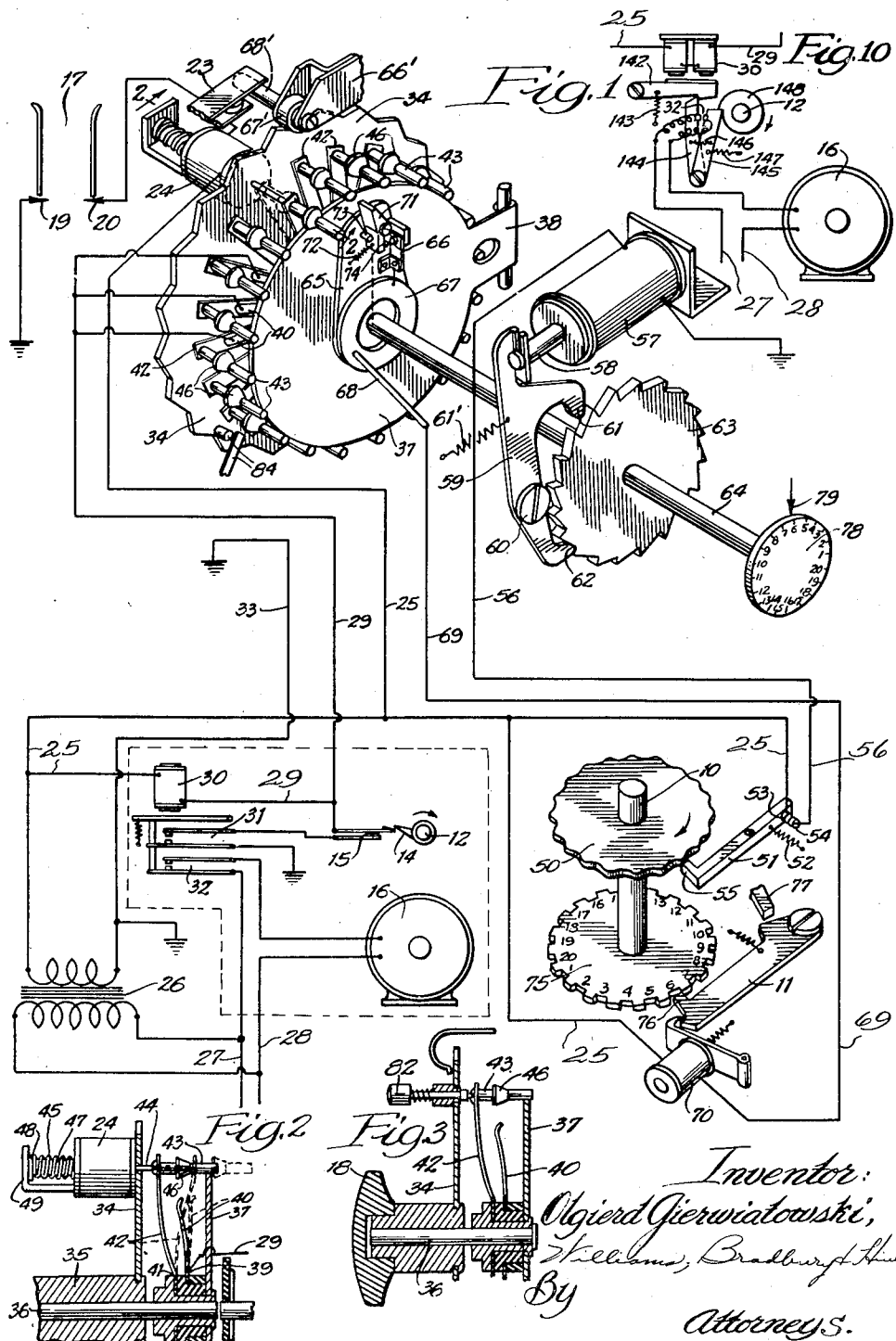


2,572,609

4 Sheets-Sheet 1



Oct. 23, 1951

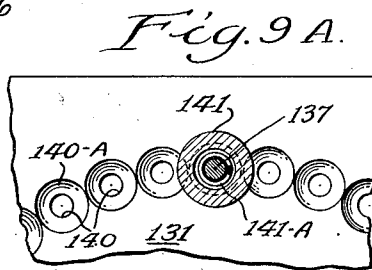
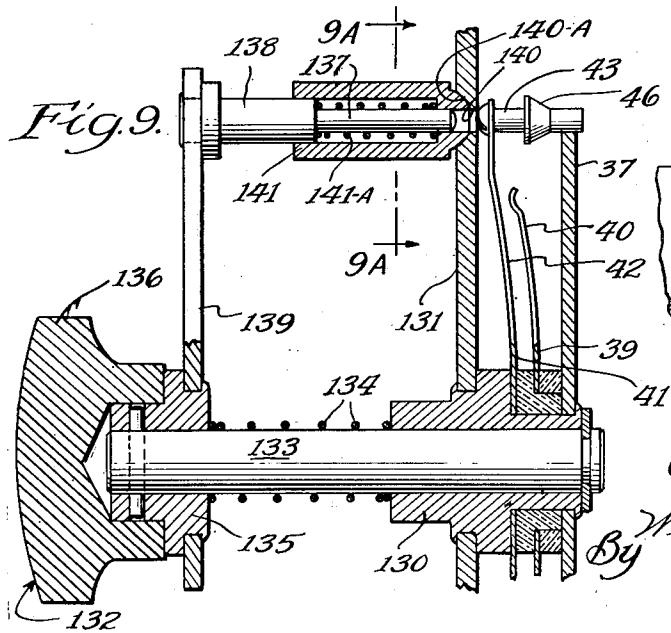
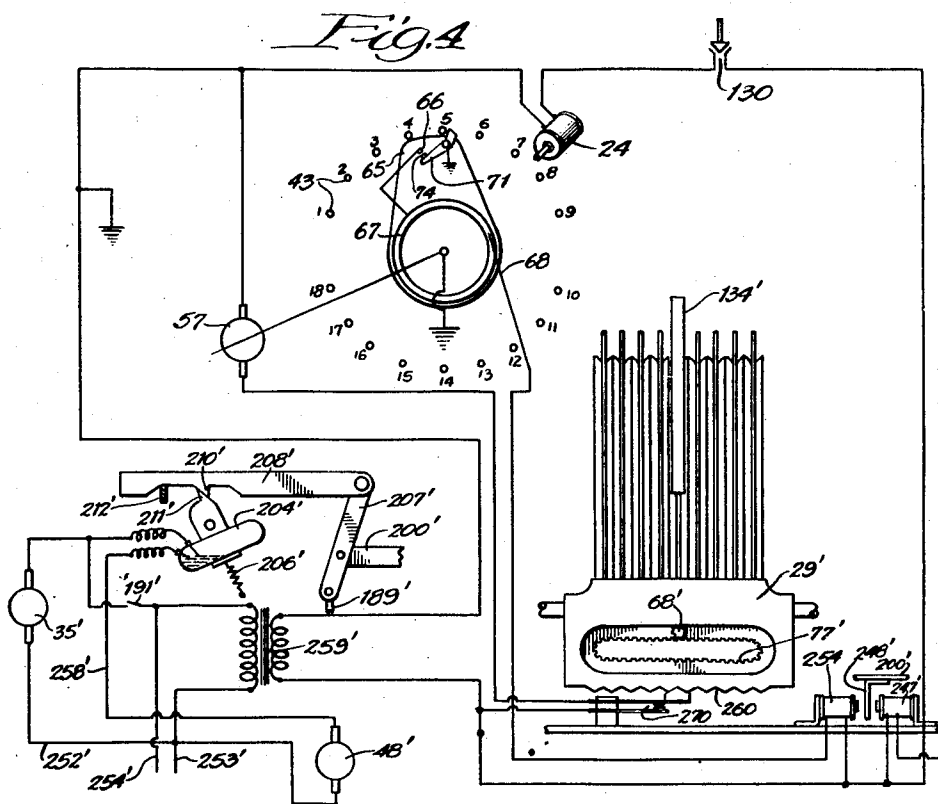
O. GIERWIATÓWSKI

2,572,609

AUTOMATIC PHONOGRAPH

Filed Sept. 3, 1943

4 Sheets-Sheet 2



Inventor:

Olgiard Gierwiatowski,

By *Williams, Bradbury & Hunt*
Attorneys

Oct. 23, 1951

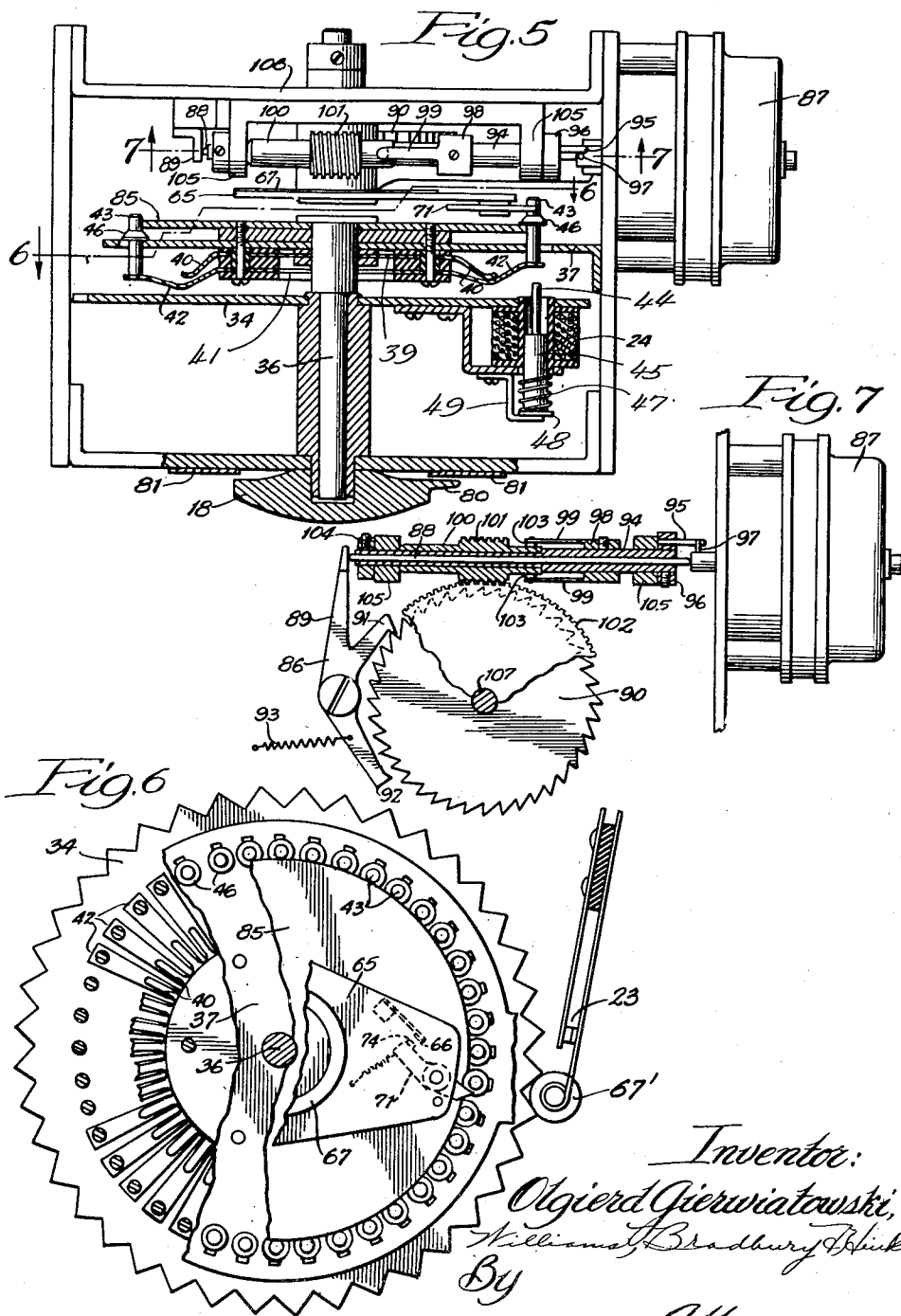
O. GIERWIATOWSKI

2,572,609

AUTOMATIC PHONOGRAPH

Filed Sept. 3, 1943

4 Sheets-Sheet 3



Oct. 23, 1951

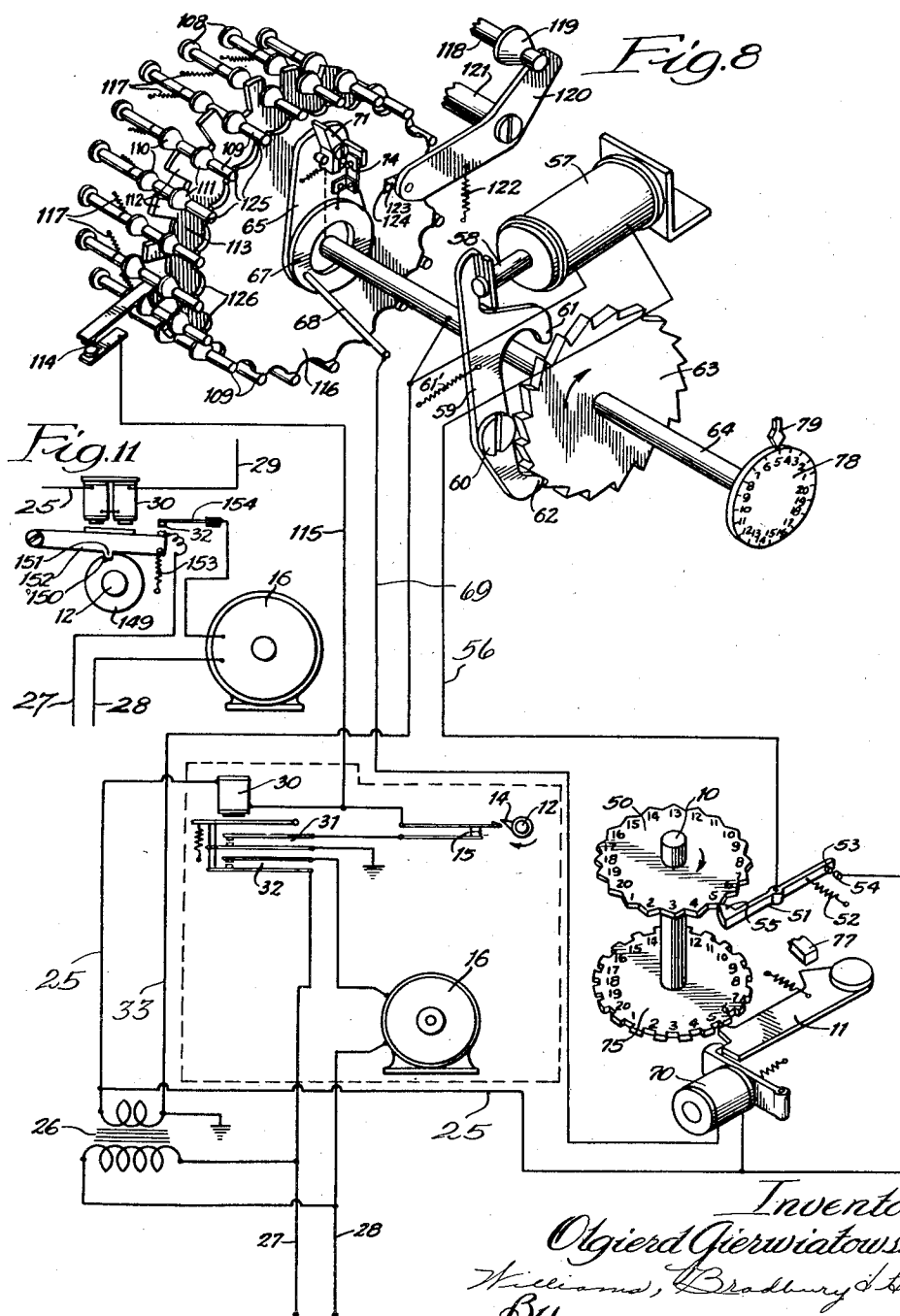
O. GIERWIATOWSKI

2,572,609

AUTOMATIC PHONOGRAPH

Filed Sept. 3, 1943

4 Sheets-Sheet 4



Inventor:
Olgierd Gierwiatowski;
Williams, Bradbury & Shinkle
By
Attorneys.

UNITED STATES PATENT OFFICE

2,572,609

AUTOMATIC PHONOGRAPH

Olgiard Gierwiatowski, Chicago, Ill., assignor, by
mesne assignments, to J. P. Seeburg Corpora-
tion, Chicago, Ill., a corporation of Illinois

Application September 3, 1943, Serial No. 501,066

15 Claims. (Cl. 74—479)

1

This invention relates to automatic phonographs and particularly to selectors for such phonographs which may be arranged in remote relation to the phonograph or may be arranged thereon.

The invention relates to the general type of multi-selector for automatic phonographs which is described and claimed in co-pending application Serial No. 497,920, filed August 9, 1943, now Patent No. 2,531,374 (which is a continuation-in-part of application Serial No. 332,175, now abandoned, filed April 29, 1940) of Edward F. Andrews.

One of the objects of the invention is to provide an improved selector of the type including a plurality of selectively operable selector members or elements.

A further object of the invention is to provide an improved selector wherein the selectivity operable selector elements are operated upon insertion of a coin.

A further object of the invention is to provide a selector having a plurality of selector elements, each controlling the playing of a record, and common means whereby each of the members may be selectively actuated.

A further object of the invention is to provide a selector having a plurality of elements, each adapted to be actuated to control the reproduction of a single recording, and movable electromagnetic operating means adapted to be positioned so as to actuate any desired one of the elements.

A further and more specific object of the present invention is to provide a remote control for an automatic phonograph comprising a plurality of selector members adapted to be displaced so as to control the reproduction of corresponding recordings, and switching means in the remote control unit adapted to be actuated by any of said members so as to start the motor in the main unit.

Another object of the present invention is the provision of a new and improved selector element operating mechanism embodying means for preventing operation of the mechanism to move a selector element unless the operating means is positioned to engage an element.

Another and more specific object of the invention is to provide a selector having a plurality of members, each adapted to be moved individually to control the playing of a recording, solenoid means for actuating the members individually, and means for rendering the solenoid inoperative except when it is arranged in cooperative relation with one of said members.

Another and more specific object of the present invention is the provision of a new and improved selector element operating mechanism wherein mechanical means are provided for the

2

purpose of preventing operation of the mechanism to displace a selector element unless the mechanism is properly positioned relative to the element.

5 A further object of the present invention resides in the provision of a new and improved selective control arrangement for automatic phonographs for maintaining the phonograph in operation to complete the playing of the last selected record and after the return to normal position of the selector element corresponding to said record.

Other objects, advantages, and capabilities of the invention will appear from the following description of preferred embodiments thereof, taken in conjunction with the following drawings, in which:

Fig. 1 is a diagrammatic view showing a selector embodying my invention, arranged for the control of a "Symphonola" phonograph;

Fig. 2 is a sectional detail view through a portion of the selector, the section being taken on the line 2—2 of Fig. 1;

Fig. 3 is a similar sectional view showing another embodiment of my invention;

Fig. 4 is a diagrammatic view showing the manner in which my improved selector may be embodied in an "A. M. I." phonograph;

Fig. 5 is a sectional view through the selector shown diagrammatically in Fig. 1, the selector being modified, however, for rotary movement by a motor instead of a solenoid;

Fig. 6 is a sectional elevation through the selector shown in Fig. 5, the section being taken on the line 6—6 of Fig. 5;

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 5, showing the manner in which the selector shaft is driven by the motor;

Fig. 8 is a modified form of my invention shown in Fig. 1, the principal modification being the arrangement of the selector for manual control of the selecting members instead of the solenoid control shown in Fig. 1;

Fig. 9 is a fragmentary cross-sectional view of another embodiment of the invention wherein the selector elements are displaceable manually and mechanical means are provided for preventing such displacement unless the displacing means is properly positioned relative to the elements;

Fig. 9A is a fragmentary cross-sectional view taken along the line 9A—9A of Fig. 9;

Fig. 10 is a fragmentary diagrammatic view showing a further modification of the invention, the apparatus shown in the figure being adapted to be substituted for those portions of Figs. 1 and 8 blocked off by the dash lines; and

Fig. 11 is a fragmentary diagrammatic view similar to that shown in Fig. 10 of still another modification of the invention.

3

The present invention and also portions thereof are applicable to many types of automatic phonographs. It will be illustrated in conjunction with phonograph control apparatus of the character including selector units, located at the phonograph and at desired remote points, having selector elements corresponding to recordings playable by the phonograph and a member common to and disposed in operative relation to said elements for selective movement into substantial registering alignment with one or another of the elements and for operative movement in a direction to effect movement of an aligned selector element to selecting positions. The present invention, while particularly adapted to such arrangements, may be used in conjunction with other types of phonograph control. This is especially true of certain features of this invention, such for instance, as the means for preventing operative movement of the selector element moving member unless said member is substantially aligned with a selector element. This feature may be applied equally well to arrangements wherein selector elements are located at the phonograph and are operable into selecting position by a selector moving member thereat controlled from the phonograph or some remote point, as illustrated, for instance, in the Wilcox Patent No. 2,234,937 granted March 11, 1941. In the following portion of the specification the present invention is shown in conjunction with phonographs known to those skilled in the art as the "Symphonola" and "A. M. I." phonographs.

The manner in which my invention is associated with the "Symphonola" and "A. M. I." phonographs will readily be understood from the abbreviated description of these phonographs in the applications Serial Nos. 332,175 and 497,920 of Edward F. Andrews, referred to above. It is therefore considered necessary merely to refer to essential operations of the mechanism of these phonographs in the present application. The so-called "Symphonola" is a machine extensively used throughout the United States, being manufactured by J. P. Seeburg Corporation and is fully described in patent applications filed August 26, 1937 by Carl G. Freborg et al., Ser. No. 161,010, now Patent No. 2,243,698, and September 1, 1937 by Carl G. Freborg, Serial No. 161,906, now abandoned (Patent No. 2,237,139, based on application Serial No. 343,721, which is a continuation-in-part of the application referred to). The "A. M. I." phonograph is fully described in Patent No. 2,104,032, issued January 4, 1938, to Clifford H. Green.

Referring to Figs. 1, 2, and to some extent Fig. 5 of the drawings, it is pointed out that the "Symphonola" comprises a selector shaft 10 which is capable of occupying twenty positions corresponding to twenty records. During the record changing cycle of the machine, the shaft 10 is subjected to a complete revolution so that it moves through every one of the twenty positions. It may be arrested in any one of these positions by a latch member 11, and the result will be that the record corresponding to the position of arrestment of the shaft 10 will be reproduced. The record changing operation is controlled by a cam shaft 12 which carries a finger 14. After the playing of a record, the shaft 12 is put into operation, and it opens a switch 15 which will hereinafter be referred to. The operation of the motor to play successive records continues as long as the motor 16 is energized.

It is to be noted that the elements shown in

4

the lower part of Fig. 1 are mounted upon or in close propinquity to the phonograph proper. The elements in the upper part of Fig. 1 constitute a control or selector unit which may be mounted upon the phonograph cabinet or may be located at any desired position. The five conductors which connect the lower and upper portion of Fig. 1 may be formed into a single cable of desired length.

It is to be further noted that the elements shown in Fig. 1 may be enclosed within a suitable housing, leaving only the coin slot 17 and a control handle 18 (Fig. 5) available to the exterior of the housing.

A coin of suitable denomination inserted into the coin chute 17 connects a grounded contact 19 to a contact 20. The contact 20 is connected to one leaf of a switch 23, the other leaf of which is connected to a solenoid 24. The other side of the solenoid 24 is connected through a conductor 25 to the ungrounded side of the secondary of the transformer 26, the primary of which is connected to the power lines 27 and 28. A conductor 29 connects a metallic ring 39 (see Fig. 2) and fingers 40, hereinafter described, to one side of switch 15 and to a relay 30. The other side of the relay 30 is connected through the conductor 25 to the ungrounded side of the secondary of the transformer 26. The other side of the switch 15 is connected to one side of a switch 31 which is mechanically connected to the motor switch 32. When the relay 30 is energized, the switches 31 and 32 are closed.

One side of the secondary of the transformer 26 is grounded and is connected through a conductor 33 to the control unit, this conductor being also grounded in that unit. The solenoid 24 is mounted upon a disc 34 so that it may be carried around into twenty different positions. The disc 34 is rigidly connected to a hollow spindle 35, which rigidly carries the manipulating handle 18, as shown in Fig. 5. The hollow spindle 35 is mounted on a stationary spindle 36, which is rigidly mounted on the stationary disc 37, rigidly supported on the housing by brackets 38. Upon the forward side of the disc 37 and in insulated relation thereto is mounted the metallic ring 39, which has a plurality of radially directed fingers 40 corresponding in number to the number of recordings controlled. Thus, in the device shown in Figs. 1, 2 and 3, there are twenty fingers 40, while in the device shown in Figs. 5, 6 and 7, forty fingers are provided. These fingers are distributed equally around the ring 39. In spaced relation to the ring 39 is a similar ring 41 electrically connected to the spindle 36, which is grounded. The ring 41 is provided with similar longer fingers 42, each finger 42 being aligned with one of the fingers 40. The fingers 42 are longer than the fingers 40 and carry at their outer ends pins 43. In their normal position, the fingers 42 are in their full line position shown in Fig. 2. The fingers 42 and the pins 43 may be displaced to the right, as viewed in Fig. 2, by a pin 44 which projects rearwardly from the armature 45 of the solenoid 24. When a pin 43 is thus moved to the right, a frusto-conical portion 46 on the pin 43 is engaged behind the disc 37 in the manner shown in dotted lines in Fig. 2 and in connection with one of the pins shown in Fig. 1. When the pin 43 is thus displaced to the right, as viewed in Fig. 2, and is engaged by the disc 37, the associated finger 40 is in electrical contact with the associated finger 42, as shown in dotted lines in Fig. 2. The pin 43 remains in this position until

5

it is released in a manner hereinafter described. It will be understood that when one or more of the fingers 42 is in contact with corresponding fingers 40, the circuit through the relay 30 is complete, and the switches 31 and 32 are closed so that the motor 16 remains in operation until all the pins 43 are in normal position, that is, the full line position shown in Fig. 2, and the switch 15 is thereafter opened by the arm 14, which occurs immediately after the playing of each record. The armature 45 is biased forwardly, or to the left, as viewed in Fig. 2, by a spring 47, which bears against the solenoid 24 and against a head 48 on the forward end of the armature 45. A stop 49 is provided against which the head 48 abuts in normal position of the armature 45.

In order to prevent displacement of the selector elements unless the displacing means is properly positioned relative to the elements, whereby actuation of elements may be made more readily and rapidly even when closely spaced to enable a large number of records to be selected, and when the displacing means may be moved rapidly by power means, there are provided means for preventing energization of solenoid 24 unless such proper positioning exists. The disc 34 is provided with a circumferential series of notches corresponding in number to the number of records; that is, in the case of the embodiment of the invention shown in Fig. 1, there are twenty notches. A spring pressed arm 66' carries a roller 67', which is adapted to remain in one of the notches on the disc 34, except when it is being turned by the handle 18. The solenoid 24 is located on the disc 34 so that the pin 44 is in alignment with one of the pins 43 in each position of the roller 67' within one of the notches in the disc 34. The arm 66' carries a projecting pin 68' which is adapted to hold the switch 23 open, except when the roller 67' is located in one of the notches of the disc 34. It will be understood that when a coin is inserted in the coin chute 17, a circuit is completed from ground, contact 19, contact 20, switch 23 which is closed only by the proper positioning of the roller 67' in one of the notches of the disc 34, solenoid 24, conductor 25, and secondary of the transformer 26, back to ground. Thus, the solenoid 24 is energized and the aligned pin 43 is moved rearwardly into the dotted line position in Fig. 2.

The shaft 10 carries a notched wheel 50 of insulating material, this wheel being provided with notches corresponding in number to the number of selections in the phonograph. This notched wheel cooperates with a pivoted arm 51, which is biased towards it by a spring 52. The arm 51 carries a contact 53 which is adapted to engage a stationary contact 54 each time that the nose 55 of the arm 51 moves into a notch in the wheel 50. The contact 54 is connected by a conductor 56 to one side of a solenoid 57 in the control unit. The other side of the solenoid 57 is grounded. The armature 58 of the solenoid 57 is connected to an escapement member 59 which is pivoted at 60. The escapement member 59 is biased towards its normal position shown in Fig. 1 by means of a spring 61'. The escapement member 59 is provided with detents 61 and 62 which cooperate with a ratchet wheel 63 rigidly mounted on a shaft 64. This shaft 64 is mounted in axial alignment to the spindle 36 and carries at its end adjacent the disc 37 an arm 65 of insulating material. When the solenoid 57 is energized, the detent 61 engages one of the teeth of the ratchet wheel 63 and moves it one incre-

6

ment of a tooth space in the clockwise direction. When the solenoid 57 is de-energized, the spring 61' carries the detent 62 into engagement with one of the teeth of the ratchet wheel 63 and moves it the remainder of the tooth space. Thus, the ratchet wheel 63 is moved one tooth space in two separate increments, the shaft 64 being stationary for a definite short period between the two increments.

In order to effect the selection of a record when the movable member 65 is in cooperative relation to an actuated pin, means are provided for closing a control circuit when a pin is engaged. Preferably, but not necessarily, the arm 65 is provided with a circuit controlling dog 71 adapted upon engaging a pin to close a circuit between contacts 66 and 74. The arm 65 carries the contact 66 which is connected to a slip ring 67 mounted on the arm 65. The slip ring 67 is engaged by a brush 68, which is connected by a conductor 69 to an electromagnet 70. The other side of the electromagnet 70 is connected to the ungrounded side of the secondary of the transformer 26. A dog 71 is pivotally mounted on the arm 65. This dog is connected to the shaft 64 (which is grounded) and is normally biased by a spring 72 against a stop 73. The dog 71 is adapted to engage any of the pins 43 which have been displaced inwardly. When the dog 71 engages such an actuated pin 43, it is swung so as to bring the previously referred to contact 74 into engagement with the contact 66. The arm 65 is mounted on the shaft 64 so that this contact is made when the ratchet wheel 63 receives its first increment of movement from the detent 61. Consequently, the engagement between the contact 74 and 66 persists for the short, definite period previously mentioned. When this engagement is effective, the electromagnet 70 is energized and its armature is withdrawn from the latch 11 so that this latch is released to engage a latch wheel 75 which is carried by the shaft 10. The detent 76 of the latch 11 consequently enters a notch in the latch wheel 75, thus holding the shaft 10 against further rotation. A member 77 on the phonograph engages the latch 11 at an intermediate point of the record changing cycle and re-engages the latch 11 with the armature of the magnet 70.

The shaft 64 carries a disc 78 whereby the shaft may be brought into synchronized relation with the shaft 10. Thus, as shown in Fig. 1, an arrow 79 on a stationary portion of the device indicates the position of the arm 65 with respect to the number of the recording shown on the disc 78. The latch 11 is adapted to engage the notch in the latch wheel 75 corresponding to record No. 6, and the arm 65 should be in the No. 6 position, as shown in Fig. 1. If it is not in this position, it may be rotated thereinto by manual actuation in the counterclockwise direction. The disc 78 is, of course, normally enclosed by the housing of the control unit. A pointer 80 on the handle 18 indicates on the circular indicia strip 81 (Fig. 5) the recording for which the solenoid 24 is adjusted. Stop means 84 are provided on the disc 34 and on the stationary part of the device so that simple conductors may be connected to the solenoid 24 without danger of fracture.

The operation is as follows:

The handle 18 is rotated until its pointer 80 is in registry with the number of the recording which it is desired to select. The disc 34 is held in this position by the roller 67', and the switch

7

23 is closed, but only when the armature is properly positioned to move a pin. A coin of appropriate denomination is inserted in the coin chute 17, and a circuit is completed through the solenoid 24 so that its armature 45 pushes the corresponding pin 43 into selecting position, which is the dotted line position in Fig. 2. The engagement of the arm 42 with the arm 40 completes the circuit through the relay 30 and the switches 34 and 32 are closed. The motor 16 is thus put into operation, and the record changing cycle starts, the shaft 12 being driven by the motor 16. The switch 15 now closes to establish a holding circuit for relay 30, and the shaft 10 is put into rotation. Each time the nose 55 of the arm 51 moves into a notch on the notched wheel 50, the contact 53 engages the contact 54, and the solenoid 57 is energized to rotate the ratchet wheel 63 and the shaft 64 in synchronism with the shaft 10. The synchronous movements continue until the dog 71 engages the actuated pin 43, which, as has been indicated previously, occurs as a result of the energization of the solenoid 57. This engagement completes the circuit through the electromagnet 70 so that the latch 11 is released and is moved by its spring onto the periphery of the latch wheel 75. This releasing occurs when the nose 55 is in a notch of the wheel 50, so that the detent 76 engages the wheel 75 between a pair of adjacent notches. When the solenoid 57 is de-energized as a result of the nose 55 moving up out of a notch into engagement with a projection on the wheel 50, the spring 61 imparts the last increment of movement to the ratchet wheel 63. At that time, the detent 76 of the latch 11 drops into the appropriate notch of the latch wheel 75, thus terminating the movement of the shaft 10. The final increment of movement of the shaft 64 moves the dog 71 past the actuated pin 43, moving this pin radially outwards so that the frusto-conical portion 46 is disengaged from the disc 37. When this occurs, the resilience of the arm 42 returns this pin to its normal position, which is the full line position in Fig. 2.

As has been previously indicated, the position of the shaft 10 determines which record is brought out by the continuation of the record changing cycle. When the record has been brought out and has been moved into playing position, the shaft 12 stops out of contact with the switch 15 so that this switch remains closed. If only one pin 43 was actuated, the motor 16 continues to operate after the return of the pin because the relay 30 is energized through the switch 15 and the switch 31. After the selected record has been engaged by its transport mechanism, the member 77 resets the latch 11. After the record has been played, the record changing cycle is resumed and the switch 15 is opened promptly. The relay 30 is de-energized and the motor is stopped.

If, however, a plurality of pins 43 have been actuated by a suitable location of the solenoid 24 and the insertion of a coin for each location, the operation of the motor 16 is not terminated at the end of playing of the first record, the relay 30 being energized by the circuit maintained between one or more of the arms 40 with the corresponding arms 42. Consequently, the record changing operation and the playing operation continues alternately until all the actuated pins 43 are discharged and the switch 15 is opened at the inception of a record changing operation thereafter.

Fig. 3 shows diagrammatically a modified and simplified form of the invention suited for a multi-selector phonograph not controlled by a coin. The

8

disc 34 is rotated by the handle 18 in the same manner as in the embodiment previously described. This disc carries a plunger 82 which is available from the exterior of the housing for manual operation. It will readily be understood that the plunger 82 may be located manually in the desired selecting position in alignment with any one of the pins 43. The plunger 82 may be moved inwardly to engage the frusto-conical portion 46 of the pin behind the disc 37, thus closing the circuit between the associated arms 42 and 40, with the result that the corresponding records are reproduced in the manner described in connection with Fig. 1. It will be understood that all the mechanism in the phonograph and to the right of the disc 37 in Fig. 3 are similar to the mechanism shown in Fig. 1. Suitable indicating means for showing which recording is being selected may be provided on adjacent portions of the housing and the disc 34.

It will be understood that the plunger 82 may be actuated in any desired number of positions to move the pins 43 to their inward position in which they are retained by the engagement of the frusto-conical member 46 with the disc 37. The phonograph will play the corresponding records and will discharge the pins 43 in the manner described in connection with Figs. 1 and 2. When all of the pins 43 are thus discharged, contact is broken between all the fingers 42 so that the phonograph ceases to operate after all the pins 43 have been discharged and the switch 15 becomes opened by the finger 14 after the playing of the last record.

In Fig. 4 I have shown diagrammatically the manner in which my improved selector, shown in Figs. 1 and 2, or in Figs. 5, 6 and 7 may be applied to the "A. M. I." machine. As stated above, this machine is described in Patent No. 2,104,032, issued January 4, 1938, to Clifford H. Green, and is further illustrated and described in the aforesaid applications of Edward F. Andrews. In this figure, I have employed numbers corresponding to those in the Green patent, with the addition of primes, and I have also employed other reference numerals used in the aforesaid Andrews application for convenience of reference. In the control unit, the same reference numerals employed in Fig. 1 are used.

The power lines 253' and 254' are connected to the primary of the transformer 259'. The power line 253' is connected to the turntable motor 35' and the record changing motor 48' by means of a conductor 252'. The power line 254' is connected through a switch 191' to the other side of the motor 35' and to the switch 204'. The switch 191' may be controlled by the machine, as shown in the Green patent, or it may be controlled manually or in any other suitable way. The other side of the switch 204' is connected to the other side of the record changing motor 48'. The switch 204' is a mercury switch biased to closed position by a spring 206'. The switch 204' carries a projection 211' which is adapted to cooperate with a projection 210' on a link 208'. The link 208' has an inclined surface adapted to cooperate with a stationary abutment 212'. The link 208' is pivotally connected to an arm 207' which is mounted on a bar 189' so as to move around the axis of this bar. The arm 207' has pivotally connected thereto a bar 200' which carries an armature 248' so as to be actuated by a magnet 254' in one direction and a magnet 247' in the opposite direction. As fully explained in the Andrews application referred to,

energization of either of these magnets initiates operation of the motor 48' and results in the removal of a record from the magazine to the turntable, or vice versa. When that particular operation is completed, the record changing mechanism returns the armature 248' and the bar 200' to neutral position, thus terminating the record changing operation.

The record magazine 29' moves to the left and to the right, being actuated by a pinion 68' which cooperates with an endless rack 77' on the magazine 29'. When the magazine 29' stops, one of the records is located in alignment with the record transfer member 134', this member removing the record from the magazine and placing it with a pre-determined side up, the particular side being turned up for reproduction depending on the direction in which the magazine 29' is progressing.

Upon the magazine 29' I mount a notched bar 260 which is adapted to cooperate with a switch 270. It will readily be understood that when the magazine 29' moves one record space with respect to the record transfer member 134', the switch 270 is closed. One side of the switch is connected to the ungrounded side of the secondary of the transformer 259'. The other side is connected to the solenoid 57 which moves the arm 65 step by step in the manner described in connection with Figs. 1 and 2. It will, of course, be understood that this step by step movement may be effected by means of a motor, for example, the motor 87, described in connection with the modification shown in Figs. 5, 6 and 7. When the dog 71 mounted on the arm 65 engages an actuated pin 43, contact 74 engages contact 66 and a circuit is completed through these contacts, ring 67, and brush 68 to the electromagnet 254, thus displacing the bar 200' to the left.

The pins 43 are actuated by means of the solenoid 24, which is connected to the ungrounded side of the secondary of the transformer 259' through a switch 130, which may be a coin actuated switch or may be actuated manually.

The operation is as follows:

The switch 191' is closed either manually or by means of coin control mechanism. The motor 35' is thus put into operation and the turntable is rotated continuously until the switch 191' is again opened. It will be understood that this opening may be effected in known manner by the mechanism shown for this purpose in the Green patent referred to, or in any other suitable known way.

The switch 204' being in its normal closed position, as shown in Fig. 4, the motor 48' also starts to operate, the result being that the pinion 68' moves the magazine 29' to the left and to the right. During this movement of the magazine, the switch 270 is closed periodically, and the arm 65 is rotated step by step as long as the movement of the magazine 29' continues. The operator locates the solenoid in alignment with the selection which he desires to have played and then he closes the switch 130, energizing the solenoid 24 and moving the selected pin 43 inwardly. He may actuate as many pins 43 as he desires.

The arm 65, moving step by step around the pins 43 in the manner previously described, moves the dog 71 into engagement with an actuated pin and it is swung so as to complete the circuit through the electromagnet 254. The bar 200' is thus moved to the left. This movement has

no effect on the switch 204', but it does have the effect of releasing a clutch which controls the movement of the magazine 29'. The displacement of the bar 200' to the left starts the operation of the record transfer member 134' so that the record in alignment therewith when the magazine 29' stops is removed and placed upon the turntable. When this record transfer movement is completed, the record transfer mechanism returns the bar 200' to its neutral or intermediate position. This movement of the bar 200' to the right causes the projection 210' to swing the switch 204' in the clockwise direction, as viewed in Fig. 4, thus terminating the operation of the motor 48' during the reproduction of a record. When the record is completed, a switch controlled by the tone arm completes the circuit of the electromagnet 247' so that the bar 200' is moved to the right. This movement brings the projection 210' past the projection 211' and the spring 206' throws the switch 204' to closed position, thus starting the motor 48'. The displacement of the bar 200' to the right also engages a clutch which puts the record transfer member 134' into operation to pick the record off the turntable and return it to its place in the magazine. When this operation is effected, the record changing mechanism returns the bar 200' to its neutral or intermediate position, thus disengaging the aforesaid clutch. During the last part of this movement, the clutch which connects the motor 48' to the pinion 68' is re-engaged. If the switch 191' is maintained closed, the magazine will resume its movement until the dog 71 again encounters an actuated button, whereupon the magnet 254 will be energized and the cycle thus far described will be repeated.

It is to be noted that there are two series of pins 43, one series corresponding to the left hand side of the records in the magazine, and the other series corresponding to the right hand side of the records in the magazine. These series are separated by blank positions or spaces in which the arm 65 moves when the contact member of the switch 270 moves past the extreme projections on the bars 260. Consequently, the ratchet wheel 63 should have a number of teeth corresponding to double the number of records, plus two, for this type of reciprocating magazine.

In the embodiment of the invention shown in Figs. 5, 6 and 7, the construction is generally similar to that of the device shown in Figs. 1 and 2, and similar reference numerals are applied to corresponding parts. In this embodiment of the invention, the pins 43 extend freely through openings in the plate 37. Mounted upon this plate, on the rear side thereof, is a stationary disc 85, with which the frusto-conical portion 46 of a pin is adapted to cooperate in the manner shown on the right hand side of Fig. 5, i. e., the plate latches the pin in actuated position.

This embodiment of the invention is arranged for the control of forty recordings, and consequently, forty pins 43 and corresponding elements are provided. In this embodiment, the arm 65 and associated elements may be arranged in precisely the same relation as shown in Fig. 1. The arm 65 is adapted to be actuated step by step by means of an escapement member 86, which is controlled by a motor 87. This motor is connected in the same manner as the solenoid 57 in Fig. 1, so that the motor receives an im-

pulse each time that the phonograph unit sends out an impulse over the line 56. This impulse puts the motor 87 into operation. When the motor 87 starts to operate, its armature moves to the left, as viewed in Figs. 5 and 7, and consequently, a rod 88 is moved to the left. This rod engages an arm 89 on the escapement member 86, the arrangement being such that the detent 91, normally in engagement with the ratchet wheel 90, is moved away from the ratchet wheel 90, and another detent 92 on the escapement member 86 is moved into the path of another tooth on the ratchet wheel. The arm 89 on the escapement member 86 is biased against the rod 88 by means of a spring 93. The rod 88 extends through a hollow shaft 94, which is adapted to be driven by the motor 87 through the engagement of a pin 95, rigidly carried by a collar 96 secured to the shaft, with a pin 97 extending radially from the motor shaft. The collar 96 is rigidly mounted on the hollow shaft 94, as is a collar 98. The collar 98 comprises a plurality of resilient arms 99 which extend away from the collar 98 over a hollow shaft 100, which is rotatably mounted on a reduced portion of the hollow shaft 94. The hollow shaft 100 carries a worm 101 which cooperatively engages a worm gear 102. The resilient arms 99 are provided with friction members 103 which are adapted to engage the shaft 100. The hollow shaft 94 is held against axial movement by cooperation between the collar 96 at one end and the collar 104 rigidly secured on its other end with bearings 105, which are in stationary relation, being mounted on a frame member 106. The hollow shaft 100 is held against axial movement by engagement of one end with one of the bearings 105 and engagement of the other end with a shoulder on the hollow shaft 94, as shown in Fig. 7. The ratchet wheel 90 and the gear 102 are rigidly mounted upon the shaft 107 which carries the arm 65.

The operation is substantially similar to that of the modifications previously described. Each time the motor 87 receives an impulse, it starts to operate, and it drives the hollow shaft 94 and consequently the worm 101 and gear wheel 102 so as to drive the ratchet wheel 90 in the clockwise direction, as viewed in Fig. 7. When the motor 87 starts operating, the rod 88 is moved to the left, as viewed in Fig. 7, and the detent 91 is withdrawn from the ratchet wheel 90, thus permitting the clockwise movement referred to. The detent 92 is at the same time moved into the path of a tooth on the ratchet wheel 90 so that rotation of the ratchet wheel 90 in the aforesaid direction more than one tooth's distance is prevented. If the motor is energized for a longer period than that necessary to bring the adjacent tooth of the ratchet wheel 90 into engagement with the detent 92, the friction members 103 merely slip upon the hollow shaft 100. When the motor is de-energized, the armature and rod 88 move to the right, and the detent 92 is withdrawn from the ratchet wheel 90 and the detent 91 is moved into the path of the next tooth. The inertia of the armature is sufficient to bring this next tooth into direct contact with the detent 91. It will in this way be understood that the shaft 107 which carries the arm 65 is moved step by step as each impulse is received. When the dog 71 hits an actuated pin 43, contact 74 engages contact 66, with the results set forth in connection with the embodiments shown in Figs. 1 and 2.

In the embodiment of the invention illustrated in Fig. 8, the lower portion is substantially like the showing of the lower portion of Fig. 1 and need not be described minutely. It is sufficient to point out that in this embodiment of the invention, selection is accomplished by manually operated buttons 108. Consequently, there is no solenoid 24 in the upper part of the figure, and consequently the branch of conductor 25 leading to it is omitted. This embodiment of the invention comprises an arm 65 which is actuated by a solenoid 57 in precisely the same manner as described in connection with Fig. 1. The dog 71 on the arm 65 is adapted to cooperate with any of the pins 109 which are pressed inwardly. The pins 109 carry the buttons 108 for their manual operation, and they also carry frustro-conical portions 110 and 111. When a pin 109 is pushed inwardly, the frustro-conical portion 110 engages a projection 112 on a rotatable disc 113. This engagement moves the disc in counterclockwise direction, as viewed in Fig. 8, against the action of a spring (not shown) and effects the closing of a switch 114. One side of the switch 114 is grounded, the other being connected by conductor 115 to the relay 30. Consequently, the relay 30 is energized and the motor 16 is operating whenever any of the buttons 108 is in its actuated condition. When a button 108 is pushed inwardly, its frustro-conical portion 111 passes behind a disc 116 by which it is held in actuated position by means of a spring 117 which biases the pin 109 outwardly (to its unactuated position), and at the same time toward the center of the circular series of pins. The actuated pin remains in its inward position until it is moved out of engagement with the disc 116 by means of the dog 71.

The actuated pins may also be released by manual manipulation, in a manner now to be described. A pin 118 carries a frustro-conical cam portion 119 which is adapted to engage a lever 120. The lever 120 is pivotally mounted at 121 and is biased by a spring 122 against the pin 119. The lever 120 carries a forwardly projecting pin 123 which extends into an opening 124 in the disc 116. When the pin 118 is pushed inwardly, the cam 119 swings the lever 120 in a clockwise direction, as viewed in Fig. 8. Consequently, the disc 116 is swung in the opposite direction, and the peripheral projections 125 with which the frustro-conical elements 111 normally engage are moved laterally away from the frustro-conical elements 111, and recesses 126 on the periphery of the disc 116 are brought into alignment with the frustro-conical elements 111. Consequently, the springs 117 carry all the rearwardly located pins 109 forwardly into normal position.

It will readily be understood that when any number of buttons 108 are pushed inwardly, the switch 114 is closed and the relay 30 is energized and the motor 16 is put into operation. As described in connection with the modification of Fig. 1, the solenoid 57 is energized progressively step by step until the switch 74 is closed by cooperation of the dog 71 with an actuated pin 109. The closing of this switch energizes the relay 70 and allows the latch 11 to lock the notched wheel 75 into position to effect the playing of the corresponding record. After the record is played, the shaft 10 again rotates, and the arm 65 moves step by step with the notched disc 75 until the dog 71 engages another actuated pin 109, whereupon the operation just described is repeated. When the dog 71 discharges the last actuated pin 109, which it does immediately after the locking

of the disc 75 in selecting position, the relay 30 remains energized through switches 31 and 15. At the end of the playing of the last recording, the finger 14 opens the switch 15 and the machine stops.

In Figs. 9 and 9A there is illustrated a further embodiment of a selector element operating means provided with means for preventing operation thereof to actuate an element unless the operating means is properly located to the element. In this embodiment the operating member is movable manually both to select and to operate elements, but it should be understood that it could be operated otherwise and from remote points, if desired.

The selector pins 43 are cooperatively associated with a latching plate 37 secured as to a stationary bushing supporting also the contact fingers 40 and 42, and a plate 131 provided for a purpose to be set forth in detail shortly. The contacts 40 and 42 are insulated from each other, and contacts 40 and 42 are likewise insulated from the supporting structure, as heretofore set forth.

The pin selecting and operating means, indicated generally by reference character 132 includes a rotatable and axially movable shaft 133 supported by bushing 130. This shaft is biased to an outer normal position by spring 134 bearing against bushing 130 and a collar 135 secured to the shaft. The shaft may be readily rotated to select a pin (and a recording) and to operate the pin into its actuated or selecting position by an enlarged knob 136.

When the knob is pushed in the selected pin 43 is moved by the reduced end 137 of a stud 138 secured to the outer end of a radially extending arm 139 secured to the collar 135 so that it rotates and moves axially with shaft 133.

In order to prevent operation of mechanism to move a pin unless the stud is properly aligned with a pin 43, the plate 131, located between the stud and pins, is provided with a series of apertures 140 of a diameter slightly larger than the reduced end 137 of stud 138. Consequently, the knob cannot be pushed in unless the stud is correctly aligned relative to the pin. As heretofore indicated, this construction enables pins to be placed close to each other and get operated easily and quickly and without damage as a result of jamming or the like.

The making of selections is further facilitated by providing the apertures with countersunk portions 140A adapted to receive the adjacent end of a positioning element 141 slidably carried by the stud 138 and biased toward the plate 131 by a spring 141A located in its interior. This construction makes the apparatus substantially self-centering.

In the embodiment shown in Figs. 1 and 8, I may dispense with the holding circuit provided by switches 15 and 31 and maintain the motor switch 32 closed by mechanical means. Thus, as shown in Fig. 10, the armature of the electromagnet 30 is carried by a pivoted latch member 142 which is biased away from the magnet by a spring 143. It may be well to note again that the elements shown in Fig. 10 may be substituted for those portions of Figs. 1 and 8 enclosed in the dash lines.

The contacts constituting the switch 32 are carried by two pivotally mounted arms 144 and 145. These arms are biased toward make position by a spring 146. The arm 145 is biased by a stronger spring 147 toward a cam 148. The

cam 148 is mounted on the cam shaft 12. The arm 144 is adapted to cooperate with the latch 142.

When the magnet 30 is energized by engagement between the arms 40 and 42 of the embodiment of Fig. 1 or by closing of the switch 114 in the embodiment of Fig. 8, the latch 142 is moved away from the arm 144 so that the switch 32 is closed and the motor is placed in operation.

If a plurality of pins 43 are actuated, then the magnet 30 remains energized during all the corresponding plays except the last play. During the record changing cycle between successive plays, the arms 144 and 145 are oscillated without, however, separating the contacts constituting the switch 32. When the shaft 12 is at rest during the playing of a record, the arm 145 rests against the highest point of the cam 148 and the arm 144 is beyond the detent of the latch 142.

During the last record changing cycle, that is, the cycle which brings out the last record for playing, the shaft 12 rotates in a clockwise direction so that the arm 145 moves off the high point of the cam 148 and the arm 144 follows it, since the magnet 30 is still energized. When the last pin 43 is discharged, the magnet 30 is deenergized and the latch 142 moves downwardly under the influence of the spring 143.

At the completion of the record changing cycle, the highest point of the cam 148 is in engagement with the arm 145 and the arm 144 is moved thereby past the detent of the latch 142. During the playing of the last record, the arm 145 is engaged by the highest point of the cam 148. At the end of the playing of the last record, the shaft 12 starts to rotate and the arm 145 drops off the highest point of the cam 148 into contact with the lowest point of this cam while arm 144 is restrained by the latch, thus separating the contacts constituting the switch 32 as shown in Fig. 10.

In the embodiment shown in Fig. 11, which like the apparatus shown in Fig. 10 may be substituted for those portions of Figs. 1 and 8 blocked off in the dash lines, a collar 149 is mounted on the shaft 12. This collar is provided with a peripheral recess 150 which is adapted to receive a projection 151 on a pivotally mounted arm 152. This arm is biased by a spring 153 which tends to bring the projection 152 into the recess 150. The arm 152 carries the armature of the magnet 30 which is adapted to raise the arm and to bring the projection 151 out of the recess 150.

The switch 32 is constituted by a contact on the arm 152 and a contact on a resilient arm 154. When the magnet 30 is energized, the switch 32 is maintained closed, and consequently, a plurality of records may be played without movement of the arm 152.

During the record changing cycle for the playing of the last selected record, the pin 43 being returned to normal position, the electromagnet 30 is deenergized. At this time, the projection 151 engages the periphery of the collar 149 and the switch 32 is maintained closed until after the last record is played.

When the last record is played, the record changing cycle again comes into operation and the cam shaft 12 starts to rotate. Immediately after this rotation begins, the recess 150 is brought into alignment with the projection 151 and the arm 152 is moved away from the magnet 30, thus opening the motor switch 32.

It will be understood that the operation is in all respects similar to that described above in

15

connection with Figs. 1 and 8, with the exception that the holding circuit, including switches 31 and 15, is dispensed with, the switch 32 being held closed mechanically after the electromagnet 30 is deenergized and until the last record is played, whereupon the motor 16 stops.

Although the invention has been described in connection with the specific details of preferred embodiments thereof, it must be understood that such details are not intended to be limitative of the invention except insofar as set forth in the accompanying claims. Having thus described my invention, I declare that what I claim is:

1. In an automatic phonograph selector, a plurality of displaceable selector elements, a pusher element, mounting means for moving said pusher element into axial alignment with any one of said displaceable elements, an electrical coil, an armature movable under the influence of said coil, said armature being adapted when said coil is energized to produce axial movement of said pusher element to push a displaceable element when in alignment therewith, means including circuit controlling means positionally correlated with said mounting means to prevent energization of said coil unless said pusher is in axial alignment with one of said selector elements, and means for returning said pusher element to initial position after the coil is deenergized leaving the actuated selector element in displaced condition.

2. In an automatic phonograph of the type controllable by a plurality of selector members displaceable in a predetermined direction and adapted when displaced to control the playing of selected recordings, a carrier cooperatively associated with an movable relative to said selector members, a selector member displacing element mounted on said carrier for movement relative to the carrier in the direction of movement of said selector members and movable with said carrier into position to displace selected members, electromagnetic means for effecting movement of said displacing element, means including a circuit comprising a normally open switch controlling the energization of said electromagnetic means arranged to be closed for effecting operation of said electromagnetic means to move said displacing element to displace a selected selector member, means including structure defining spaced apart projections mounted on and movable with said carrier for preventing operation of said displacing element except when said carrier is positioned to locate said displacing element in position to displace a selected selector member, and automatic means for returning said displacing element to normal position after the electromagnetic means is deenergized leaving the cooperating selector member in displaced position.

3. In an automatic phonograph of the type controllable by a plurality of selector members displaceable in a predetermined direction and adapted when displaced to control the playing of selected recordings, a carrier cooperatively associated with and movable relative to said selector members, a selector member displacing element mounted on said carrier for movement relative to the carrier in the direction of movement of said selector members and movable with said carrier into position to displace selected selector members, means including an electromagnet controlling movement of said displacing element and effective to move said displacing element upon operation of said electromagnet, means in-

16

cluding circuit controlling means for said electromagnet positionally correlated with said selector members and carrier to prevent operation of said electromagnet unless said selector member displacing element is positioned to displace a selected selector member and automatic means for returning said displacing element to normal position after the electromagnet is deenergized leaving the cooperating selector member in displaced condition.

4. In an automatic phonograph of the type controllable by a plurality of selector members displaceable in a predetermined direction and adapted when displaced to control the playing of selected recordings, a carrier cooperatively associated with and movable relative to said selector members, a selector member displacing element mounted on said carrier for movement relative to the carrier in the direction of movement of said selector members and movable with said carrier into position to displace a selected selector member, electromagnetic means for effecting movement of said displacing element, means for operating said electromagnetic means to effect movement of said displacing element only when said carrier is positioned to locate said element in alignment with a selected selector member, said last mentioned means including a switch in circuit with the said electromagnetic means and switch operating means movable with said carrier for effecting operation of said switch to render said electromagnetic means operative to move said displacing element only when said element is positioned to displace a selector member, and automatic means for returning said displacing element to normal position after the electromagnetic means is deenergized leaving the cooperating selector member in displaced condition.

5. In an automatic phonograph of the type controllable by a plurality of selector members displaceable in a predetermined direction and adapted when displaced to control the playing of selected recordings, a carrier cooperatively associated with and movable relative to said selector members, a selector displacing element mounted on said carrier and movable with said carrier into position to displace selected selector members, means associated with the carrier for effecting movement of the carrier to align a selected selector member and the selector member displacing element upon their being brought into approximate alignment, means positionally correlated with said selector members and carrier to prevent movement of said selector member displacing element to displace a selected member unless said element is positioned properly to displace the selected member, and automatic means for returning the displacing element to normal position after its actuation leaving the cooperating selector member in displaced condition.

6. Apparatus of the character described, including a plurality of unlocked selector elements selectively movable from non-selecting to selecting position, a member common to and disposed in operative relation to said elements for selective movement into substantially registering alignment with one or another of said elements and for operative movement in a direction to move an aligned selector element to selecting position, means for effecting operative movement of said member in said direction, means for preventing said last mentioned means from effecting said operative movement of said member unless said member is substantially aligned with a selector element, and automatic means for returning said

17 common member to normal position after its actuation leaving the aligned selector element in displaced condition.

7. Apparatus for operating selector elements of the type selectively movable from non-selecting to selecting position, including in combination, a member common to and disposed in operative relation to said elements for selective movement into substantially registering alignment with one or another of said elements and for operative movement in a direction to move an aligned selector element to selecting position, electro-magnetic means for effecting operative movement of said member in said direction, means for preventing said electro-magnetic means from effecting said operative movement of said member unless said member is substantially aligned with a selector element, and automatic means for returning said common member to normal position after the electromagnetic means is deenergized leaving the cooperating selector element in displaced condition.

8. Apparatus of the character described, including a plurality of unlocked selector elements selectively movable from nonselecting to selecting position, a member common to and disposed in operative relation to said elements for selective movement into substantially registering alignment with one or another of said elements and for operative movement in a direction to move an aligned selector element to selecting position, means operable to produce operative movement of said member in said direction, means including structure mechanically independent of said selector elements for operating said last mentioned means only when said member is substantially aligned with a selector element, and automatic means for returning said common member to its normal position after its actuation leaving the cooperating selector element in displaced condition.

9. Apparatus for operating selector elements of the type selectively movable from nonselecting to selecting position, including in combination, a member common to and disposed in operative relation to said elements for selective movement into substantially registering alignment with one or another of said elements and for operative movement in a direction to move an aligned selector element to selecting position, electromagnetic means operable to produce operative movement of said member in said direction, circuit controlling means for operating said last mentioned means only when said member is substantially aligned with a selector element, and automatic means for returning said common member to normal position after the electromagnetic means is deenergized leaving the cooperating selector element in displaced condition.

10. Apparatus of the character described, including a plurality of unlocked selector elements selectively movable from nonselecting to selecting position, a member common to and disposed in operative relation to said elements for selective movement into substantially registering alignment with one or another of said elements and for operative movement in a direction to move an aligned selector element to selecting position, manually operable means connected to said member for effecting both selective and operative movement of said member in said direction, means including structure associated with said manually operable means and mechanically independent of said selector elements for effecting operative movement thereof only when

said member is substantially aligned with a selector element, and automatic means for returning said common member to its normal position after actuation leaving the cooperating selector element in displaced condition.

11. Apparatus for operating selector elements of the type selectively movable from nonselecting to selecting position, including in combination, a member common to and disposed in operative relation to said elements for selective movement into substantially registering alignment with one or another of said elements and for operative movement in a direction to move an aligned selector element to selecting position, means operable to produce operative movement of said member in said direction, means for operating said last mentioned means only when said member is substantially aligned with a selector element, means including resiliently actuated means movable relative to said member for aligning said member with selected elements, and automatic means for returning said common member to its normal position after its actuation leaving the cooperating selector element in displaced condition.

12. Apparatus for operating selector elements of the type selectively movable from nonselecting to selecting position, including in combination, a member common to and disposed in operative relation to said elements for selective movement into substantially registering alignment with one or another of said elements and for operative movement in a direction to move an aligned selector element to selecting position, means operable to produce operative movement of said member in said direction, means for operating said last mentioned means only when said member is substantially aligned with a selector element, means including resiliently biased structure movable with and relative to said member for aligning said member with selected elements and automatic means for returning said common member to normal position after its actuation leaving the cooperating selector element in displaced condition.

13. In a selector for actuation of one or several of a plurality of actuatable selector elements, a series of unlocked selector elements each independently movable from an unactuated to an actuated position, selector actuating means movable in a plane into and past alignment with any one of said selector elements, said selector actuating means being also movable in a second plane to actuate a selector element after alignment therewith, means for preventing motion of said selector actuating means in said second plane except after operative alignment with a selector element has been effected, and automatic means for returning said selector actuating means to normal position after its actuation leaving the cooperating selector element in displaced condition.

14. Apparatus of the character described, including a plurality of unlocked selector elements selectively movable from non-selecting to selecting position, a member common to and disposed in operative relation to said elements for selective movement into substantially registering alignment with one or another of said elements and for operative movement in a direction to move an aligned selector element to selecting position, means for effecting operative movement of said member in said direction, means mechanically positionally correlating said member and selector elements but mechanically inde-

19

pendent of said selector elements for preventing said last mentioned means from effecting said operative movement of said member unless said member is substantially aligned with a selector element, and automatic means for returning said common member to normal position after its actuation leaving the cooperating selector element in displaced condition.

15. In an automatic phonograph, a plurality of circularly arranged unlocked selector members displaceable in a predetermined direction and adapted when displaced to control the playing of selected recordings, a carrier cooperatively associated with and rotatable relative to said selector members, a selector member displacing element on said rotatable carrier and rigidly connected to the latter and movable with it into position to displace selected selector members, means for rotating the carrier to align a selector member and the selector member displacing element, means for moving said selector member displacing element to displace a selected selector member, structure positionally correlating said selector members and carrier and the selector member displacing element and mechanically independent of said selector members for preventing movement of said selector member displacing element to displace a selected member unless said

20

element is positioned properly to displace the selected member and automatic means for returning said displacing element to normal position after its actuation leaving the cooperating selector member in displaced condition.

OLGIERD GIERWIATOWSKI.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,040,839	Fator	May 19, 1936
2,119,251	Smyth	May 31, 1938
2,233,026	Mock	Feb. 25, 1941
2,235,943	Myllins	Mar. 25, 1941
2,255,216	Henry	Sept. 9, 1941
2,257,019	Brinkert	Sept. 23, 1941
2,319,945	Osborne	May 25, 1943
2,332,631	Gasser	Oct. 26, 1943
2,429,160	Helmstein et al.	Oct. 14, 1947

FOREIGN PATENTS

Number	Country	Date
23,343 of 1902	Great Britain	July 20, 1903
165,386	Germany	Nov. 13, 1905