging surface for engaging the topmost rec-
ord of the stack, and means associated with said
arm and said record engaging means for enabling
said flat surface to readily accommodate itself 10
flatly upon the surface of any record in the stack.

39. In an automatic phonograph of the type
wherein a plurality of records are stacked upon
the turntable for successive reproduction, a rec-
ord ejector arm for removing the respective top- 15
most records from the stack, said arm being sup-
ported in angular relation to the records in the
stack, and means on said arm for engaging the
topmost record of the stack, said means being
mounted for universal movement on said arm. 20

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