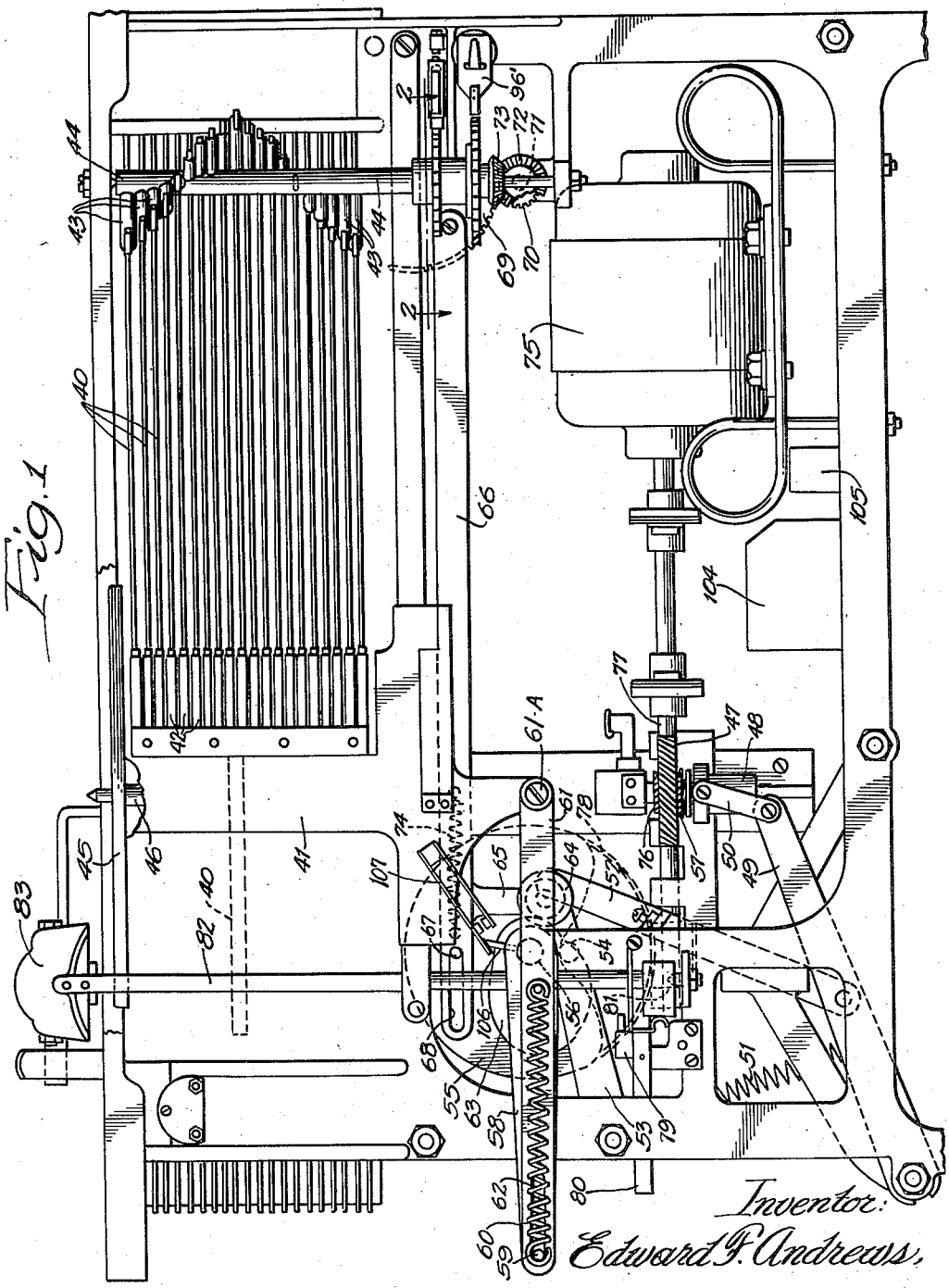
Nov. 21, 1950 E. F. ANDREWS 2,531,374

SELECTOR MECHANISM FOR AUTOMATIC PHONOGRAPHS

Filed Aug. 9, 1943 11 Sheets-Sheet 1

Fig. 1



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Nov. 21, 1950 E. F. ANDREWS 2,531,374

SELECTOR MECHANISM FOR AUTOMATIC PHONOGRAPHS

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Fig. 2

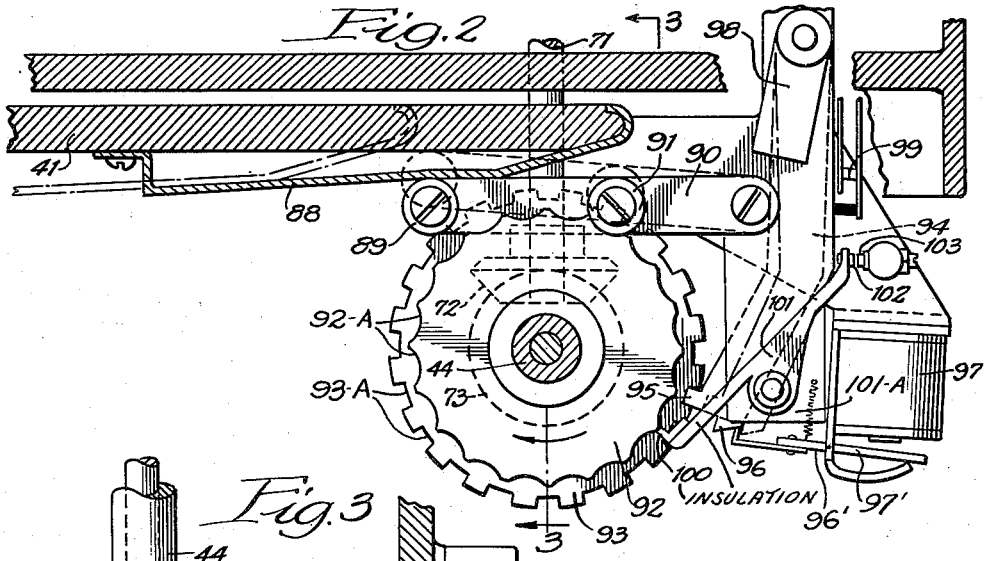
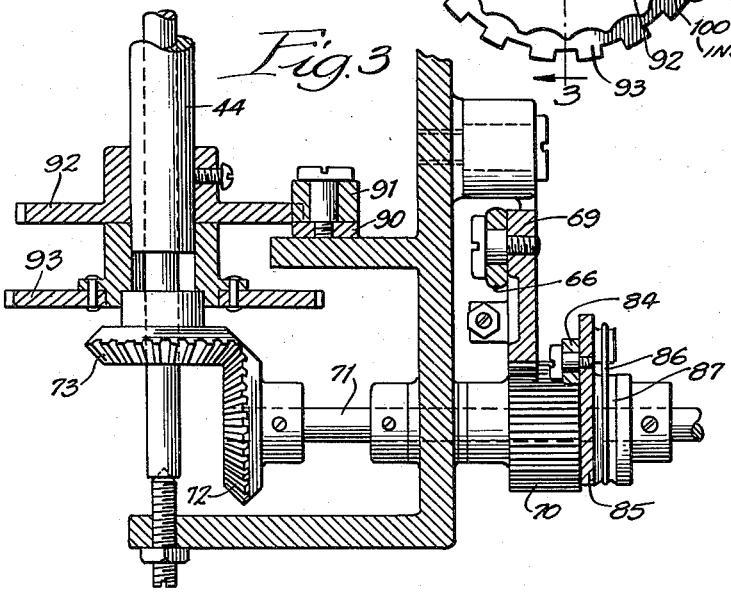


Fig. 3



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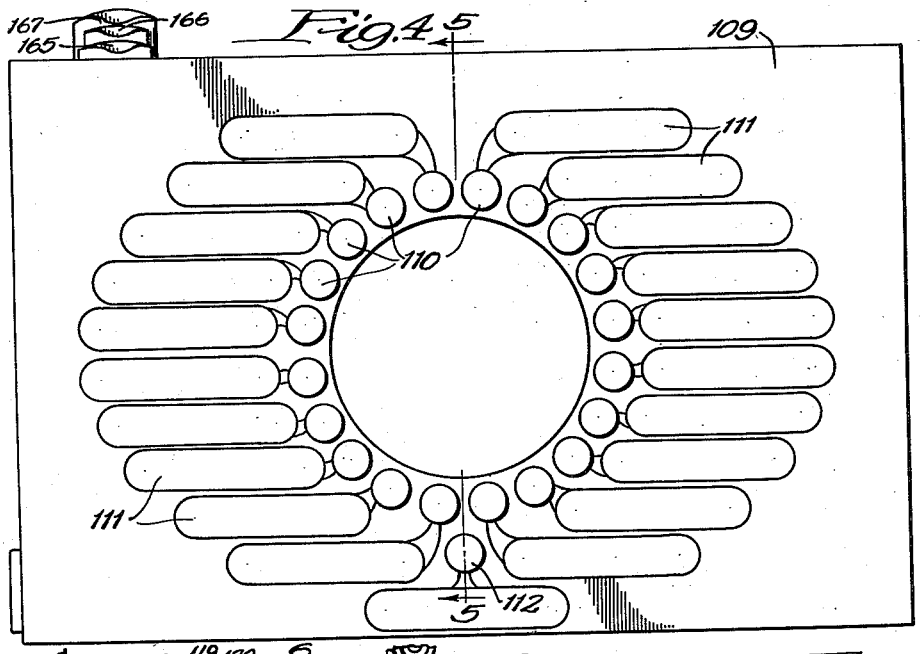
Nov. 21, 1950 E. F. ANDREWS 2,531,374

SELECTOR MECHANISM FOR AUTOMATIC PHONOGRAPHS

Filed Aug. 9, 1943 11 Sheets-Sheet 3

Fig. 4



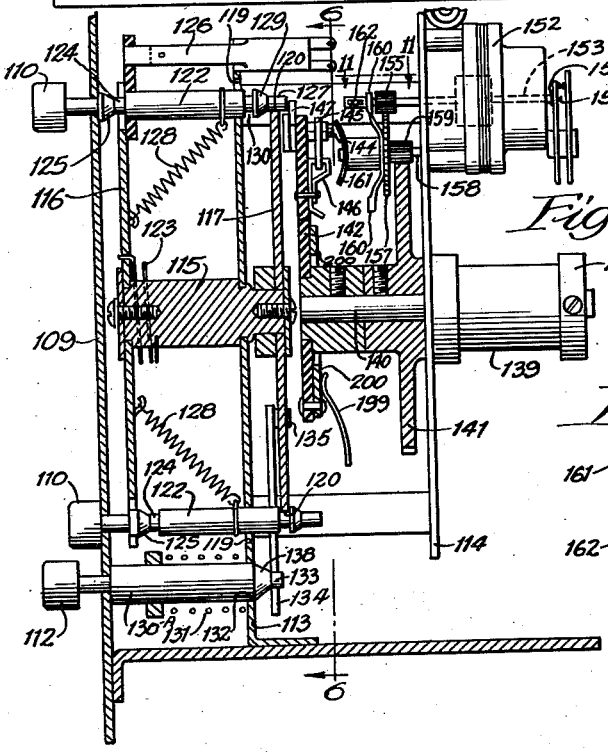


Fig. 5

Fig. 11

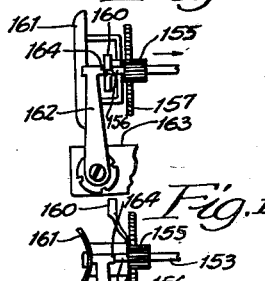


Fig. 12

Fig. 14

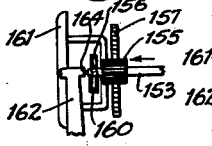
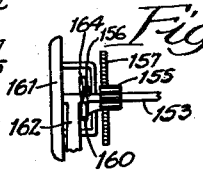


Fig. 13



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Nov. 21, 1950 E. F. ANDREWS 2,531,374

SELECTOR MECHANISM FOR AUTOMATIC PHONOGRAPHS

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Fig. 6

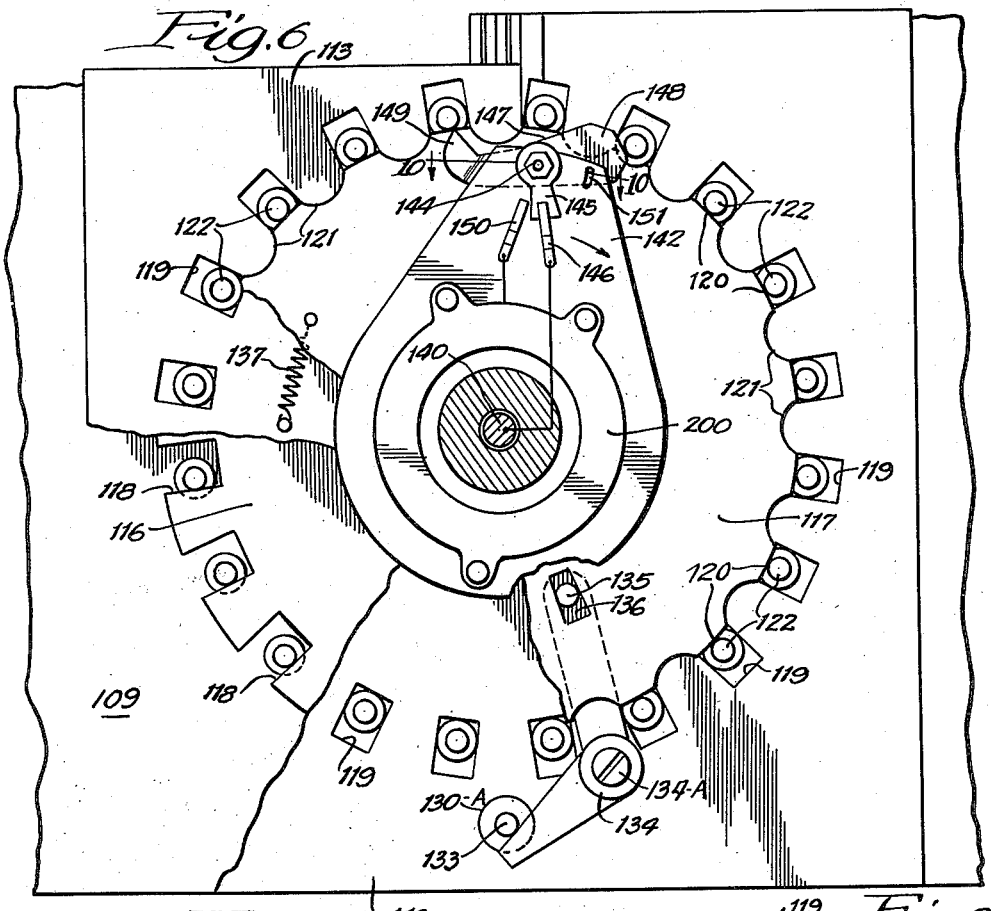


Fig. 7

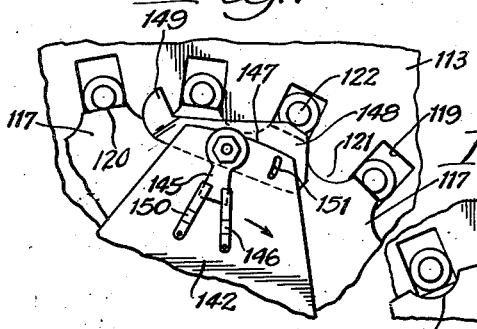


Fig. 8

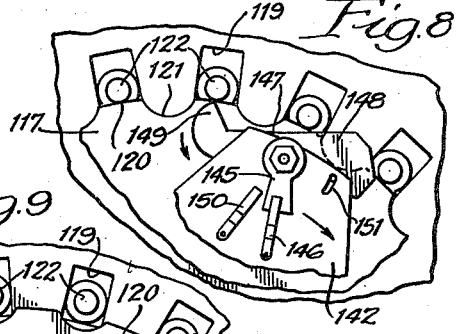


Fig. 9

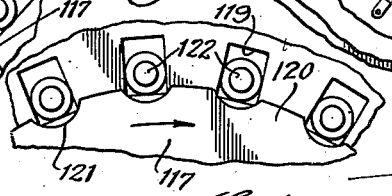
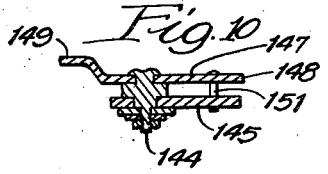


Fig. 10



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Nov. 21, 1950 E. F. ANDREWS 2,531,374

SELECTOR MECHANISM FOR AUTOMATIC PHONOGRAPHS

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Fig. 15

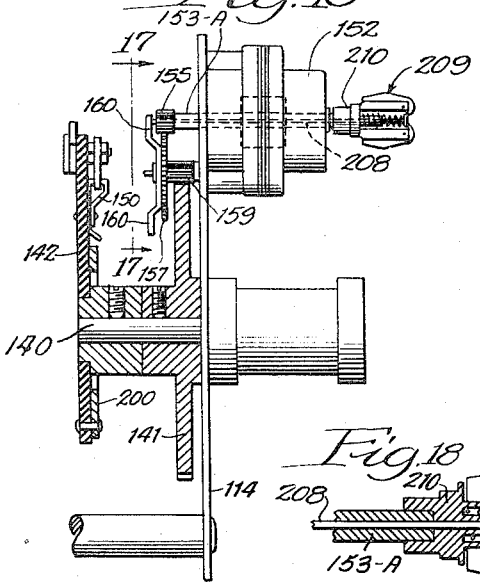


Fig. 16

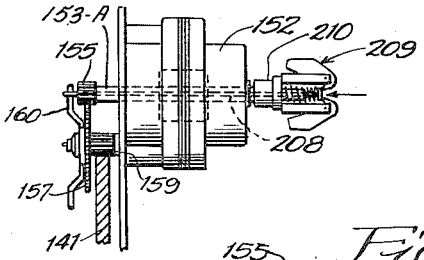


Fig. 17

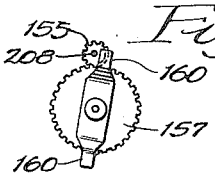


Fig. 18

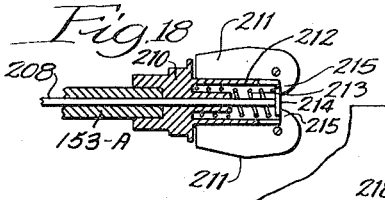


Fig. 19

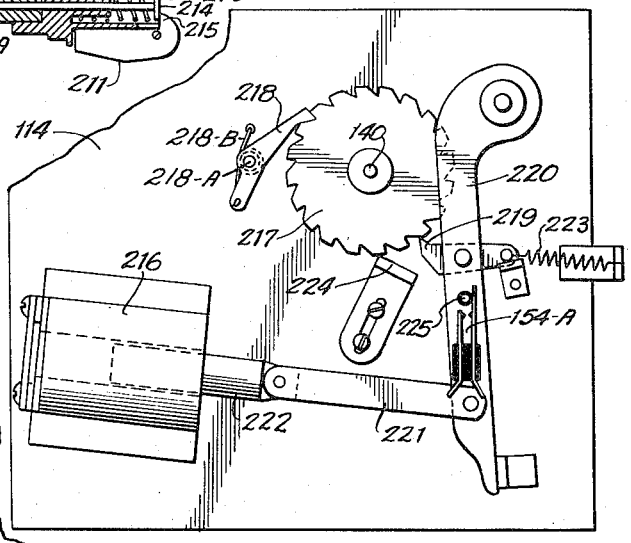
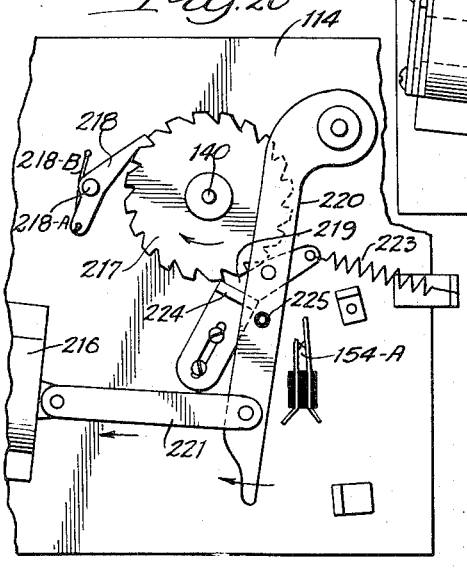


Fig. 20



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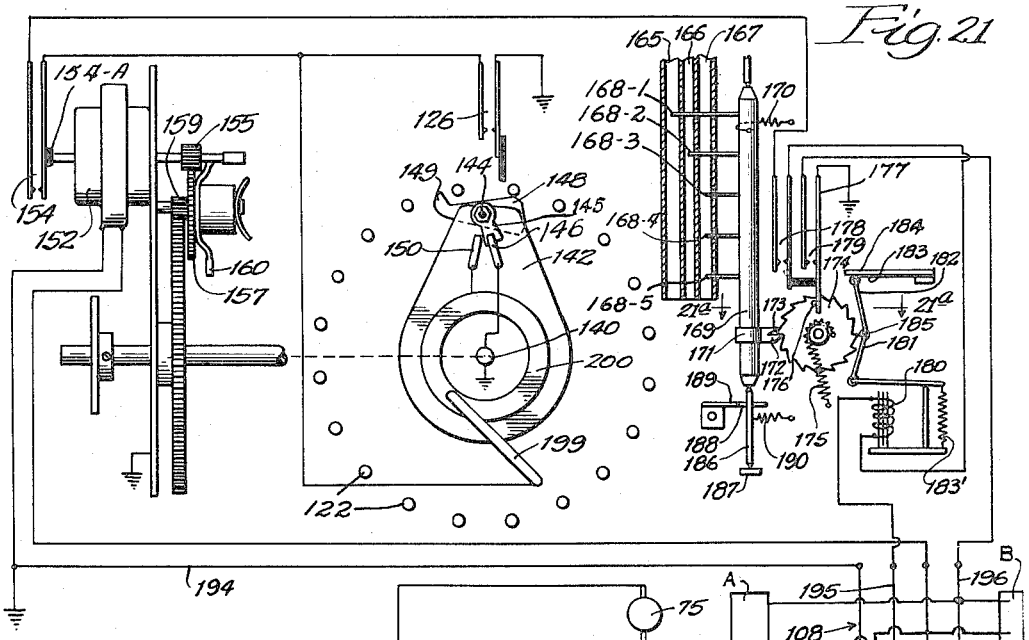
Nov. 21, 1950 E. F. ANDREWS 2,531,374

SELECTOR MECHANISM FOR AUTOMATIC PHONOGRAPHS

Filed Aug. 9, 1943 11 Sheets-Sheet 6

Fig. 21



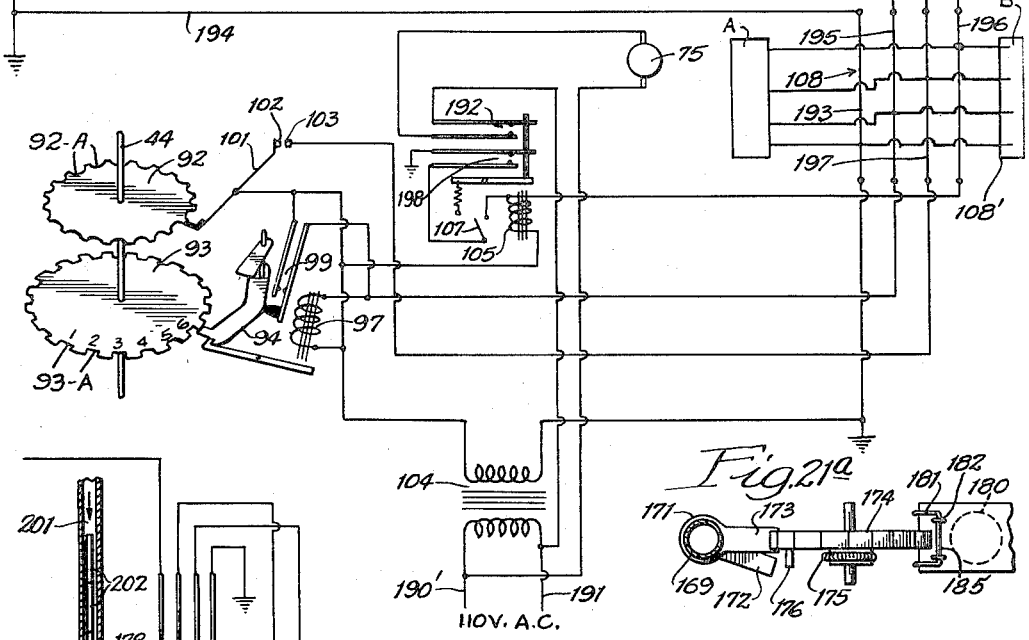
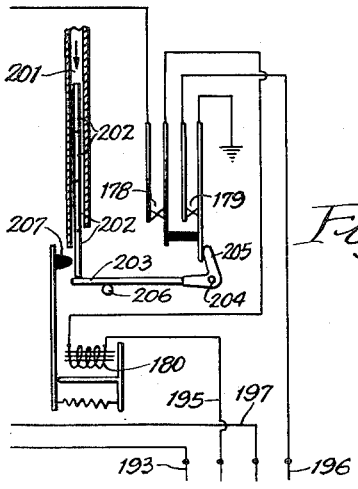


Fig. 21a

Fig. 22



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Nov. 21, 1950 E. F. ANDREWS 2,531,374

SELECTOR MECHANISM FOR AUTOMATIC PHONOGRAPHS

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Fig. 23

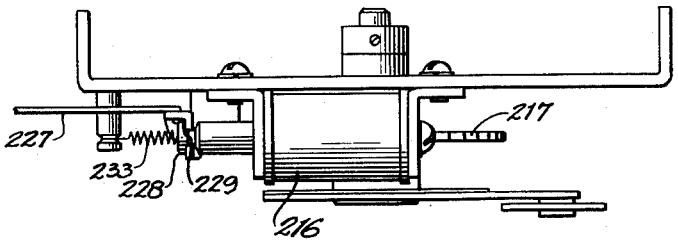
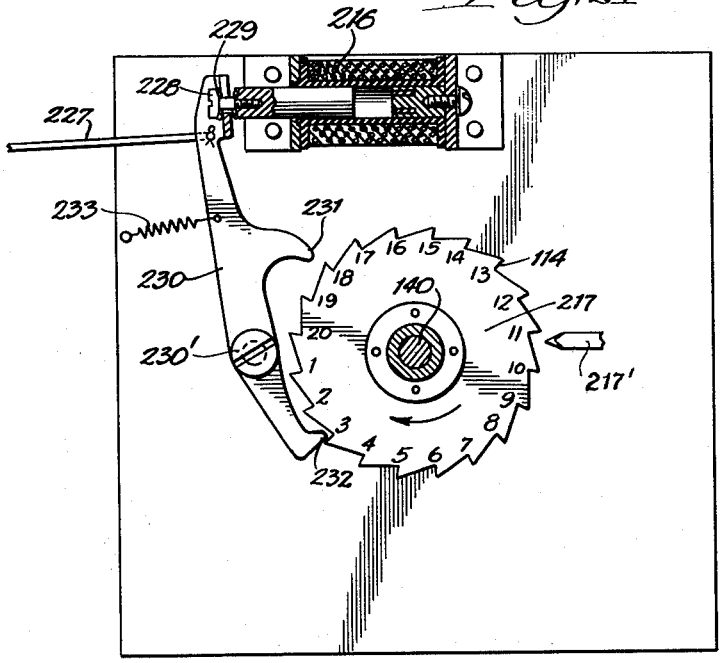


Fig. 24



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SELECTOR MECHANISM FOR AUTOMATIC PHONOGRAPHS

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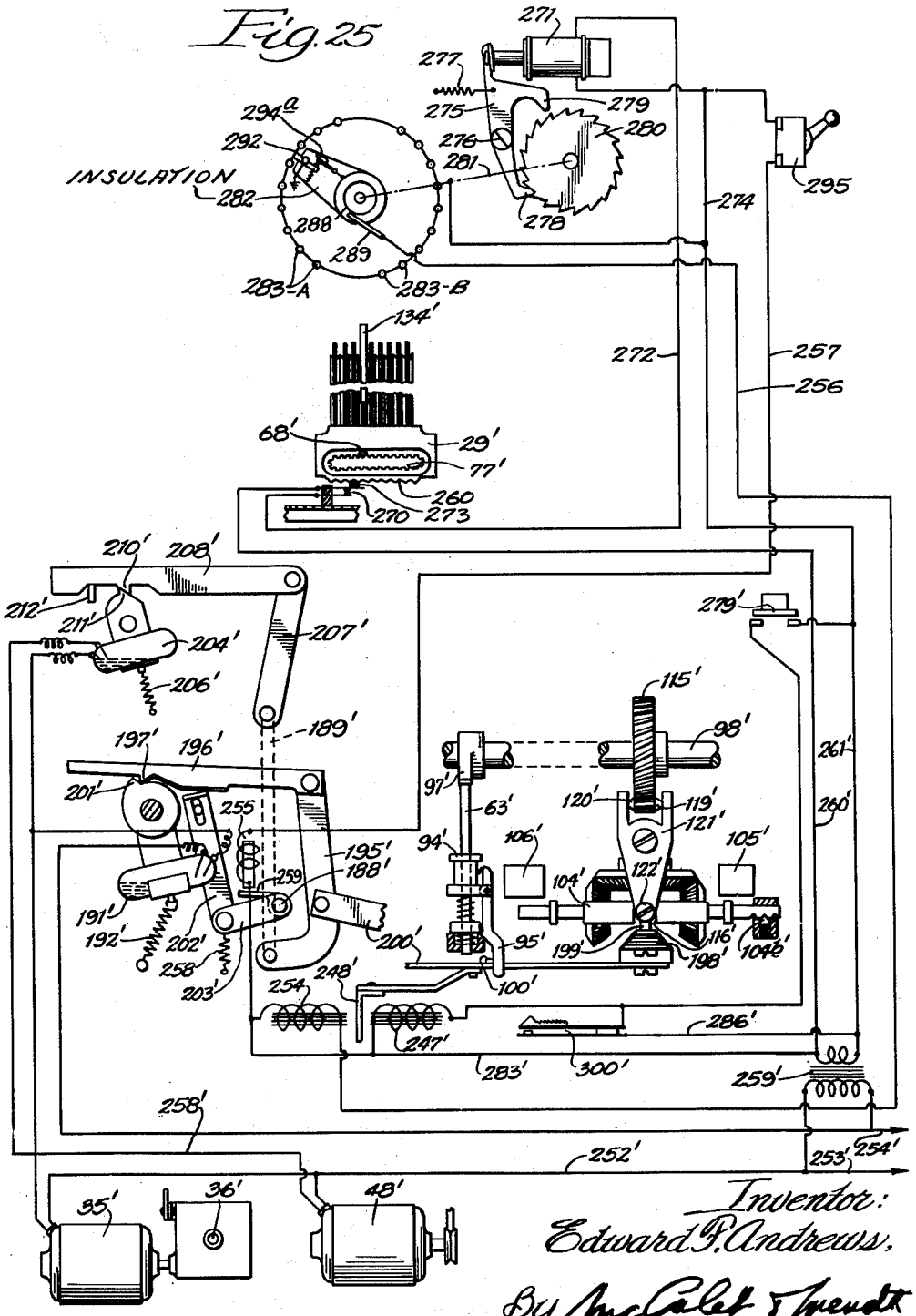
Fig. 25



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Nov. 21, 1950 E. F. ANDREWS 2,531,374

SELECTOR MECHANISM FOR AUTOMATIC PHONOGRAPHS

Filed Aug. 9, 1943 11 Sheets-Sheet 9

Fig. 26

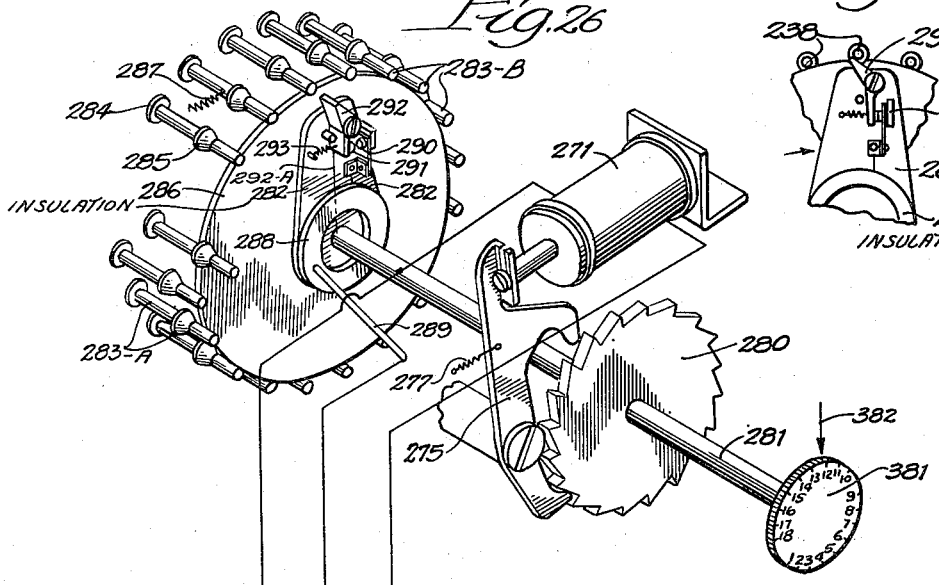
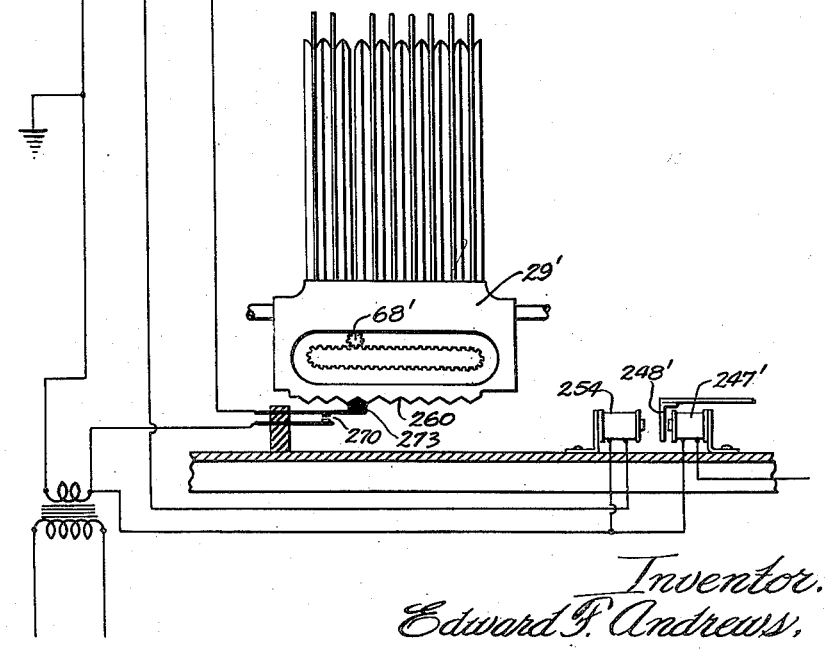


Fig. 27



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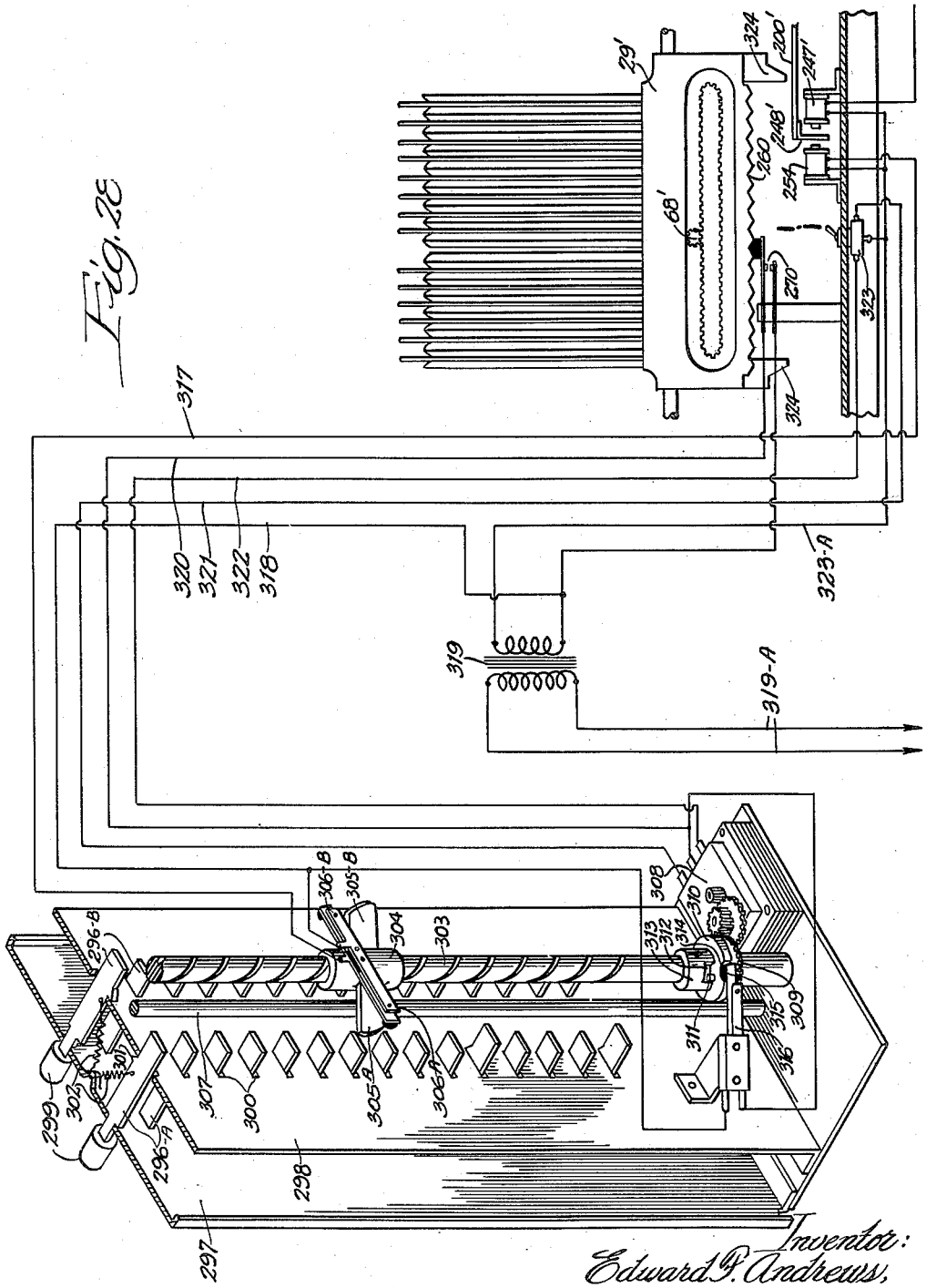
Nov. 21, 1950 E. F. ANDREWS 2,531,374

SELECTOR MECHANISM FOR AUTOMATIC PHONOGRAPHS

Filed Aug. 9, 1943 11 Sheets-Sheet 10

Fig. 28



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SELECTOR MECHANISM FOR AUTOMATIC PHONOGRAPHS

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Fig. 31.

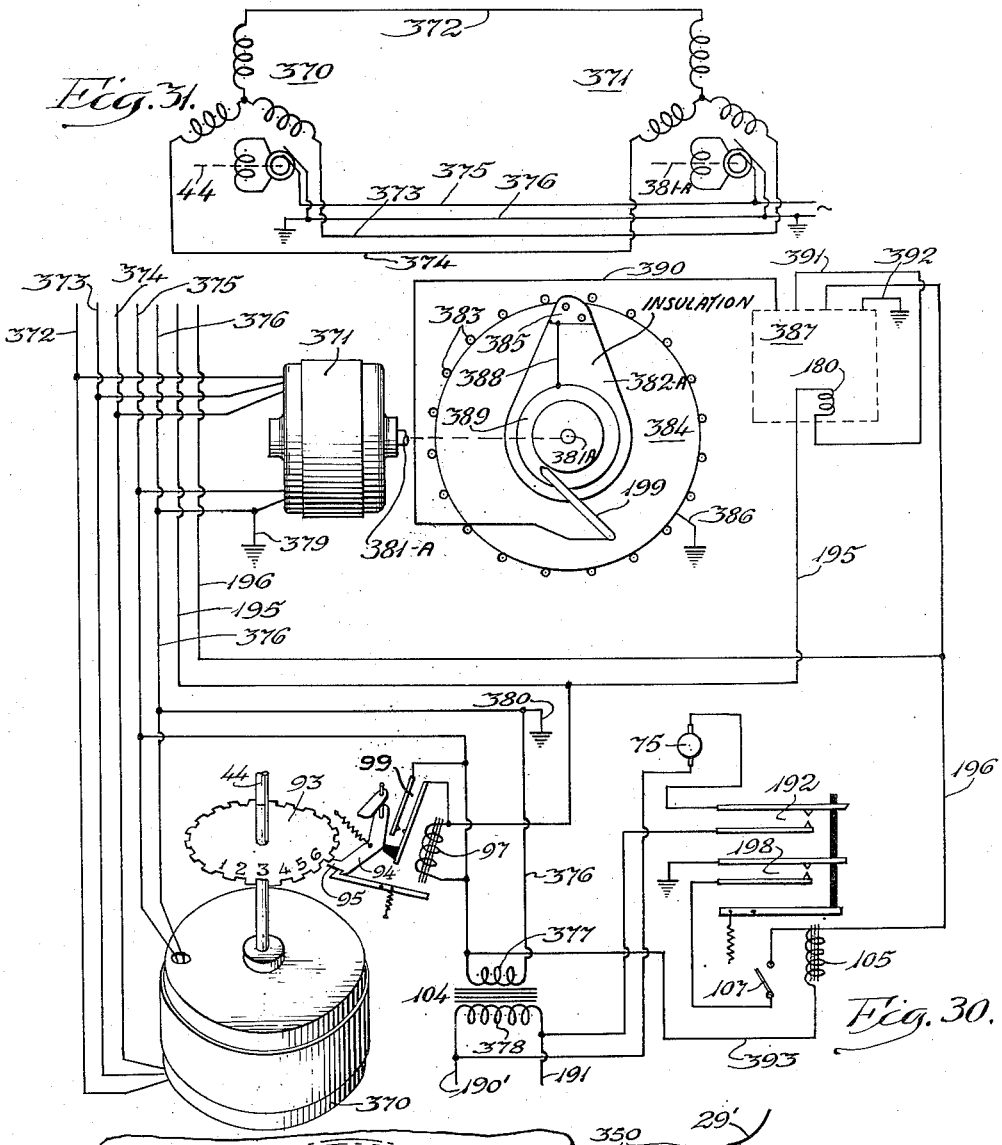

Fig. 30.

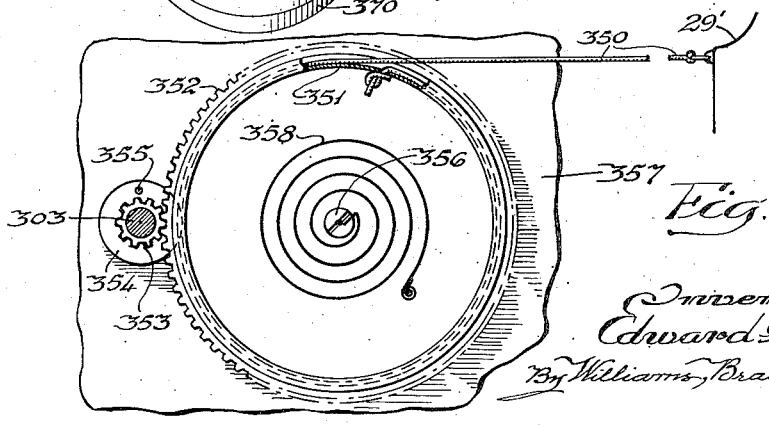

Fig. 29.

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Patented Nov. 21, 1950 2,531,374

UNITED STATES PATENT OFFICE

2,531,374

SELECTOR MECHANISM FOR AUTOMATIC PHONOGRAPHS

Edward F. Andrews, Chicago, Ill., assignor, by mesne assignments, to J. P. Seeburg Corporation, Chicago, Ill., a corporation of Illinois

Application August 9, 1943, Serial No. 497,920

7 Claims. (Cl. 274—10)

1

This invention relates to automatic phonographs, and more particularly to selectors for such phonographs, whereby any desired record in the magazine may be selected and reproduced at the will of the operator. The instant application is a continuation-in-part of my copending application, Serial No. 332,175, filed April 29, 1940, now abandoned.

One of the objects of the present invention is to provide an improved selector for phonographs.

Another object of the invention is to provide an improved selector which may be mounted on the phonograph or which may be located in remote relation thereto.

A further object of the invention is to provide an improved selector for automatic phonographs, said selector being adapted and arranged for connection of a plurality thereof to a single phonograph.

A further object of the invention is to provide an improved selector for automatic phonographs which is adapted for connection to any of a large number of types of phonograph.

A further object of the invention is to provide a selector for an automatic phonograph comprising means on the phonograph and means in the control unit adapted to move synchronously, and having means in the remote control unit for arresting both synchronously moving means, to determine the playing of a particular record.

A further object of the invention is to provide an improved selector for an automatic phonograph of this type in which the means on the phonograph, moving in synchronism with the control unit, is driven by the phonograph mechanism to control the operation of the means on the selector unit, the first said means being arrested by an impulse from the control unit.

A further object of the invention is to provide a system of this type in which the synchronized means on the phonograph is rotatable, and the synchronized means on the control unit is also rotatable.

A further object of the invention is to provide a system of this type in which the synchronized means on the phonograph is reciprocatory, and the synchronized means on the control unit is rotatable.

A further object of the invention is to provide a system of this type in which the synchronized means on the phonograph is reciprocatory, and the synchronized means on the control unit is also reciprocatory.

A further object of the invention is to provide a selector comprising a circle of actuable elements in the path of a rotating member adapted to cooperate with an actuated element to cause the playing of a recording on one face of a double-faced disc record, and to cooperate with another of said elements to cause the playing of

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the recording on the other side of the same record.

A further object of the invention is to provide a selector in which a plurality of selector elements move in synchronism with a movable selector means on the phonograph until an electrical impulse controlled by one of said selector elements effects the selection of the desired recording.

A further object of the invention is to provide means for maintaining a plurality of selector units in synchronism with each other so that any recording can be played by a manual selecting operation performed at any one of said selector units.

A further object of the invention is to provide an electromagnetic escapement adapted to move a member past a series of selector elements in such a manner as to cause an electrical impulse effective to cause the playing of a desired recording when the moving member encounters an actuated one of the series of selector elements.

A further object is to provide a selector comprising a member moving past a series of actuable elements and an electromagnetic escapement adapted to produce the selecting impulse upon the energization of the escapement, and to restore an actuated element to unactuated position when the escapement is de-energized.

A further object of the invention is to provide one or more selector units synchronized with selector means on a selective automatic phonograph and remote therefrom, adapted by manual means at the selector unit to produce an electrical impulse which, when transmitted to the selector means on the phonograph, will cause the selection of the desired recording.

A further object of the invention is to provide improved coin control means.

A further object of the invention is to provide a selector for selective automatic phonographs in which a moving selector device associated with the phonograph produces a series of electrical impulses to cause the corresponding movement of a selector member in synchronism therewith, which member cooperates with manually controlled means for electrically arresting the selector device to effect the selection of any desired recording.

A further object of the invention is to provide a remote control selector comprising an electromagnetic escapement for maintaining synchronism between a moving member in the selector unit and a moving selector element associated with the phonograph.

Another object of the present invention is the provision of a new and improved selector system for automatic phonographs wherein movable members at the selector units are maintained in synchronism by electrical means resiliently tend-

ing to maintain and to restore the members in corresponding positions; and, furthermore, wherein the members are self-synchronized at all times except during power outages, and wherein they are synchronized after power is again supplied to the system.

Another object of the present invention is to provide a new and improved selector system for an automatic phonograph wherein selections to be played are stored at a remote selector unit and are individually transferred to the phonograph as the selections are played.

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

Fig. 1 is an elevational view, partly broken away, of a chassis of a phonograph to which my invention may be applied;

Fig. 2 is an enlarged sectional plan detail view, with parts omitted, the section being taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional detail, the section being taken on the line 3—3 of Fig. 2 and rotated ninety degrees clockwise. The view also includes parts not shown in Fig. 2;

Fig. 4 is a front view of a selector unit embodying my invention. One of these units may be located at some suitable place upon the cabinet housing the phonograph chassis illustrated in Fig. 1, as at the front thereof, and other units may be located at various places near or far from the phonograph;

Fig. 5 is a fragmentary vertical section therethrough, the section being taken on the broken line 5—5 of Fig. 4;

Fig. 6 is an enlarged sectional elevation, partly broken away, of the selector shown in Figs. 4 and 5, the section being taken on the line 6—6 of Fig. 5;

Fig. 7 is a fragmentary view similar to Fig. 6 showing the elements in a different position of adjustment;

Fig. 8 is a similar fragmentary view showing the manner in which the contact controlling dog is returned to initial position;

Fig. 9 is a fragmentary view similar to Figs. 7 and 8 showing the manner in which the cancel disc 117 is moved to release actuated pins;

Fig. 10 is a fragmentary sectional detail taken along line 10—10 of Fig. 6 and showing the contact controlling dog and the contact arm in section;

Fig. 11 is a fragmentary sectional view, the section being taken on the line 11—11 of Fig. 5, showing certain elements adapted to arrest the motor after a predetermined degree of revolution;

Fig. 12 is a similar view showing the parts in different relation;

Fig. 13 is still another similar view showing the parts in another relation;

Fig. 14 is a similar view showing the parts in a still further position;

Fig. 15 is a fragmentary elevational view, partly in section, showing a modified form of the invention shown in Fig. 5, particularly, and involving in particular a modified form of motor control;

Fig. 16 is a fragmentary view showing part of Fig. 15, with certain elements in a different position of adjustment;

Fig. 17 is an elevational detail view, as seen on the line 17—17 of Fig. 15;

Fig. 18 is an enlarged fragmentary sectional view, taken axially of pin 208 in Figs. 15 and 16, and showing the details of the governor control shown in Figs. 15 and 16;

Fig. 19 is an elevational view of a modified form of the invention, in which a solenoid is employed instead of a motor;

Fig. 20 is a similar fragmentary view showing the parts of the embodiment of Fig. 19 in a different position of adjustment;

Fig. 21 is a diagrammatic view of the selector illustrated in Figs. 1 to 14 inclusive, provided with a coin controlled mechanism in the remote selector unit;

Fig. 21a is a sectional detail taken on the line 21a—21a of Fig. 21;

Fig. 22 is a diagrammatic view showing a modified form of coin control;

Fig. 23 is a plan view showing a modified form of the invention, employing a solenoid and escapement drive;

Fig. 24 is an elevational view, partly in section, showing the drive elements of Fig. 23;

Fig. 25 is a diagrammatic view showing the manner in which my improved selector is adapted to another automatic phonograph;

Fig. 26 is a diagrammatic view showing in perspective part of the structural elements of the system shown in Fig. 25;

Fig. 27 is a fragmentary view of certain elements shown in Fig. 26, and illustrating the manner in which the impulse switch is closed and the actuated pin returned to normal position;

Fig. 28 is a diagrammatic view showing a modified form of selector in which an element moves successively in one direction and in the other direction, controlling a phonograph of the type illustrated diagrammatically in Fig. 25;

Fig. 29 is a fragmentary elevational view illustrating a modification of the embodiment of the invention illustrated in Fig. 28;

Fig. 30 is a diagrammatic view of another embodiment of the present invention illustrating a different type of synchronizing apparatus; and

Fig. 31 is a diagrammatic representation of the electrical connections of a portion of the apparatus shown in Fig. 30.

Referring to the drawings, Fig. 1 illustrates the chassis of a known automatic phonograph, manufactured by the J. P. Seeburg Corporation, which is disclosed in detail in Carl G. Freborg Patent No. 2,237,139, dated April 1, 1941, and Carl G. Freborg et al. Patent No. 2,243,698, dated May 27, 1941. The machine about to be described and in conjunction with which the present invention is shown, is best illustrated in Patent No. 2,237,139 and it corresponds particularly to the embodiment illustrated in Figs. 14, 15 and 16 of this patent, which embodiment is a modification illustrated in Figs. 1 to 13, inclusive, of the patent. Inasmuch as the details of construction and operation may be found in the said patents, only such description of the apparatus as is deemed necessary for a clear understanding of the present invention is included herein. This machine in general comprises a plurality of slidably mounted and apertured record carriers 40, which are adapted to be translated individually from the right to the left for playing, by means of a reciprocable carriage 41. The carriage 41 is provided with a plurality of record carrier engaging means 42, there being one such means for each record carrier. The engagement of one of the record carrier engaging means 42 with its associated carrier 40 is controlled by an assembly of arms 43 which are mounted so as to project out-

wardly from a vertical shaft 44. The arms 43 are arranged at various heights so that each is adapted to engage one of the record carrier engaging means 42. For this purpose, the arms 43 are arranged on the shaft 44 in helical fashion so that only one of the arms 43, in any particular position of the shaft 44, is able to engage its associated carrier engaging means 42. A more detailed description of this apparatus may be found in the above mentioned Patent No. 2,237,139.

The phonograph comprises a turntable 45, which is adapted to be raised into its full line position in Fig. 1, that is, a position above the level of the stack of record carriers 40, and to be moved downwardly into a position below the level of the stack of record carriers 40. The shaft 46 of the turntable passes freely through a turntable driving gear 47. When the turntable is in its uppermost position, the gear 47 is operatively connected to the shaft 46 by a clutch 57 including a member secured to shaft 46 and adapted to be connected to gear 47, as clearly set forth in said Patent No. 2,237,139. The lower end of the shaft 46 is supported by a bearing 48 operatively connected to and movable with the shaft, and to which an arm 49 is connected by a link 50. The arm 49 is biased upwardly by a strong spring 51 connected to the arm. The arm 49 is connected by a link 52 to an arm 53, pivotally mounted on the chassis. The arm 53 carries a roller 54, which is adapted to cooperate with a cam 55 mounted on the cam shaft 56, which extends across the chassis. It will be understood that when the cam 55 rotates from the position shown in Fig. 1, the arm 53, link 52, and arm 49 will be moved downwardly against the tension of the spring 51, and that the turntable 45 will be moved to its lowermost position, below the level of the stack of record carriers 40. During the latter part of a complete revolution of the cam 55, the turntable 45 will be moved up by the spring 51 to its uppermost position, in which it is shown in Fig. 1.

The cam shaft 56 carries an arm 58, which is connected through pin 59 and spring 60 to a link 61. The link 61 is pivotally connected at 61—A to the carriage 41, so that this carriage is caused to move to the right and back to the left during each revolution of the cam shaft 56. The pin 59 is located in a slot 62 in the link 61 to provide for lost motion at the left hand position of the carriage 41.

The cam shaft 56 carries a cam 63, which is adapted to cooperate with a roller 64. The roller 64 is carried by an arm 65, which depends from a link 66. The link 66 is supported at one end by a pin 67, carried by the chassis, this pin extending through a slot 68 at one end of the link 66. The opposite end of the link 66 is connected to a toothed sector 69, which is pivotally mounted on the chassis, and engages a pinion 70 on a shaft 71. The shaft 71 carries a bevel gear 72, which meshes with a bevel gear 73 on the shaft 44. The link 66 is biased to the left, as viewed in Fig. 1, by a spring 74 suitably connected to the link and the chassis. The pinion 70 is freely mounted on the shaft 71 and is engaged by a dog 84 carried by a plate 85 (Fig. 3) also free on the shaft 71. The plate 85 carries a spring clutch member 86, which is wrapped around a boss 87, rigidly mounted on the shaft 71. When the link 66 moves to the right, as viewed in Fig. 1, the plate 85 is moved in clockwise direction, as viewed from the left in Fig. 3, and the spring clutch member 86 causes the shaft 71 to move in the same direction. If the shaft 71 is held against rotation, the clutch member 86 slips on the boss 87. When the link 66 moves in the opposite direction, that is, toward the left, as viewed in Fig. 1, the sector 69 merely rotates the pinion 70, this pinion slipping past the dog 84 during this reverse movement. The shafts 44 and 71 are held against rotation, when the carriage is at the right end and the desired carrier is to be selected, and the parts are properly positioned by the engagement of an abutment member 88 on the carriage 41 with a roller 89 on an arm 90 (Fig. 2). The arm 90 carries a roller 91, which engages any one of the notches 92—A of a notched wheel 92, which is rigidly mounted on the shaft 44. The wheel 92 has a peripheral series of uniformly spaced notches 92—A which correspond in number to the arms 43. After the carriage 41 has moved to the left, as viewed in Fig. 2, carrying with it a record carrier, the roller 91 is ineffective to hold the shafts 44 and 71 against rotation.

The cam 63 and associated parts are arranged so that on each revolution of the cam shaft 56, the shaft 44 is given a complete revolution. In the machine disclosed in the aforesaid Patent No. 2,237,139, the shaft 44 is given a complete revolution and an additional angular movement corresponding to the angle between two adjacent arms 43. This same degree of rotation may be used in the present embodiment, although as actually shown, the cam 63 is arranged to give the shaft 44 a complete revolution for each rotation of the cam shaft 56.

The machine is operated by a motor 75. When the motor 75 is operating, the gear 47 is driven continuously by means of a worm 76 on a shaft 77 coupled to the shaft of the motor. The cam shaft 56 is operated periodically from the motor through a gear 78 (shown only diagrammatically), which is driven by a worm gear (not shown) actuated by the shaft 77. Clutch means (also not shown) controlled by a latch arm 79 connect said worm gear to the shaft 77. The latch arm 79 is held in declutching position during playing of a record by means of a latch member 80. The latch arm 80 is actuated by player arm trip means 81, carried by a shaft 82, to effect release of the latch 80. The shaft 82 serves as a pivotal mounting for the player arm 83. When the arm 83 moves inwardly to a sufficient degree toward the center of the record, or when the arm 83 is subjected to an oscillatory movement due to an eccentric groove at the center of the record, the member 81 releases the latch 80 so that rotation of the cam shaft 56 ensues. Means (not shown) are provided on the cam shaft for effecting the relatching of the latch arm 79 at the end of one revolution. The cam shaft 56 also carries a cam which is adapted to swing the tone arm mounting shaft 82 back to initial playing position.

The machine, as thus far described, operates continuously as long as the motor 75 is running. If the turntable is in the position in which it is shown in Fig. 1 and the motor is started, the turntable 45 moves downwardly and at the same time the link 66 begins its movement towards the right, so as to rotate the shaft 44 through at least one revolution. The carriage 41 moves to the right and returns the record carrier 40 in the "out" position back into the stack. When the carriage 41 thus moves to the right, one of its record carrier engaging means 42 is caused to engage its record carried with the aid of the particular arm 43, which is directed away from the observer, as viewed in Fig. 1. The carriage 41

then moves to the left, carrying with it the record carrier which has been thus engaged by one of the record carrier engaging means 42. When the carriage 41 has transported the record carrier with the record supported thereon over an apertured portion thereof to its extreme left position, as viewed in Fig. 1, the turntable moves upwardly, passing through the aperture in the record carrier and receiving the record from that carrier, which record is elevated until it engages the pickup needle. The turntable is now in rotation and playing of the record begins. When the turntable is elevated to its highest position, the latch arm 79 is latched out and the rotation of the cam shaft 56 stops. When the record is completely played, the tone arm releases the latch arm 79 and the cycle is repeated. The turntable 45, moving downwardly, returns the played record to its carrier, which carrier is returned to the stack, when the carrier 41 moves again to the right. In the Symphonola, as manufactured, the cam corresponding to the cam 63 does not become effective until the turntable is moved down to its extreme position and the carriage 41 has started to move to the right. For the purposes of the present invention, it is preferred to rotate the shaft 44 comparatively slowly, and consequently the cam 63 is so formed that rotation of the shaft 44 begins immediately the turntable 45 starts to descend.

Apart from the details noted, the device so far described is, as heretofore indicated, the standard Seeburg machine, which is described and claimed in Patent No. 2,243,698 patented to Carl G. Freborg et al., May 27, 1941, and Patent No. 2,237,139 patented to Carl G. Freborg, April 1, 1941, to which, and particularly the latter, reference is made for the disclosure of details not minutely referred to herein. The device, as thus far described, in an automatic phonograph comprising a member, the shaft 44, which has a plurality of positions, each determinative of a record to be played.

Upon the shaft 44, immediately below the wheel 92, I rigidly mount a latch disc 93 provided with a series of peripheral rectangular recesses 93—A corresponding in number and position to the arms 43. I pivotally mount upon the chassis of the machine a latch arm 94, which is provided with a tooth 95, adapted to enter any one of said recesses, as best shown in Fig. 2. The latch 94 is provided with a detent 96, which is adapted to be engaged with the armature 96' of a relay 97 so as to hold the latch 94 in unlatched position. Rigidly connected to the latch 94 is an arm 98, which is adapted to be engaged by the carriage 41 when it moves to its extreme right hand position (which is somewhat farther to the right than shown in Fig. 2). When the arm 98 is thus moved, the latch 94 is swung to the right, as viewed in Fig. 2, and is held in disengaged position by the armature of the relay 97 until that relay is energized. A leaf switch 99, including two blades, one of which is movable by latch member 94, is adapted to cooperate with the latch member 94. This switch is open when the latch 94 is disengaged and is closed whenever the latch 94 is in latching relation with the latch wheel 93, as shown in Fig. 2.

Means are provided whereby a series of impulses are created during the rotation of the shaft 44. To obtain these impulses, I may conveniently employ the notched wheel 92 as an operating means. This wheel engages a piece of insulation 100 mounted upon an insulated arm 101, which is pivotally mounted on the chassis by means of a suitable bracket 101—A. The arm 101 is provided with a contact 102, which is adapted to engage and disengage contact 103 insulated from the chassis. The arm 101 is biased by a spring (not shown) around its pivot so that the piece of insulation 100 bears against the periphery of the wheel 92. When a projection of this wheel engages the piece of insulation 100, the contacts 102 and 103 are separated; when, however, the piece of insulation 100 moves into a recess of the wheel 92, the contact 102 engages the contact 103. Consequently, if the shaft 44 is rotated through an angle corresponding to a certain number of arms 43, then the contacts 102 and 103 will engage that number of times, so that a corresponding number of impulses will pass through the circuit in which the contacts 102 and 103 are located.

As a suitable place on the chassis I mount a transformer 104 and a relay 105, the circuit connections for which and functions of which will be described in greater detail hereinafter. At a suitable position on the cam shaft 56 is mounted an arm 106, which is adapted to open a switch 107 at the position of the turntable in which it is desired to terminate playing. The preferred position is just when the turntable has begun to move downwardly after the playing of a record.

The selector elements which have been so far described have been those which it is preferred to mount upon the chassis. The remaining elements of the selector, which will now be described, may be assembled in a separate unit, which unit may be mounted upon the chassis of the phonograph or which may be located at any suitable distance therefrom, being connected thereto by suitable wires, as will hereafter be explained. My improved selector is capable of being operated by a plurality of remote control units, to be described shortly, with or without a unit on the cabinet of the phonograph. Selector elements above described are included in the lower portion of Fig. 21. In this figure, the reference numeral 108 (including conductors 193, 195, 196 and 197) indicates a cable of any desired length, whereby the elements of the selector, which are to be described, may be connected to the phonograph device described above. This figure also shows a similar cable 108' (including four conductors branching out from the four specified conductors included in cable 108), showing the manner in which any number of control units (the two illustrated being indicated by reference characters A and B) may be connected to the phonograph. Before describing Fig. 21 in detail, the remainder of the selector elements will be described in connection with the illustrations of their physical elements, more particularly with reference to Figs. 4 to 14.

Referring particularly to Fig. 4, which illustrates a remote control unit which is adapted to be mounted on the cabinet of the phonograph, the reference numeral 109 designates a panel on which are mounted a suitable number of buttons 110 corresponding to the number of selections and the number of arms 43. As will hereinafter appear, each one of these buttons corresponds to one particular arm 43, and can be employed to effect the location of that particular arm 43 in cooperative relation with the record carrier engaging means 42 to result in the reproduction of the corresponding recording. The buttons 110 have associated therewith card-holding pocket means 111, which are adapted to receive cards

bearing the titles of the recordings corresponding to the individual buttons 110. In addition to the buttons 110, there is provided a clearing button 112. As will hereinafter appear, any desired number of the buttons 110 may be pushed inwardly for selection of the corresponding recordings. The button 112 may be pushed in momentarily for the purpose of returning the buttons 110 to their normal outward position without the reproduction of the associated recordings.

Rigidly secured to the panel 109 are frame plates 113 and 114. Rigidly mounted on the plate 113 is a post 115 which projects backward and forward and is located in substantial alignment with the center of the circle formed by the buttons 110. The post 115 provides pivotal mountings for the disc 116, located forwardly of the plate 113, and for a disc 117, located rearwardly of the plate 113. The disc 116 is provided with a circumferential series of notches 118 (Fig. 6) corresponding in number and spacing to the buttons 110. The plate 113 is provided with a similar series of rectangular openings 119. The disc 117 is provided with a corresponding series of projections 120, between which the disc is provided with recesses 121. In normal condition, the openings 119 and the projections 120 are in alignment, as shown in the right hand side of Fig. 6. Each of the buttons 110 is mounted on the outer end of a pin 122, which pins extend through the peripheral notches 118 of the disc 116 and the openings 119 of the plate 113, these pins being normally in alignment with the projections 120. The disc 116 is biased in the clockwise direction, as viewed in Fig. 6, by means of a spring 123 (Fig. 5), so that one of the edges of each of the notches 118 bears up against its associated pin 122 in the manner shown in the lower left hand corner of Fig. 6. Each pin 122 is provided with a reduced portion 124 adjacent its forward end. Normally, these reduced portions are in alignment with the plate 116, as best seen in Fig. 5. Forwardly of the reduced portion 124, each pin 122 is provided with a conical formation 125. It will readily be understood that when any one button 110 is pushed inwardly, the conical cam formation 125 moves along its associated notch 118 so that the disc 116 is rotated counter-clockwise, as viewed in Fig. 6, by pushing in any one of the buttons 110. Of course, any number of buttons 110 may be pushed inwardly without effecting any additional displacement of the disc 116. This displacement of the disc 116 opens the switch 126, which is carried by the plate 113, the disc 116 being arranged when displaced to effect movement of a switch member, as best shown in Fig. 5. When all buttons are released and returned to initial position, in a manner which will hereinafter be described, the switch 126 closes.

Each pin 122 has a reduced terminal portion 127, which normally rests against a projection 120 of the disc 117, in the manner shown at the upper end of Fig. 5 and in Fig. 6. Each pin 122 is biased centrally and forwardly by a spring 128. Forwardly of the reduced terminal portion 127, each pin 122 is provided with a conical cam formation 129, and forwardly of the cam portion 129, each pin is provided with an annular recess 130. When a pin 122 is pressed inwardly, the cam formation 129 slips over the projection 120 of the disc 117, and this projection enters the recess 130 in the manner shown in the lower part of Fig. 5. It may here be noted that the openings 119 are elongated in the radial direction so as to permit the necessary outward movement of the pin 122, which is necessary for the conical formation 129 to move past the projection 120. It will be understood that when a pin 122 is pressed inwardly in the manner shown in the lower part of Fig. 5, it will be held in that position until it is released. It may be released by being pushed outwardly, that is, away from the center, whereupon the spring 128 will draw the pin forwardly. It may also be released, together with all other pins 122, which may have an inward position, by pushing the button 112. As best seen in Fig. 5, the button 112 is carried on the outer end of a releasing pin 130—A, which is biased outwardly by a spring 131 (Fig. 5). The pin 130—A extends through an opening 132 in the plate 113. This pin has a reduced portion 133 at its rear end. This reduced portion is normally in engagement with one arm of a bell crank lever 134, pivotally mounted at 134—A on the plate 113, the other end of which carries a pin 135 projecting through a radial slot 136 (see Fig. 6) in the disc 117. The disc 117 is biased in the counter-clockwise direction, as viewed in Fig. 6, by a spring 137, secured to the disc 117 and to the place 113, so that the bell crank lever 134 is resiliently held against the reduced portion 133 of the pin 130—A.

Immediately in front of the reduced terminal portion 133, the pin 130—A is provided with a conical cam formation 138. When the button 112 is pushed inwardly, the conical portion 138 swings the bell crank lever 134 in counter-clockwise direction, as viewed in Fig. 6, and the disc 117 is rotated in the opposite direction so that the projections 120 are moved out of the recesses 139 of any pins which are held inwardly, so that these pins are released and drawn forwardly by the springs 128.

Upon the plate 114 is mounted a bearing 139 for a shaft 140, which shaft is arranged in alignment with the axes of the discs 116 and 117. Rigidly secured upon the shaft 140 are a gear 141 and an arm 142 of insulating material. The shaft 140 is held in mounted relation by means of a collar 143. At the outer end of the arm 142 is pivotally mounted a shaft 144 (see Fig. 6). On the rear side, the shaft 144 rigidly carries a bridge member 145, which is always in frictional engagement with a contact 146 mounted on the arm 142. The contact 146 is grounded, as indicated in Fig. 21. On the forward side of the arm 142, the shaft 144 carries a dog 147 which is adapted to engage the pins 122 as the arm rotates. The arm 142 rotates in the clockwise direction, as viewed from the rear, that is, as viewed in Fig. 6. The dog 147 comprises a forward pin engaging portion 148 and a rear pin engaging portion 149. The pin engaging portion 148 is of cam formation and it is arranged to engage with the rear end 127 of any pin 122 which has been displaced inwardly. When such engagement occurs, the dog 147 is moved in the clockwise direction, as viewed in Fig. 6, so as to bring the bridge member 145 into engagement with a contact 150 so that the contact 150 is grounded through the bridge contact 145 and the grounded contact 146. The rear pin engaging portion 149 is arranged so that it is able to contact the end portion 127 of any of the pins 122, irrespective of whether these pins are pushed inwardly or are in normal position. For this purpose, the pin engaging portions 148 and 149 are in displaced relation, as best seen in Figs. 5 and 10. When the dog 147 is rotated in the clockwise direction, as viewed in Fig. 6, by co-

operation with the forward end 148 with one of the pins 122 which has been pressed inwardly, the pin engaging portion 149 is moved outwardly so that it is brought into position to engage one of the pins 122, being that pin which is shown adjacent the shaft 144 in Fig. 6. The pin engaging portion 149 is provided with a cam formation so that the engagement with this pin causes the dog 147 to return into its position shown in Fig. 6 relative to the arm 142. It will be understood that this return is effected before the arm 142 has moved so as to engage the next pin in the event that that pin has been pressed inwardly. The pin engaging portions 148 and 149 of the dog 147 are employed so that the bridge contact 145 may engage the contact 150 for the greatest possible portion of the total travel of the arm 142 between any pin 122 and the rearwardly adjacent pin 122. In view of the employment of alternating current to energize the relay 97 at the phonograph, as well as the relay 180 at the selector unit, a time of contact sufficient for the alternating current to pass through its peak value at least once is desired. Thus, by causing the contacts 145 and 150 to be in engagement for the greatest possible portion of the movement of arm 142, a faster operation of arm 142 is possible, while still providing a sufficiently long period of contact for proper energization of the relays.

As will hereinafter appear, the arm 142 is adapted to move step by step, corresponding to the distance of one pin to the other. These movements are in the same direction. For the sake of clarity, a short description of the movement of the arm 142, independent of the rest of the mechanism, is now given.

Assuming that the dog 147 is in the position in which it is shown in Fig. 6 and the arm 142 begins to move, then the portion 148 of the dog will pass all the pins which have not been actuated or pushed inwardly. The pin engaging portion 149 also clears all the pins 122. When the forward pin engaging portion 148 arrives at a pin 122 which has been pressed inwardly, it engages that pin and the dog 147 is rotated slightly in the clockwise direction, as viewed in Fig. 6, into the position shown in Fig. 7. This position is determined by a pin and slot connection 151 between the dog 147 and the arm 142. When the dog 147 is moved into the position shown in Fig. 7, the rear pin engaging portion 149 is moved outwardly between the first and second pins behind the actuated pin. The displacement of the dog 147 grounds the contact 150 in the manner previously described. The continued movement of the arm 142 causes the forward pin engaging portion 148 to move the actuated pin 122 radially outwardly, as shown in Fig. 7. This outward movement of the pin 122 disengages the pin from the disc 117 so that the spring 128 connected to that pin moves it forwardly into its initial position, being the position in which the uppermost pin 122 is shown in Fig. 5. As the arm 142 continues to move from its position shown in Fig. 7 into its position shown in Fig. 8, the rear pin engaging portion 149 engages the pin 122 rearward of the pin 122 which had been actuated, and consequently the dog 147 is swung in the counterclockwise direction, as viewed in Figs. 6, 7, and 8, until it attains the position shown in Fig. 8. This movement of the dog 147 breaks the engagement between contacts 150 and 145. The arm 142 moves to a slight extent into the position in which it is shown in Fig. 6, and it remains in this position until the record corresponding to the actuated pin has been played. The arm 142 is driven stepwise by means of a motor 152. The shaft 153 of the motor 152 is provided with a definite amount of end play, and is so arranged that the shaft 153 is moved to the right, as viewed in Fig. 5, when the motor is energized, closing a switch 154. One of the arms of the switch is arranged to serve as a spring, normally biasing the shaft in the opposite direction; that is, towards the left, as viewed in Fig. 5. This arm is insulated from the shaft by insulating material 154—A (Fig. 5). The shaft 153 carries a pinion 155 adjacent its left hand extremity, which is designated 156. The pinion 155 meshes with a gear 157 which is rotatably mounted upon a shaft 158 mounted on the plate 114. The gear 157 is frictionally attached to a pinion 159 which meshes with the gear 141. The gear ratios are such that one half revolution of the gear 157 corresponds to the movement of the arm 142 through a distance corresponding to the distance between the two adjacent pins 122. The pinion 159 carries two diametrically opposed radial arms 160 which are adapted alternately to engage the end 156 of the shaft 153 when it is in its left hand position, as shown in Fig. 5. When the shaft 153 is moved to the right, as viewed in this figure, the end 156 of the shaft 153 is out of the path of an arm 160. Consequently, when the motor 152 is de-energized, the end 156 of the shaft moves to the left, as a result of the de-energization and previously mentioned end play, into the path of movement of an arm 160 so as to arrest the pinion 159 at the end of half a revolution. The gear 157 is mounted relative to the arms 160 and the pinion 159 by means of a friction slippage, it being frictionally held between the pinion and the arms which are carried by the pinion. Thus, the gear 157 and the pinion 155 may rotate a short distance as a result of this slippage when an arm 160 is held immovable by engagement with the end 156 of the shaft 153. This avoids any large strain on the mechanism as a result of the inertia of the motor armature when an arm 160 is suddenly stopped. When the motor 152 is again energized, the end 156 of the shaft 153 is moved to the right, as viewed in Fig. 5, to move the shaft out of the path of movement of arms 160 so that the pinion 159 may be again driven by the motor. If desired, additional means may be provided for ensuring that the pinion 159 will be arrested at a definite position. For this purpose, I secure for rotation with the pinion 159 a cam member 161 which is adapted during each revolution to move an arm 162 rearwardly toward the motor. The arm 162 is mounted on a bracket 163 suitably secured to frame plate 114 so that its movement is frictionally resisted and that the arm remains in any position in which it is moved. The arm 162 carries a projection 164 in alignment with the shaft 153 of the motor 152. When the motor 152 is energized for a period sufficient to cause a half revolution of the pinion 159, the shaft 153 moves to the right, as viewed in Fig. 5. During this half revolution, the cam 161 engages the arm 162 and pushes its projection 164 towards the shaft of the motor, thus bringing the projection 164 into the path of the arms 160 alternately. When the motor 152 is de-energized, the shaft 153 moves outwardly to the left, as viewed in Fig. 5, thus moving the projection 164 and the arm 162 outwardly away from the motor. Thus, in any

event, the arms 160 alternately engage and are arrested by the projection 164 or the end 156 of the shaft 153. Consequently, if the motor is not de-energized exactly at the right instant, the gear 157 will nevertheless receive only a half revolution. The projection 164 being moved to the left, as viewed in Fig. 5, when the motor 152 is de-energized, and the shaft 153 moving to the right, as viewed in Fig. 5 when the motor is again energized, the arms 160 are free to move when the motor again begins to operate. Thus, the arm 162 and projection 164 act as an additional means of limiting the travel of the pinion 159 to one-half revolution each time the motor 152 is energized, as they operate mechanically and independently of the energization of the motor and the consequent position of the motor shaft. The unit shown in Fig. 4 is provided with coin chutes 165, 166, and 167, which may be three in number, adapted to receive coins of different denominations, such as nickels, dimes, and quarters. Arms (Fig. 21) 168 extend into these coin chutes. Arm 168—1 extends into coin chutes 165, 166 and 167, arm 168—2 extends into coin chutes 166 and 167; and the other three arms 168—3 extend into coin chute 167 only. The arms 168 are carried upon a light hollow shaft 169, preferably of aluminum, which is axially mounted. A light spring 170 angularly biases the shaft 169 and the arms 168. The latter extend through suitable slots in the coin chutes into the path of the coins descending through the chutes. The shaft 169 carries an escapement 171 which comprises two detents 172 and 173. In the normal position of the arms 168, the detent 172 is engaged by one of the teeth of a ratchet wheel 174, which is biased for rotation in the counter-clockwise direction, as viewed in Fig. 21, by means of a spring 175. The detents 172 and 173 are located in angular relation relative to the axis of the shaft 169. When a coin is dropped down one of the chutes, the shaft 169 is angularly displaced against the bias of spring 170 from its normal position one or more times, depending upon the chute employed and the number of arms 168 engaged by the coin. Each displacement effects the withdrawal of the detent 172 out of engagement with the ratchet wheel 174 and the introduction of the detent 173 into alignment with the next tooth of the ratchet wheel (Fig. 21a). When the shaft 169 resumes normal position after each such displacement, the detent 173 is withdrawn from the ratchet wheel 174 and the detent 172 is introduced into alignment with the ratchet wheel 174 so that it engages the next tooth. Consequently, if a coin is inserted in the chute 165, the ratchet wheel will move one tooth in the counter-lockwise direction, as viewed in Fig. 21. If a coin is inserted through chute 166, the ratchet wheel 174 will be displaced two teeth. If a coin is inserted in chute 167, the ratchet wheel 174 will be displaced five teeth.

In initial position of the ratchet wheel 174, a pin 176 is in engagement with an arm 177 which holds switches 178 and 179 open, as shown in Fig. 21. When the ratchet wheel 174 is displaced in the counter-clockwise direction, as viewed in Fig. 21, from this initial position, the switches 178 and 179 are closed. The ratchet wheel 174 is returned step by step to its initial position by means of a relay 180. The armature of the relay 180 is connected by means of two link members 181 and 182 to a flat spring 183 which is normally located against a plate member 184. When the relay 180 is de-energized, the spring 183 and the spring 183' move the link members 181 and 182 into a position clear of the ratchet wheel 174. When the relay 180 is energized, the downward movement of its armature brings the link members 181 and 182 towards alignment and brings a transverse pin 185 into engagement with a tooth of the ratchet wheel 174. The downward movement of the linkage effects the rotation of the ratchet wheel 174 through a distance corresponding to one tooth. In order to permit the ratchet wheel 174 to rotate in the clockwise direction, as viewed in Fig. 21, the lower end of the shaft 169 is supported on a pin 186, the lower end of which abuts against a stationary abutment 187 located therebelow. The upper end of the pin 186 can move away from the ratchet wheel 174, it being guided in a slot 188 in a stationary plate 189. The upper end of the pin 186 is biased towards the ratchet wheel 174 by means of a light spring 190. Consequently, when the ratchet wheel 174 is rotated in the clockwise direction, as viewed in Fig. 21, the lower end of the shaft 169 moves outwardly to allow the tooth of the ratchet wheel 174 to pass.

It is desirable that the springs 170, 190, 175, 183, and 183' should be of small tension so as to reduce the amount of power necessary to operate the respective mechanisms. I have found that by making the parts associated with these springs of correspondingly light weight or small mass, the natural period of vibration of the system composed of the springs and their associated parts can be kept short. Thus the parts are not likely to respond to heavy impulses of low frequency, such as a kick or a jar. It will be appreciated that these mechanisms should be non-responsive to any ordinary disturbance which the device might encounter so that no external shocks can cause the operation of the device without the dropping of coins and so that such external forces will in no other way affect the desired operation. Thus, if the parts 168, 169, 171, 172, 173, and 186 are made very light and such mass as they have is kept close to the axis around which they swing or move, the resonant system composed of these parts, together with the springs 170 and 190, will have a high natural frequency and therefore will not respond readily to any ordinary external influence. The parts 181, 182, the armature of the relay 180, and the ratchet wheel 174 should also be light relative to the springs 183, 183', and 175, for the same reason.

Immediately each tooth of the ratchet wheel 174 passes the detent 172, the lower end of the shaft 169 is moved inwardly towards the ratchet wheel 174 so as to hold the ratchet wheel in its new position.

Power is supplied to the device from power lines 190' and 191, which are connected to the primary of the transformer 194 and also to the motor 75. In one of the motor leads (the one connected to line 190') is the switch 192. One side of the secondary of the transformer is connected to the relay 97, to the relay 105, to one side of switch 99, and to the arm 101 which carries the contact 102. The other side of the secondary of the transformer 104 is grounded and is connected through a conductor 193 in the cable 108 to a grounded conductor 194, which is connected to one terminal of the motor 152.

The other side of the relay 97 is connected to the other side of the switch 99 and also through a conductor 195 in the cable 108 to one side of the relay 180. The other side of the relay 105 is con-

nected to one side of the switch 107 and is also connected through a conductor 196 in the cable 108 to one side of switch 179. The other side of the switch 179 is grounded. The contact 103 is adapted to be engaged by the contact 102 and is connected through a conductor 197 in the cable 108 to the other terminal of the motor 152. The other side of the switch 107 is connected to one side of a switch 198, the other side of which is grounded. The switches 192 and 198 are normally open and are adapted to be closed when the relay 105 is energized. The other side of the relay 180 is connected to one side of the switch 178, the other side of which is connected to one side of switch 154. The other side of switch 154 is connected to one side of switch 126, and is also connected to an insulated arm 199 which bears upon a conductive ring 200 mounted on the arm 142. The ring 200 is connected to the contact 150.

The operation is as follows:

When the machine is at rest, the switch 107 is open and the turntable 45 is at its uppermost position or at a position slightly below its uppermost position. Any desired number of buttons 110 are moved inwardly to select the corresponding records. Actuation of any of the buttons opens the switch 126. Coins of corresponding value are inserted in one or more of the chutes 165, 166, or 167. The ratchet wheel 174 moves to a corresponding extent in the counter-clockwise direction, as viewed in Fig. 21, so as to close the switches 178 and 179. The closing of the switch 179 completes a circuit through switch 179, conductor 196, relay 105, and the secondary of the transformer 106. The energization of the relay 105 closes switches 192 and 198. The closing of the switch 192 completes the circuit of the motor 75 so that the motor drives the cam shaft 56, the controlling clutch being engaged. Shortly after the cam shaft 56 has begun to move, the switch 107 closes. The rotation of the cam shaft causes the turntable 45 to descend, replacing its record on the record carrier 40. Continued movement of the cam shaft causes the carriage 41 to move to the right to bring the displaced record carrier into the stack of record carriers at the right hand side of Fig. 1. During the descent of the turntable and the movement of the carriage 41 to the right, the cam 63 actuates the link 66 to the right, as viewed in Fig. 1, causing the shaft 44 to rotate. The position of the shaft 44 corresponds to the position of the arm 142, and they move step by step in synchronous relation. Thus, at each movement of the shaft 44 corresponding to the movement of this shaft from the effective position of one arm 43 to the effective position of the next arm 43, the contact 102 engages contact 103, thus imparting an impulse to the motor 152 which causes it to drive the pinion 159 through a half revolution. This half revolution is terminated in a manner previously described. Thus, each movement of the shaft 44 which results in the rotation of the wheel 92 through one tooth distance results in the movement of the arm 142 through a distance corresponding to the distance between two adjacent pins 122. Each time the motor 152 receives an impulse, the switch 154 is closed, but if the dog 147 is not in engagement with a pin 122 which has been pushed inwardly, the closing of the switch 154 has no effect, the switch 126 being open, as a result of one or more pins 122 being pushed inwardly, and the contact 145 being out of engagement with the contact 150. The continued rotation of the shaft 44 results in repeated engagements between contacts 102 and 103, resulting in repeated impulses to the motor 152 and repeated half revolutions of the pinion 159. When, however, the dog 147 is brought into engagement with a pin 122 which has been pushed inwardly, the contact 150 is grounded and a circuit is completed through contacts 146, 145, 150, ring 200, arm 199, switch 154, which has been closed by the operation of the motor, switch 178, relay 180, and relay 97. This occurs when a notch of the latch wheel 93 is coming opposite the tooth 95 of the latch arm 94. The energization of the relay 97 releases the latch arm so that the tooth drops into this recess with the result that the shaft 44 is held against rotation. The continued rotation of the cam shaft 56 may move the link 66 to the right, as viewed in Fig. 1, so that it tends to continue the rotation of the shaft 44. This, however, is prevented by slippage of the clutch ring 86 upon the boss 87, as previously described. The shaft 44 is arrested in any position which corresponds to the actuated pin 122 whose actuation has brought about the release of the latch arm 94. Since the shaft 44 no longer rotates, the contact 102 remains out of engagement with the contact 103 and the motor 152 receives no more impulses.

The energization of the relay 180, which has just been referred to, causes the ratchet wheel 174 to move one step in the clockwise direction, as viewed in Fig. 21. The rotation of the cam shaft 56 continues, resulting in the complete movement of the carriage 41 to the right and then to the left. The arm 43, which corresponds to the particular pin 122 which has caused the arrestment of the shaft 44, is in position to cause the engagement of the corresponding record carrier engaging means 42 with the corresponding record carrier 40. Consequently, this particular record is moved into alignment with the turntable 45. Continued rotation of the cam shaft 56 moves the turntable 45 upwardly so as to bring the record into engagement with the needle of the player arm 83. The turntable 45 is then caused to rotate by the motor 75, and the clutch which controls the actuation of the cam shaft 56 is latched out by the latch arm 79, which is engaged by the latch arm 80 in well known manner.

When the playing of the record is completed, the inward position of the tone arm 83 or its reverse movement, due to a spiral or eccentric groove on the record, releases the latch arm 80 from the latch arm 79 so that the clutch is reengaged and the record changing cycle is resumed to play the record corresponding to the next actuated pin 122 which is engaged by the dog 147. In this manner, all the records corresponding to actuated buttons are played, provided they have been paid for by the insertion of proper coins.

In the case of the last recording which has been paid for, the switches 178 and 179 are opened immediately the shaft 44 is locked against rotation. At this time, however, the motor circuit is maintained closed until after the record is played, the relay 105 being maintained energized through closed switch 107 and closed switch 198. After this record has been played and the rotation of the cam shaft 56 has begun, the switch 107 is opened by the arm 106 so that operation of the machine is terminated.

In the event that no selections are made and that the switches 178 and 179 are closed by the insertion of a suitable coin or coins, the switch 126 being closed, the operation is as follows:

Initial movement of the shaft 44 results in en-

gagement between the contacts 102 and 103 and a single impulse is given to the motor 152. This impulse to the motor results in the closing of the switch 154 and the completion of a circuit through switch 126, switch 154, switch 178, relay 180, and relay 97. Consequently, the detent wheel 93 is latched against further movement at a position corresponding to the next selection. Consequently, the machine will play records in succession corresponding in number to the value of the coins inserted. When operating in this manner, the arm 142 moves step by step, but the contact 150 remains disconnected from the contact 146, owing to the fact that the dog 147 encounters no actuated pins.

The relay 97 is in series with the relay 180. It is understood, of course, that a very large number of relays 180 may be arranged in parallel. In the event that a large number of remote stations select the same recording for playing, then, when the contacts 145 would move simultaneously into bridging relation with the contacts 150 and 146, the current flowing through the relay 97 would be distributed through all the relays 180 so that they might be insufficiently energized. Immediately the relay 97 is energized, the switch 99 closes, short-circuiting the relay 97. Consequently, the current flowing through the various relays 180 is no longer limited by the impedance of the relay 97, which is now short-circuited, thus insuring sufficient current to operate all the ratchet wheels 174. It should be noted that the contacts 99 are arranged so as to close in the shortest possible length of time after the energization of the relay 97 to supply adequate current to the relays 180 without undue delay.

The effect of the insertion of one or more coins in one of the chutes 165, 166, 167, of any of the remote units or the control unit is to close the switches 178, 179. If one remote selector unit is energized by the insertion of coins and another similar unit is not so energized, then in the latter unit there is no connection between conductor 195 and the switch 154. The motors 152 of all the control units move step by step in unison, they all being connected to the lines 194 and 197. The resulting movement of the arm 142 in the unit which has not been energized by coins is of no effect as far as selecting is concerned because the associated switch 178 is open. The closing of the switch 179 by the insertion of one or more coins results in the energization of the relay 105. This relay closes the switch 192 so that the motor 75 is started and is maintained in operation as long as the relay 105 is energized. After the motor has started to operate, the switch 107 closes, and consequently the relay 105 is energized through the switch 198 until all the recordings paid for have been played. The switch 107 is opened mechanically at the end of the playing of each recording. While the ratchet wheel 174 is in credit position, the switch 179 remains closed so that the circuit through the relay 105 is maintained. Before the playing of the last paid for recording, the switch 179 opens, but the circuit of the relay 105 is completed through switches 107 and 198. At the end of the playing of this last paid for recording, the switch 107 opens, the relay 105 is de-energized, and the switches 192 and 198 are opened so that the motor 75 is rendered inoperative and remains inoperative until a further coin or coins are inserted.

As has been explained before, when a plurality of control or remote stations are provided, the motors 152 move step by step in unison. However, only the stations which are energized by coins have any effect in selection. If coins are inserted in one of the units and no selection is made, the switch 126 remains closed, and as a result, the armature 142 and the shaft 44 move one step as a result of the energization of the motors 152. When that first step is completed, the switch 154 closes and the relay 180 of the selecting unit or units and the relay 97 are energized so that the shaft 44 is located in the position to play the next recording. If a coin or a plurality of coins of higher denomination are placed in the coin chutes, the phonograph will play sequentially, that is, one record being played, then the next record, then the next record, etc., the pinion 159 rotating 180 degrees between the playing of each recording. When no selections are made, the switch 126 is closed and the relays 97 and 180 are energized when the switch 154 is closed after one actuation of the motor. It may be noted that sequential playing is provided by the use of switches 154 and 126 in circuit between the switch 178 and the arm 199.

In the modification of the invention illustrated in Fig. 22, a single coin chute 201 is provided which is adapted to receive a suitable number of coins 202 which stack up edgewise in the chute. The lowermost coin is adapted to engage an arm 203 which is pivotally mounted at 204. The arm 203 carries an upturned end 205 which is adapted to close the two switches 178 and 179. The resiliency of the switches is such that a single coin 202 is able to move the arm 203 downwardly into contact with a stop 206, thus closing the switches. When no coin rests on the arm 203, the resiliency of the leaves of the switches 178 and 179 is effective to open the switches and raise the arm 203 away from the stop 206. The armature of the relay 180 is provided with a nonmetallic coin discharging member 207. As shown in Fig. 22, the member 207 is displaced from the position of the lowermost coin 202. When the relay 180 is energized, its armature moves to the right as viewed in Fig. 22 and the lowermost coin 202 is displaced, i. e., it is knocked out of its indicated position by member 207. The coin engaging member 207 immediately moves away from the position of the lowermost coin and the remaining coins, if any, in the chute 201 move down one step. It will be readily understood that the relation of the switches 178 and 179 and the relay 180 is precisely the same as in the embodiment of the invention illustrated in Fig. 21, and the connections of the four leads are designated by the same numbers as employed in the embodiment shown in Fig. 21.

In Figs. 15, 16, 17, and 18, I show a modified form of motor unit 152 for driving a shaft 153—A. The motor shaft has secured to it a pinion 155 which engages with a gear 157 which is frictionally connected to the pinion 159, in the manner described in connection with the embodiment of the invention shown in Fig. 5. The elements 140, 141, and 142 may be precisely as described in connection with the aforesaid embodiment and they will not be again described minutely. The shaft 153—A of the motor 152 is hollow and accommodates in sliding relation a pin 208. This pin is caused to move longitudinally by means of a centrifugal governor 209 mounted on the armature shaft and in remote relation to the pinion 155. The governor comprises a frame portion 210 which is mounted on the end of the armature shaft, this frame portion having pivotally mount-

ed thereon weights 211. The frame 210 is provided with a cylindrical formation 212 which receives a compression spring 213. The compression spring bears against the head 214 of the pin 208, tending to move the pin to the right, as viewed in Fig. 15; that is, in a direction so as to withdraw the pin 208 out of the path of the arms 160. The weights 211 are provided with end portions 215 which extend over the head 214, as best seen in Fig. 18. When the motor is put into operation, the weights 211 fly outwardly in the manner best shown in Fig. 16, as a result of centrifugal force, and the end portions 215 move the shaft 208 to the left, as viewed in Fig. 16, against the action of the spring 213. This movement of the pin 208 brings its free end into the path of the arms 160. It will be readily understood that when the arms 160 are in the position in which they are shown in Fig. 17 with relation to the pin 208, and when the motor 152 receives an impulse, the adjacent arm 160 is moved past the pin 208 before the pin is projected. When this arm clears the pin 208, the motor 152 has attained sufficient speed to project the pin 208 in the manner shown in Fig. 16. Consequently, when the pinion 159 has made half a revolution, the diametrically opposed arm 160 engages the projecting end of the pin 208 and rotation of the pinion 159 and the gear 141 is terminated until the motor 152 receives a further impulse. It will be understood that the contacts 102 and 103 are arranged to open somewhat before the arm 160 is stopped by the pin 208.

In Figs. 19 and 20, I show a modified embodiment of my invention in accordance with which the motor 152 is replaced by a solenoid 216. In place of the gear 141, shown in the embodiments disclosed in Figs. 5 and 15, I mount upon the shaft 140 a ratchet wheel 217. The ratchet wheel 217 is provided with teeth in number corresponding to the number of pins 122. The ratchet wheel 217 is held in definite position by a dog 218, pivotally mounted on the plate 114 on a pin 218—A and biased by a spring 218—B. The ratchet wheel 217 is adapted to be actuated step by step by means of a dog 219. This dog 219 is carried by a pivoted arm 220, which is connected by a link 221 to the armature 222 of the solenoid 216. The dog 219 is biased towards the ratchet wheel 217 by means of a spring 223. The dog 219 is adapted to be arrested by means of an abutment 224 so as to insure that the energization of the solenoid 216 merely moves the ratchet wheel 217 a distance corresponding to one tooth. The arm 220 carries a pin 225 which is adapted to cooperate with a switch, which is identified by the reference numeral 154—A, which is the substantial equivalent of the switch 154 previously described in connection with the embodiment shown in Figs. 5 and 21. The switch 154—A is normally open, as shown in Fig. 19. When the solenoid 216 receives an impulse, the ratchet wheel 217 is rotated in the clockwise direction, as viewed in Figs. 19 and 20, by a distance corresponding to one tooth. At the same time, the switch 154—A is closed.

This type of device, in which the motor 152 is replaced by the solenoid 216, is particularly adapted for the step-by-step rotation of the arm 142 when it is desired to rotate the arm 142 a large number of steps in a relatively short interval of time; that is, when it is desired to reduce the time per step. However, if the time per step is very short with relation to the frequency of the alternating current employed to operate the relay 97 by means of the contacts 145, 146, and 150, it is preferred to substitute a source of direct current for the transformer 194. It will be understood that the leads from the solenoid 216 may be connected to the leads 193 and 197 in Fig. 21, thus substituting the solenoid drive for the motor drive of the arm 142, the circuit otherwise remaining substantially the same as shown in Fig. 21.

Figs. 23 and 24 show a modified form of the solenoid actuated device shown in Figs. 19 and 20, in which a longer period of contact is provided to facilitate the operation of the relay 97 on alternating current with relatively rapid impulses. In this embodiment of the invention, the ratchet wheel 217, which is mounted on the shaft 140, is displaced by the solenoid 216 through distances corresponding to a single tooth of the ratchet wheel 217 by two separate increments. The armature of the solenoid 216 is connected by means of a screw 228 and a spring 229 to the upper end of an escapement member 230. This escapement comprises two detents 231 and 232 which are adapted to cooperate with the ratchet wheel 217. The escapement member 230 is held in the position in which it is shown in Fig. 24 by means of a spring 233 having one end connected to the escapement member and the other end connected to a stationary post, the armature of the solenoid 216 being partially withdrawn from the solenoid in this position. The detent 232 is in engagement with the ratchet wheel 217. When the solenoid 216 receives an impulse, its armature moves to the right, as viewed in Fig. 24, and the detent 231 engages the ratchet wheel and causes it to move through an increment of a toothed step in the clockwise direction. When the solenoid is deenergized, the spring 233 returns the escapement member to its position in Fig. 24, and during this return the detent 232 engages the ratchet wheel 217 and gives it a further displacement so that the total displacement of the two increments is the distance corresponding to the distance between one tooth and the next on the periphery of the ratchet wheel 217. It will be noted that when the ratchet wheel 217 has received one increment of its total motion, due to the movement of the solenoid armature to the extreme right, the shaft 140 is positioned so that if the end 148 of the dog 147 is in engagement with an actuated pin 122, then the bridge member 145 will be in the position shown in Fig. 7, and contact is established. This contact will then be maintained until the projection 149 of the dog 147 encounters the next pin 122, which will not occur until the spring 153 has returned the escapement member 230 nearly to the position shown in Fig. 24. Consequently, owing to the pause between the two successive increments or movements of the ratchet wheel 217, a relatively long time is permitted for the energization of the relays 97 and 180 by means of alternating current.

The pivot 230' of the escapement arm 230 is located in relation to the projections 231 and 232 and the toothed wheel 217 so that when the solenoid 216 is energized, the projection 231 will strike the wheel 217 near the top of the slanting surface of a tooth, and when the arm 230 is returned by the spring 233 to the position shown in Fig. 24, the projection 232 will strike the slanting surface of another tooth near the top, thus imparting two increments of motion in the same direction to the wheel 217, the total movement corre-

sponding to a single tooth and locking the wheel 217 into an intermediate and a final position.

A member 227 may be connected to the escapement arm 230 so that the escapement member 230 may be operated manually in the event that one of the remote selector units should get out of step with the others, due, for instance, to a broken connection. The member 227 can be rapidly pressed to rotate the wheel 217 to a position in which it is again in synchronism with the other remote selectors and with the automatic phonograph. The position of the ratchet wheel 217 is indicated by a pointer 217' and suitable numbers on the wheel.

My improved selector may very readily be applied to practically any type of automatic phonograph in which the record to be played is determined by the position of a member. Thus, my invention may readily be applied to the type of automatic phonograph known generally as the A. M. I. phonograph. Such a phonograph is described in Patent No. 2,104,032, issued January 4, 1938, to Clifford H. Green. In Fig. 25, I show schematically the manner in which my improved selector may be applied to the phonograph described in that patent. For convenience of understanding of the phonograph in question, I have reproduced in Fig. 25 essential portions of the Green mechanism, and I have used the same reference numbers employed in the Green patent, adding primes thereto in order to differentiate from similar numbers previously used in the present application.

In this phonograph, the turntable spindle 36' is driven by a motor 35'. The record changing operations are controlled by a motor 48', which is controlled by the mercury switch 204'. The main switch 191' is biased towards closed position by a spring 192'. One side of the main switch 191' is connected to a power line 254'. The other side of this switch is connected to one side of the switch 204' and to the motor 35'. The other side of the switch 204' is connected by a line 258' to the motor 48'. The other sides of the motors 35' and 48' are connected by conductor 252' to the other power line 253'. A switch 300', which is adapted to be closed by the tone arm at the end of the playing of a record, has one switch blade connected by conductor 286' to a conductor 261', which is connected to one side of the secondary of a transformer 259', the primary of which is connected to the power lines 253' and 254'. The other blade of the switch 300' is connected to an electromagnet 247' and to a cancel switch 279'. The electromagnet 247' is also connected by a conductor 283' to the conductor 260', which is connected to a terminal of the secondary of the transformer 259'. The cancel switch 279' is also connected to conductor 261'. The conductor 283' is connected to an electromagnet 254 and an electromagnet 255. The electromagnet 254 is connected to a conductor 256, and the electromagnet 255 is connected to a conductor 257.

The switch 204' is biased to closed position by a spring 206'. This switch is adapted to be actuated by a bar 208' which cooperates with a support 212'. The bar 208' is pivotally connected at one end to an arm 207' which is rigidly carried by a shaft 189'. The shaft 189' also rigidly carries an arm 195' to which is pivotally mounted a bar 196', which is adapted to control the switch 191'. The bar 196' can be rendered inoperative by a bar 202', which is guided near its upper end and at its lower end is pivotally connected to an arm 203', which is pivotally mounted at 188'. The bar 202' is biased downwardly by a spring 258 and is adapted to be moved upwardly by the electromagnet 255, which is provided with an armature 259 rigid with the arm 203'.

The record changing operations, that is, the operation of taking a record out of the magazine and placing it on the turntable and the operation of taking a record off the turntable and replacing it in the magazine, are effected by the motor 48', and their inception and termination are controlled by a linkage system which includes a link 200'. One end of the link 200' is pivotally connected to the arm 195'. Its other end is pivotally connected to the lower end of a vertical lever 198', which is pivotally mounted at an intermediate position. At its upper end, the lever 198' carries a pin 199', which engages in the medial groove 116' of a shifter rod 104'. A lever 121' is pivotally mounted on the frame work of the machine (in a manner clearly illustrated in the Green patent), and at its forward end carries a downwardly projecting pin 122', which is also engaged in the medial groove 116' of the shifter rod 104'. The rear end of the lever 121' is bifurcated and its rear ends are adapted to cooperate with projections 119' and 120' on the gear 115'. This gear is rigidly carried on a shaft 98', which effects the record changing operations. It may here be noted that the shaft 98' is driven by the motor 48' in one direction to bring the record out, and that it is driven in the opposite direction to replace the record in the magazine. These operations are effected by a rotation of the shaft 98' of somewhat less than 360°. At the end of each rotation of the shaft 98', one or other of the projections 119', 120', throws the lever 121' to neutral position. At the end of the record returning movement of the shaft 98', a cam 97' mounted thereon engages a rod 63' and resets a clutch control member 94' so as to engage the clutch (not shown), operatively to connect the motor 48' to a shaft 68' for the translational movement of the magazine 29'. The clutch control member 94' is locked in this position by means of an arm 95'. The arm 95' is adapted to cooperate with the upper end of the lever 100'. This lever is pivotally mounted to the chassis of the machine at its center, and its lower end is pivotally secured to a link 200' (in a manner not shown in the drawings, but clearly shown in the Green patent). The link 200' carries an armature 248', which is located between the electromagnets 247' and 254.

The shifter rod 104' is associated with two clutches 105' and 106' (shown only diagrammatically but fully illustrated in the Green patent). This shifter rod has three positions, in each of which it may be held by means of a spring pressed detent 104b' cooperatively associated with notches in the rod 104'.

The three positions of the shifter rod 104' are shared by the bar 200'. The bar 200' and the shifter rod 104' are shown in Fig. 25 in their neutral position. When the electromagnet 254 is energized, the bar 200' moves to the left, as viewed in Fig. 25, into forward position. This movement throws the upper end of the lever 100' to the right, and the clutch control member 94' is freed to move rearwardly, thus terminating the drive of the shaft 68' and the magazine 29'. This forward position effects the movement of the rod 104' to the right, that is, into its forward position. When this rod 104' is in neutral

position, the clutches 105' and 106' are disengaged. When the rod 104' is moved to the right, that is, into the forward position, the clutch 105' is engaged and the motor 48' is connected to the shaft 98' so as to drive it in a direction to effect the removal of a record from the magazine and its placement upon the turntable. When that operation is finished, the projection 119' engages the adjacent end of the lever 121' and throws this lever and also the bar 200' into neutral position. The return of the rod 104' to neutral position disengages the clutch 105'.

When the electromagnet 247' is energized, the bar 200' is moved to the right, as viewed in Fig. 25, into its reverse position. The rod 104' is moved to the left and the clutch 106' is engaged so that the motor 48' drives the shaft 98' in the opposite direction to effect the return of the record to the magazine. When the shaft 98' has rotated to a sufficient extent to attain this object, the projection 120' engages the adjacent end of the lever 121', and the rod 104' and the bar 200' are thrown to neutral position. At the end of this movement, the cam 97' moves the clutch engaging member 94' into clutch engaging position, as previously described.

It may here be explained that the machine is put into operation by energizing the electromagnet 255, which effects the elevation of the bar 202' and the raising of the arm 196' so that its detent 197' releases the detent 201' and permits the switch 191' to close. The arm 208' is in the position in which it is shown in Fig. 25, and consequently, both motors 35' and 48' start to operate. The clutch control member 94', being in the clutch engaging position, the motor 48' drives the shaft 68'. This shaft cooperates with an endless rack 77' so that the magazine would move to and fro until the drive of the shaft 68' is interrupted. This interruption is effected by the energization of the electromagnet 254, which throws the bar 200' and associated parts into forward position and through the movement of the lever 100' releases the clutch control member 94'. The resulting movement of the bar 196' to the left has no effect, because this bar is either held elevated by the magnet 255, or if it is not so elevated, the detent 197' is to the left of the detent 201'. The leftward movement of the arm 208' merely brings its detent 210' to the left of the detent 211' on the switch 204'. This movement of the bar 200' also effects the engagement of the clutch 105' through movement of lever 198', and the shaft 98' rotates almost one revolution to bring a record from the magazine onto the turntable. The projection 119' then moves the lever 121', the shifter rod 104', and the bar 200' to neutral position. The movement of the arm 208' to the right now opens the switch 204' so that the motor 48' ceases to operate during the playing of the record. The movement of the clutch shifter lever 198' to the right has no effect on the switch 191', which still remains closed whether the bar 202' is elevated or not. At the end of the playing of a record, the switch 300' is closed, and the electromagnet 247' is energized. The bar 200' is moved to the right into its reverse position, and the lever 121' is likewise moved to its reverse position, connecting the clutch 106'. The movement of the arm 208' to the right moves the detent 210' clear of the switch 204' so that this switch closes. The motor 48' is put into operation and the record is returned to the magazine. The movement of the arm 196' to the right during the movement of the bar 200' from neutral to reverse positions has no effect on the switch 191', which remains closed. The detent 197' is moved to the right of the detent 201'. At the end of the reverse movement of the shaft 98', the projection 120' throws the lever 121' and the bar 200' back to neutral position, and at the same time the clutch control member 94' is moved to clutch engaging position. The movement of the bar 200' from reverse to neutral position, that is, its movement to the left, brings the arm 208' into the position in which it is shown in Fig. 25, the switch 204' remaining closed. If the magnet 255 is not energized, the movement of the arm 196' to the left opens the switch 191'. If, however, the magnet 255 is energized, the operation of the machine continues.

Upon the movable carriage of the mazagine 29', I form or mount a notched bar portion 260 which is adapted to serve as a contact member for closing a switch 270 successively as the magazine travels. The projecting portions or peaks of the bar 260 are spaced equally along the magazine, the spacings being equal to that of the records in the magazine. I provide the teeth or projections on the bar 260 to be one greater in number than the number of records in the magazine. It will be noticed with reference to Fig. 25 or Fig. 26, that each time the magazine moves through the distance equal to record spacing, the switch 270 is closed once. One side of the switch 270 is connected to the conductor 260'. The other side is connected to the solenoid 271 through a conductor 272. It may here be noted that under certain circumstances (when a record has been selected, as hereinafter described), the closing of the switch 270, when the contact member 273 is at one of the peaks of the bar 260, results in the energization, first of solenoid 271 and then of the magnet 254 and the consequent disengagement of the clutch controlled by the member 94'. The clutch controlled by the member 94' has a certain lag so that the contact member 273 rides off the peak and into an adjacent notch on the bar 260 and magazine 29' stops with one of the records in alignment with the record transfer member 134'.

Solenoid 271 of the selector unit, which unit is better illustrated in Figs. 26 and 27 to which reference is also now had, is also connected by a conductor 274 to the conductor 261'. It will thus be seen that every time the magazine moves and a peak of the bar 260 passes the contactor 273, the solenoid 271 is energized once. The armature of the solenoid 271 is connected to an escapement member 275 which is pivotally mounted at 276. The armature of the solenoid 271 is normally retracted by a spring 277 connected to the escapement member and the chassis. The escapement member 275 is provided with two detents 278 and 279, which are adapted to cooperate with a ratchet wheel 280. When the solenoid 271 is energized, the detent 279 engages a tooth of the ratchet wheel 280 and rotates this ratchet wheel half a step, that is, half a tooth space in clockwise direction, as viewed in Figs. 25 and 26. When the solenoid 271 is deenergized, the spring 277 carries a detent 278 into contact with one of the teeth of the ratchet wheel 280, and consequently, the ratchet wheel 280 completes its one tooth displacement in the clockwise direction. Thus, each displacement of one tooth on the ratchet wheel 280 is effected in two substantial increments, with a distinct pause of the ratchet wheel 280 between those two increments. The ratchet wheel 280 has two teeth for each record space in the maga-

zine, and an additional two teeth. In other words, if the phonograph plays nine records, the ratchet wheel 280 should have twenty teeth. The ratchet wheel 280 is rigidly mounted on a shaft 281 which carries an arm 282. This arm is capable of moving around and cooperating with a circular series of pins 283. These pins can be pushed inwardly selectively by means of buttons 284, and they are held in their inntermost positions by engagement of the flat face of a frusto-conical portion 285 behind a stationary disc 286. Springs 287 tend to move the pins axially outwardly, and at the same time tend to move the inner ends of the pins toward the center of the disc 286, so that these springs hold the frusto-conical portion 285 of an actuated pin in locking relation to the disc 286.

The arm 282 is preferably made of insulating material and it carries a contact ring 288, which is engaged by a brush 289, which is connected through the conductor 256 to the electromagnet 254. A contact 290 mounted on the arm 282 is connected to the ring 288, as best illustrated in Figs. 26 and 27. A contact 291 adapted to engage the contact 290 is carried by a dog 292, which is pivotally mounted on the arm 282. The dog 292 is biased by a spring 293 against the stop 294—A so as to separate the contacts 291 and 290. The outer end of the dog 292 is arranged so that it is adapted to pass any pin 283 which has not been pushed inwardly from its normal position. When, however, a pin 283 is pushed inwardly, its innermost end is located in the path of the dog 292 as the arm 282 makes its step by step progress in the clockwise direction, as viewed in Fig. 26. When this step by step movement brings the dog 292 into engagement with an actuated pin 283, then the power stroke of the solenoid 271 brings the arm 282 into the position in which it is shown in Fig. 27. When this relation exists, the dog 292 is swung in the counter-clockwise direction with respect to its pivot, so that the contacts 290 and 291 are brought into engagement. Not only are these contacts brought into engagement, but they remain in engagement for a short, but very definite time. It is only after the switch 270 is opened and the solenoid 271 is de-energized, that the spring 277 swings the escapement member 275 back to initial position, imparting the second increment of the one tooth movement of the ratchet wheel 280, which moves the arm 282 past the position in which it is shown in Fig. 27. In moving away from the position show in Fig. 27, the dog 292 moves the pin 283 radially outwardly so that its spring 287 is able to draw it forwardly into its normal position. The stop 294a prevents the further yielding of the spring supported contact 290 so that the dog 292 will definitely discharge the actuated pin on the second increment of the movement of the arm 282 when the solenoid 271 is de-energized. The dog 292 is conductively connected by connection 292—A (Fig. 26) to the shaft 281, which in turn is connected through conductor 274 (Figs. 25 and 26) to the conductor 261'. It will thus be seen that every time the dog 292 engages an actuated pin, as shown in Fig. 27, a circuit is completed through the secondary of the transformer 259', conductor 283', electromagnet 254, conductor 256, brush 289, ring 288, contact 290, contact 291, dog 292, shaft 281, and conductors 274 and 261'. The conductor 257 is connected through a snap switch 295.

The conductors 272, 274, 256 and 257, may be arranged as a single cable so that the elements shown in the upper part of Fig. 25 can be arranged as a remote control. Furthermore, if desired, the switch 279' may be located in the remote control, its leads being extended through the cable which includes conductors 272, 274, 256, and 257. While I have explained the function and operation of numerous elements of the device shown in Fig. 25, I now give a short summary of the complete operation.

The elements being in the relation shown in Fig. 25, the switch 295 is turned on, the electromagnet 255 is energized, the bar 292' is elevated, and the bar 196', being elevated thereby, the switch 191' closes, and the two motors 35' and 48' are put into operation. The clutch control member 94', being in clutch engaging position, the magazine 29' is driven backwards and forwards, owing to the drive of the shaft 68'. As the magazine 29' moves through distances corresponding to successive record spacings, the switch 270 is closed for a corresponding number of times. Each closure of the switch 270 energizes the solenoid 271 and the ratchet wheel 280 is moved in clockwise direction one tooth spacing. The arm 282 is of course moved to a similar extent. If one or more of the buttons 284 are pushed inwardly, the corresponding pins 283 are brought into the path of the dog 292 and the first actuated pin engaged by this dog closes the circuit including the contact points 290 and 291 and the electromagnet 254. Consequently, the bar 200' is thrown into the forward position previously discussed, the clutch control member 94' is released, and the drive of the magazine 29' is terminated, with the record transporting member 134' in position to engage the record corresponding to the actuated pin engaged by the dog 292. No more impulses are sent out from the switch 270, and the dog 292 discharges the actuated button in the manner previously described. The movement of the bar 200' to its forward position throws the rod 104' to the right, and the clutch 105' is engaged so that the shaft 98' is driven by the motor 48' in a direction to cause the record transporting member 134' to carry the selected record out and place it on the turntable. When this operation is completed, the rod 104' and the bar 200' are returned to normal position. the switch 204' being thereby opened, as previously described. At the end of the playing of the record, the switch 300' is closed, the electromagnet 247' is energized and the bar 200' and rod 104' are moved into reverse position. The arm 208' is also moved in the manner described above, so that the switch 204' is again closed. The motor 48' now drives the shaft 98' in the opposite direction to return the record to the magazine. At the end of this operation of the shaft 98'. the clutch control member 94' is again moved to clutch engaging position, and the rod 104' and bar 200' are returned to neutral position. During this return, if the electromagnet 255 is deenergized, the switch 191' is opened. If, however the switch 295 is closed and the electromagnet 255 is energized, the switch 191' will not be open, and the operation will proceed as before, the magazine being driven by the shaft 68', the switch 270 being closed repeatedly and the ratchet wheel 280 and arm 282 moving step by step with the closing of the switch 270, until the dog 292 engages an actuated pin 283, which has the effect of terminating the drive of the magazine and the initiation of the record changing operation for moving the record out of the magazine onto the turntable.

It will be understood that the record transporting means 134' turns one way or the other so

as to place the record on the turntable with either side up. In other words, when the magazine is moving in one direction, and it is arrested during that movement, then the selected record is turned so as to present the left hand face upwards. When, however, the magazine is moved in the opposite direction, the record transporting member 134' turns so as to present the right hand side of the record uppermost for reproduction. Consequently, my selector has pins 283 which are in number double the number of records, each pin 283 corresponding to one side of one record. Thus, as shown in Figs. 25 and 26, my pins 283 are divided into two series 283—A and 283—B which are separated by blank spaces where there are no pins 283. The pins of one series correspond, say, to the left side of the records in the magazine; the pins in the other series correspond to the right side of the records in the magazine. The blank spaces referred to result from the fact that the arm 282 has two positions corresponding to the passage of the contact member 273 over the last tooth as the magazine approaches its extreme movement. Thus, when the magazine is moving towards its extreme movement, the last tooth of the bar 260 brings the arms 282 to a vacant position corresponding to no record and corresponding to no pin 283. When, however, the magazine moves in the opposite direction, then if the next pin were actuated, the magazine would be stopped at a position with the record transporting member 134' in alignment with the first record.

It is, of course, necessary that the shaft 281 and the arm 282 should be synchronized with the magazine 29'. This may readily be effected by a disc 381 mounted on the rear end of the shaft 281. The disc 381 bears numbers corresponding to the selections of the records in the magazine. and a stationary indicating means 382 is provided so that the disc 381 may be manually rotated in the clockwise direction so as to bring the number of a selection determined by the position of the magazine 29' into the position indicated by the element 382. Thus, as shown in Fig. 26, if the magazine is being driven to the left, then the present position of the magazine corresponds to the selection No. 12, and consequently, to synchronize the two elements, it is merely necessary to rotate the disc 381 in the counterclockwise direction, until the No. 12 on the disc is aligned with the arrow 382.

In Fig. 28, I have shown a modified form of my invention, employing a phonograph which may be of the general type disclosed in connection with Fig. 25. In this embodiment of the invention, I employ two rows of selector rods or bars, one row corresponding to the left hand sides of the records, and the other row corresponding to the right hand sides of the records. The bars 296, of which the individual rows are indicated by the reference characters 296—A and 296—B, are mounted for reciprocal motion in a front plate 297 and a rear plate 298. On the outer side of the front plate 297, the bars carry buttons 299 whereby they may be actuated. The bars pass through elongated slots 300 in the rear plate 298, these slots being sufficiently long to pass detents 301 on these bars when they are pressed inwardly. Springs 302 connected to the bars and to the front plate 297 bias the bars so as to retain them in their inward position with the detents 301 held behind the rear plate 298, as shown in Fig. 28. Behind and between the two rows of bars, I rotatably mount a screw 303 of steep pitch, the pitch being the same as the spacing between the bars. The screw 303 carries a nut 304 which is provided with two wings 305—A and 305—B and also two sets of contact switches 306—A and 306—B, which project laterally so as to engage actuated bars. It will readily be understood that when the screw 303 is rotated in one direction, for example, the clockwise direction, as viewed from above, the nut 304 will tend to move in the same direction because of a frictional drag, but this movement is limited by a vertical rod 307 located in front of the screw 303. The rod 307 limits the rotational movement of the nut 304 so that only one wing 305—A or 305—B is able to engage one row of bars 296—A or 296—B at one time and the associated switch 306—A or 306—B is able to engage the same row of actuated bars, the other wing and switch being moved inwardly away from the other row of bars.

The screw 303 is driven in one direction or the other by a reversible motor 308 through a suitable gear train, including a gear 309 fixedly mounted on the screw 303. Adjacent gear 309 is a disc 310 rotatably mounted on screw 303 and from which projects upwardly a pin 311. This pin extends into slot 312 in a collar 313 also rigidly mounted on the screw 303 and located above disc 310. The disc 310 is provided with a recess 314 which is adapted to receive a projection 315 which may suitably be of insulating material. This projection is carried by one of the leaves of a switch 316. This leaf is quite stout so that the projection 315, when located within the recess 314, prevents rotation of disc 310 relative to shaft 303 under certain conditions.

The lost motion provided by pin 311 and slot 312 enables the bars 296—A and 296—B of both rows to be located in transverse alignment, as the lost motion enables the shaft 303 to be rotated through a greater angular distance upon reversal of the motor 308 at the ends of travel of the magazine 29' before the motor is stopped. It may be well, perhaps, to note in this connection that in the instant case the switch 270 is closed after the playing of the end records in the magazine. This closure occurs while the magazine moves in the direction in which it last moved. Thereafter the direction of movement of the magazine is reversed, in a manner hereinafter to be described in greater detail, and the motor 308 is also conditioned for rotation in the opposite direction. When the magazine moves in the opposite direction the switch 270 is again closed as the magazine moves in a direction to play the opposite side of the same end record. Motor 308 is energized and moves in the opposite direction to rotate shaft 303 in the opposite direction. As the shaft is rotated in the opposite direction the disc 310 remains stationary because of the lost motion connection, so that the member 304 is first moved angularly with the shaft and thereafter moved into operative relation relative to the first push bar 296. If desired, the lost motion connection may be eliminated, but in this event it would be necessary properly to correlate the push bars 296 relative to the travel of the magazine after the playing of the end records in the magazine.

The switches 306—A and 306—B have one side connected through a conductor 317 to one side of the electromagnet 254. The other side of the switches and one side of the switch 316 are connected through a conductor 318 to one side of the secondary of a transformer 319, the primary

of which is supplied through conductors 319—A. The other side of the switch 316 and the common terminal of the reversible motor 308 are connected through a conductor 320 to one side of the switch 270, this being the switch which is actuated by the notched bar 260 on the magazine 29', as described in the modification shown in connection with Fig. 25. The other side of the switch 270 is connected to the lead 318 and to the secondary of the transformer 319. The other two terminals of the reversible motor 308 are connected through conductors 321 and 322 to a double throw switch 323, which determines by its position the direction in which the motor 308 runs. The switch 323 is thrown by projections 324 on the magazine 29' at the end of each movement of the magazine. The other side of the electromagnet 254 and the common lead 323—A of the switch 323 are connected to the other side of the secondary of the transformer 319.

The operation of this embodimnt of the invention is as follows:

The magazine, being driven by the shaft 68', the switch 270 is closed successively, sending a series of impulses over the line 320 to the common terminal of the motor 308, the motor circuit being completed through one or the other of the leads 321 or 322, depending upon the position of the switch 323, which, in turn, is set in correspondence to the direction of motion of the magazine 29'. At each impulse from the switch 270, the motor 308 starts to operate, and after a slight operation, the rotation of the disc 310 closes the switch 316 so that the motor 308 is maintained in operation until the disc 310 has made one revolution and the switch 316 opens. This occurs before the switch 270 is closed by the next projection on the bar 260, and it occurs every time the switch 270 is closed. At each rotation of the screw 303, the operative switch 306—A or 306—B is moved past the position of one of the bars 296—A or 296—B. If a bar 296—A or 296—B has not been pushed in, the switch 306—A or 306—B remains open, the magazine 29' continued to move, and the switch 270 closes successively, giving successive operations of the motor 308. When the switch 306—A or 306—B engages an actuated bar 296—A or 296—B, the switch is closed and the circuit through the electromagnet 254 is completed, the bar 200' is moved to its forward position, the drive of the magazine is terminated, and a record is placed on the turntable. At the end of the playing of a record, the electromagnet 247' is energized, the record is replaced in the magazine, and if the motor of the phonograph is not turned off, the magazine 29' again moves, actuating the switch 270, sending impulses to the motor 308, which causes successive operation of the motor, until the effective switch 306—A or 306—B again engages an actuated bar 296—A or 296—B. It will be noted that the wings 305—A and 305—B are provided with cam surfaces which push the bar 296—A or 296—B, which has actuated the switch 306—A or 306—B, laterally, so that the bar moves outwardly under the action of its spring 302 into its initial position.

When the motor is rotating so as to drive the screw 303 in the clockwise direction, as viewed from above in Fig. 28, the nut 304 is displaced in the same direction so that the left hand wing 305—A and left hand switch 306—A cooperate with the left hand row of bars 296—A, as viewed in Fig. 28. When, however, the screw 303 is being driven in the opposite direction, that is, the counterclockwise direction, as viewed from above in Fig. 28, the nut 304 is displaced somewhat in the same direction, and the right hand switch 306—B and the right hand wing 305—B are brought into cooperative relation with the right hand row of bars 296—B, as viewed in Fig. 28.

It will be noted that an actuated bar 296—A or 296—B closes the switch 306—A or 306—B at a point in the rotation of the screw 303 before the motor 308 stops operating. Consequently, the electromagnet 254 is energized to start the record changing cycle, and the motor 308 continues to operate until the switch is clear of the actuated bar. The electromagnet 254 is de-energized, and the subsequent operations of the phonograph can be effected by the projections 119' and 120' and the electromagnet 247', in the manner described above in connection with Fig. 25.

It is to be noted that while I have shown no switch like the switch 295 of Fig. 25 in this embodiment of the invention, such a switch, or any other suitable switch, located at the phonograph or in the remote unit, may be employed for maintaining the phonograph in operation. It will, of course, be understood that the conductors 318, 321, 322, 320, and 317, may be formed into a cable of any desired length, and that the unit on the left hand side of Fig. 28 may be arranged upon the phonograph, or as a separate unit located at any degree remoteness from the phonograph.

In the previously described embodiment of the invention the selector units at the remote locations, and also the selector unit at the phonograph, have been electrically synchronized. However, in some instances it may be preferable to maintain the selector unit at the phonograph synchronized by a mechanical connection to a movable portion of the phonograph, which may be a record selecting member or a magazine or player unit movable to different positions for the selection of different recordings. A construction of this character is illustrated in Fig. 29, to which reference is now had. This figure illustrates a modification of Fig. 28 wherein a selector unit at the phonograph is mechanically connected to the magazine 29'. The selector unit has not been illustrated completely, as it corresponds, except for modifications hereinafter noted, to the selector unit illustrated in Fig. 28.

The shaft 303 of the unit is driven in opposite directions in response to the movement of the magazine 29' in opposite directions. When the magazine 29' moves in one direction (to the right as viewed in Fig. 29), the shaft 303 is driven in one direction by a flexible cable 350 secured to a drum 351 fixedly secured for rotation with a gear 352 in mesh with a pinion 353 loosely mounted on the shaft 303. Secured to the pinion is a disc 354 having a pin 355 mounted therein and adapted to project into a slot (not shown) corresponding to the slot 312 formed in hub 313 of the shaft 303, thereby to provide a lost motion drive as described in conjunction with Fig. 28. The drum 351 and gear 352 are rotatable about a fixed shaft 356 which may be mounted in a suitable supporting plate 357 or the like. When the magazine 29' moves in the opposite direction (to the left as viewed in Fig. 29), the shaft 303 is rotated in the opposite direction by a spring 358 secured to the gear 352 and to the shaft 356. The spring also takes up the slack

in the cable 350. This spring, it may be noted, is tightened during the movement of the magazine 29' to the right.

When the selector unit is constructed and arranged as illustrated in Fig. 29, a number of the electrical connections and also the motor 308 forming part of the selector unit at the phonograph may be eliminated. In fact, the only wiring necessary between the selector unit at the phonograph and the phonograph operating mechanism consists in the two wires 317 and 318 leading to the switch 306, which, it may be remembered, is closed upon contact with a selector element 296 which has been operated into actuated position. Inasmuch as the operation of the apparatus is the same in so far as selection and playing of records is concerned, as previously described in connection with Fig. 28, it is believed that further description thereof is not necessary.

A different synchronizing arrangement, which arrangement is characterized by the use of electrical resilient synchronizing means tending to maintain and to restore the movable parts of the synchronized system into corresponding positions, is illustrated in Figs. 30 and 31. Referring now to these figures, it may be noted that the synchronizing arrangement has been shown in conjunction with an apparatus similar to that illustrated in Fig. 21, and that like parts of the system have been indicated by like reference characters.

The synchronizing means of this embodiment of the invention includes electrically interconnected units 370 and 371 of the type known as "Selsyn" or "Autosyn." They may be of the Selsyn type described, for instance, in a book entitled "Fractional Horsepower Electric Motors" by Cyril G. Veinott, published by McGraw-Hill Book Company, Inc., New York city, 1939, at pages 310 to 317 and especially at pages 311 and 312. These units include three phase stator windings (see Fig. 31) interconnected by conductors 372, 373 and 374, and single phase rotor windings interconnected by conductors 375 and 376, and supplied with single phase alternating current from a suitable source of supply. This supply source may be the secondary winding 377 of the transformer 104, the primary winding 378 of which is connected to a suitable source of alternating current by the conductors 190' and 191. While but one selector unit has been shown, it should be understood that the system may include more units. The additional units have their stator windings connected to the conductors 372, 373 and 374, and their rotors to the conductors 375 and 376. The additional units also have conductors 195 and 196 leading thereto, for a purpose which may become apparent shortly. In addition, the conductor 376 is grounded at all the stations, as indicated by reference character 379, and at the phonograph as indicated by reference character 380.

In the instant system the unit 370 governs the positions of the other units in the system, i. e., the position of the rotor of unit 370 determines the positions of the rotors of the other units so that the rotors of all units in the system occupy corresponding positions. Looking at the matter from a somewhat different angle, it may be said that when the rotor of unit 370 moves, the rotors of the other units move in synchronism therewith.

The unit 370 at the phonograph has its rotor directly connected to the shaft 44 of the phonograph. This shaft, it may be remembered, has secured to it the latch disc 93, which in turn is cooperatively associated with a latch arm 94, a relay 97, and switch 99, all of which perform the functions performed by them in the embodiment of the invention illustrated in Fig. 28.

The unit 371 of the selector has its rotor secured directly to a shaft 381—A, upon which is fixedly mounted an arm 382—A made of insulating material and cooperatively associated with the selector elements 383 circumferentially arranged relative to shaft 381—A. The selector elements are in contact with a latching disc 384 both when in actuated and non-actuated positions. In actuated positions the ends of the elements project into the path of a contact 385 carried at the outer end of arm 382, whereby when the contact 385 engages an actuated selector element 383 a circuit is completed to ground, the disc 384 being connected to ground as indicated diagrammatically by a conductor 386. After the aforesaid contact has been effected and the circuit completed to ground, continued rotation of member 382 unlatches the actuated selector element to permit the selector element to be returned to its unactuated position by its associated biasing means.

The selector element 383 may be constructed generally along the lines of the selector elements 283 shown in Fig. 26, except that they should be so constructed and arranged as to be unlatched with the exertion of minimum torque by the shaft 381—A, and so that the unit 371 may be made as small as possible and with minimum cost. If desired, a light and suitably positioned spring 287 may be used and the latching surface may be made of small size and configured so that the selector pin can be easily unlatched. In so far as the position is concerned, the spring may be disposed to be more nearly parallel with the pin.

The unit 370 located at the phonograph, which is in effect a transmitter, is preferably made larger than the units 371, which are in effect receivers, so that the required torque may be provided with sufficient accuracy of positioning. When a large number of selector elements are employed, then in view of the smaller angular separation between them, it is preferable to use larger units or to decrease as much as possible the torque required to unlatch the selector elements.

Each time that the contact 385 engages an actuated selector member, a selection impulse is transmitted to the phonograph, provided, of course, that a circuit has been conditioned for completion by the operation of the coin operated switch 178 (shown in detail in Fig. 21) in the coin operated apparatus 387, including, among other elements, the relay 180. The circuit thus completed through the selector element and the coin operated switch extends from the actuated selector element and contact 385 to the relay 97, through conductor 388, a circular contact plate 389 mounted on the rotatable arm 382, a brush 199, conductor 390 leading to the coin operated mechanism, conductor 391 leading to the relay 180, and conductor 195 leading from the relay 180 to the relay 97. The energizing circuit for the relays 180 and 97 is completed across the secondary winding 377 of transformer 104 through the ground connections 386 and 379 and conductor 376. The conductor 195 extends to other selector units in the system in order that selection impulses may be transmitted therefrom to the phonograph.

The coin operated mechanism is also con-

structed and arranged to initiate operation of the phonograph by energizing the motor 75 upon deposit of a coin. The motor 75 is energized by operation of switch 192 when the relay 105 is energized upon deposit of a coin. The relay is energized through a circuit including a ground conductor 392 at the coin operated mechanism, the conductor 196 extending from the rotor to one terminal of the relay and conductor 393 connecting the other terminal of the relay to the secondary winding of the transformer 104. The energizing circuit is completed through ground. The relay 105 also operates switch 198 in circuit with the cam operated switch 107. The relay 105 and the switches associated therewith function in the same manner as the corresponding apparatus shown in Fig. 21.

The operation of the apparatus illustrated in Fig. 30 is quite similar to that of the apparatus illustrated in Fig. 21, but in order that a better understanding thereof may be had, it will be reviewed briefly. When the machine is at rest, the switch 107 is open, and assuming that power is supplied to the transformer 104, all the units 370 and 371 in the system occupy positions determined by the position of unit 370 at the phonograph. If by chance power has been cut off and some of the movable members of the selector units have moved out of their normal positions, then when power is again supplied to the apparatus the movable members will be returned to their proper positions because of the operation of the units 370 and 371. In other words, when power is supplied to the system the rotors return to positions determined by the position of the rotor of unit 370.

In order to effect the selection and playing of records, the desired number of selector elements 383 are moved to their actuated positions, and the requisite number of coins are deposited in the coin operated mechanism 387. As a result, the relay 105 is energized to actuate switches 192 and 198 into circuit closing position, thereby to energize the phonograph motor 75 and to condition for completion a holding circuit for relay 105 extending through the cam operated switch 107. The motor rotates shaft 44, as heretofore described in connection with Fig. 21, and as shaft 44 turns the rotor of unit 370 is moved correspondingly, and this in turn effects a corresponding movement of the rotors of the units 371 at the other selector stations. This corresponding or synchronous movement of the rotor units continues until the contact 385 on a rotating arm 382 engages an actuated selector element 383. Upon such contact a selection impulse is transmitted from the selector unit to the relay 97. Energization of the relay 97 results in the unlatching of latch arm 94. This unlatching occurs when a notch of the latch wheel 93 is coming opposite the tooth 95 of the latch arm. When the tooth falls into the notch the shaft 44 is stopped. As heretofore indicated, a slight movement of the shaft 44 after the release of the latch arm 94 is utilized to effect some rotation of the movable member 382 of the selector unit after contact has been made with an actuated selector element in order to effect the return of the selector element to its unactuated or normal position.

When the shaft 44 at the phonograph is stopped, the movable members of all the selector units are likewise stopped in corresponding positions and remain in these positions until the shaft 44 is again rotated in the selection of other records. In this embodiment of the invention, as in the embodiment of Fig. 21, the selections are made and stored at the selector unit and transmitted individually to the phonograph. If the same selection is made at two selector units, the selection will be played but once, since the corresponding selector element is returned to its unactuated position at both selector units by the movable members 382 thereat. Likewise, only the number of selections paid for will be played, since the transmission of selection impulses to the phonograph is terminated by the coin operated mechanism after the number of selections paid for have been transmitted and played.

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 in so far as set forth in the accompanying claims.

Having thus described my invention, I declare that what I intend to claim is:

1. A selector for remote operation of an automatic selector type phonograph having a movable member the direction of motion of which and its position determines the selection to be played and an electric motor for moving said movable member; electrical contact means adapted to send periodic electrical impulses when said movable member moves, a remotely positioned movable selector member, electric motor means adapted to be actuated step by step by said electrical impulses for moving said selector member in synchronism with the movable member, a plurality of displaceable elements adapted to contact said selector member when displaced, manually operable means adapted when actuated to energize said electric motor, electromagnetic means adapted to stop said movable member when energized, and electrical contact means on said selector member adapted to energize said electromagnetic means to stop said movable member when said electric motor means has moved said selector member into contact with a displaced element.

2. In a selector unit for phonographs, in combination, two groups of elements movable between unactuated and actuated positions, a traveling member mounted for movement in opposite directions past said elements, a first element engaging and discharging means on said member cooperatively associated with the actuated elements of one group and a second such means cooperatively associated with the actuated elements of the other group, a control circuit including said element engaging and discharging means, said first element engaging and discharging means being constructed and arranged to close said control circuit upon engagement with actuated elements of one group during movement of the traveling member in one direction and to effect return of the elements from their actuated to unactuated positions upon additional movement in the same direction after closure of said circuit, said second element engaging and discharging means being constructed and arranged to close said control circuit upon engagement with actuated elements of the other group during movement of the traveling member in the opposite direction and to effect return of the elements from their actuated to unactuated positions upon additional movement in the same direction after closure of said circuit, and means for moving said traveling member into engagement with actuated elements and therebeyond.

3. In a selector unit for phonographs, in combination, a movable member at the phonograph, two groups of elements movable between unactuated and actuated positions, a traveling member mounted for movement in opposite directions past said elements, a first element engaging and discharging means on said member cooperatively associated with the actuated elements of one group and a second such means cooperatively associated with the actuated elements of the other group, a control circuit including said element engaging and discharging means, said first element engaging and discharging means being constructed and arranged to close said control circuit upon engagement with an actuated element of one group and then to discharge said element during movement of the traveling member in one direction, said second element engaging and discharging means being constructed and arranged to close said control circuit upon engagement with an actuated element of another group and then to discharge said element during movement of said member in the opposite direction, means correlated with the movable member at the phonograph for moving said traveling member in synchronism with said movable member to engage and discharge actuated elements, and means controlling said movable member and operative upon closure of said control circuit for stopping said movable member.

4. A selector mechanism for stopping in selected relative positions a pair of relatively movable elements of a phonograph, including in combination, a plurality of selective stops adapted to be displaced from unactuated to actuated positions, said stops being arranged in two groups, a stop engaging member mounted for movement in opposite directions relative to both said groups of stops, said member being mounted for movement to contact actuated stops of one group when said member moves in one direction and to contact actuated stops of the other group when said member moves in the other direction, means correlated with the movable element at the phonograph for moving said member in said opposite directions in synchronism with the relative movement of the relatively movable elements of the phonograph, and means controlling the relative movement and rendered effective upon contact of said stop engaging member with actuated stops for stopping the relative movement of said elements.

5. A selector mechanism for stopping in selected relative positions a pair of relatively movable elements of a phontograph, including in combination, a plurality of selective stops adapted to be displaced from unactuated to actuated positions, said stops being arranged in two groups, means including a pair of stop engaging members mounted for movement in opposite directions relative to said groups of stops, and mounted for projection into the path of actuated stops, means correlated with the movable element at the phonograph for moving said means in opposite directions in synchronism with the relative movement of the relatively movable elements of the phonograph, and means for projecting one of said stop engaging members into the path of the actuated stops of one group when said means moves in one direction and the other of said stop engaging members into the path of the actuated stops of the other group when said means moves in the opposite direction.

6. A selector mechanism for stopping in selected relative positions a pair of relatively movable elements of a phonograph, including in combination, a plurality of selector stops adapted to be displaced from unactuated to actuated position, said stops being arranged in two groups, resilient means for biasing said stops toward unactuated position, means for latching said stops in actuated position, a traveling member mounted for movement in opposite directions past said stops, means correlated with the movable element of the phonograph for moving said member in opposite directions past said stops in synchronism with relative movement of the elements of the phonograph, a first stop engaging and discharging means on said member projectable into the path of actuated stops of one group when said member moves in one direction and a second such means on said member projectable into the path of the actuated stops of the other group when said member moves in the opposite direction, an electric control circuit, said first stop engaging and discharging means being constructed and arranged to close said control circuit upon engagement with actuated stops of one group and then to unlatch said stops during movement of the traveling member in one direction, and said second stop engaging and discharging means being constructed and arranged to close said circuit upon engagement with actuated stops of the other group and then to unlatch said stops during movement of the traveling member in the opposite direction.

7. In a selector unit for phonographs, in combination, a plurality of selector elements movable between unactuated and actuated positions, a traveling member mounted for movement in opposite directions past said elements and for projection into the path of actuated stops from beyond said path, means for projecting said traveling member into the path of actuated stops when said member moves in one of said opposite directions, an electrical circuit, circuit controlling means on said traveling member cooperatively associated with said selector elements adapted to change the condition of said electrical circuit upon engagement with an actuated element during movement of said member in said one direction, means on said member for effecting return of a selector element from its actuated to its unactuated position upon additional movement of said traveling member after said change in condition of said circuit, and means for moving said member into engagement with actuated elements and therebeyond.

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