

July 7, 1953

E. A. EBERT

2,644,565

AUTOMATIC PHONOGRAPH

Filed Nov. 29, 1944

5 Sheets-Sheet 1

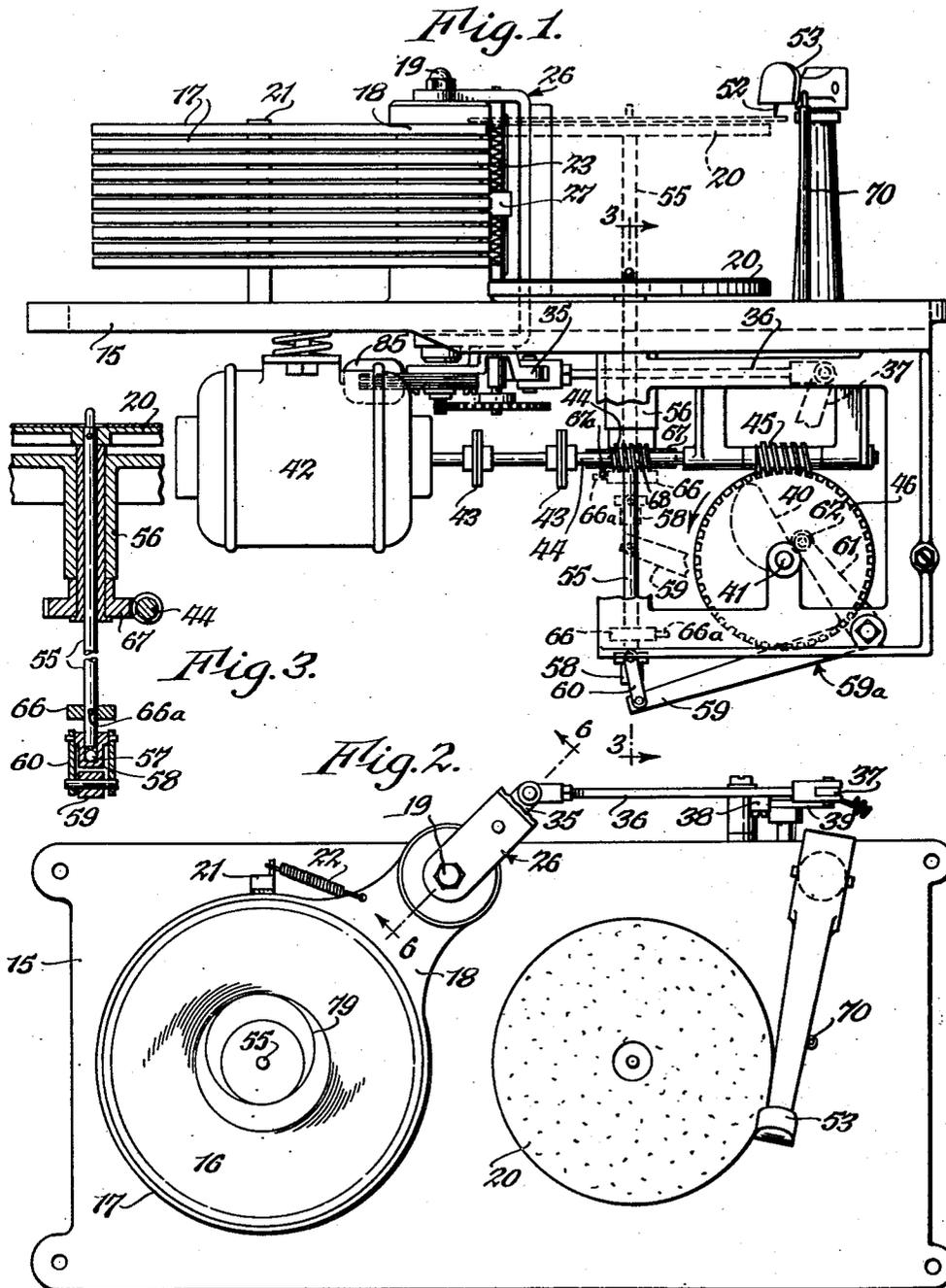
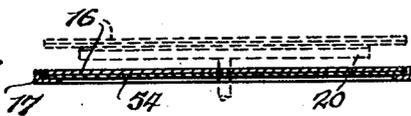


Fig. 4.



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Fig. 5.

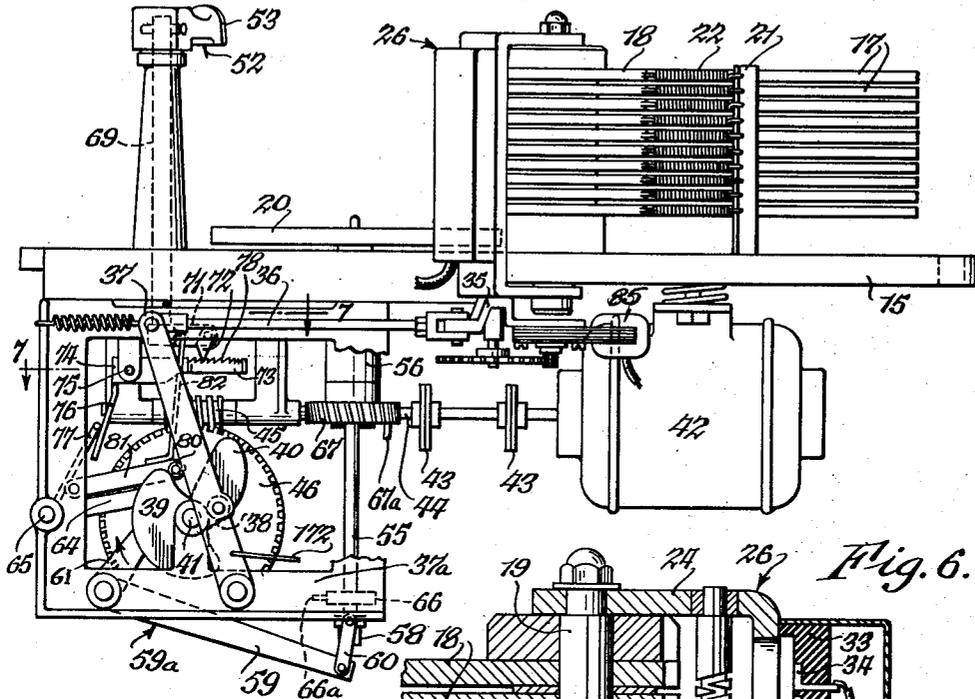


Fig. 6.

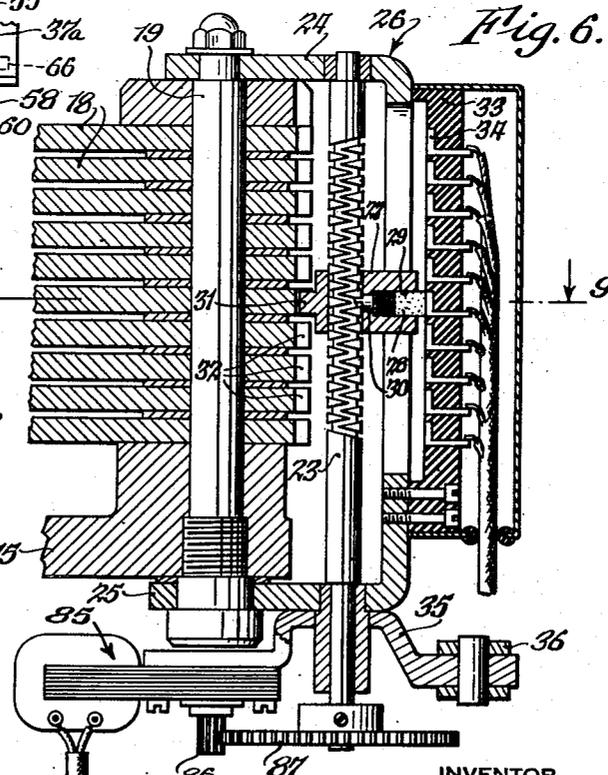


Fig. 7.

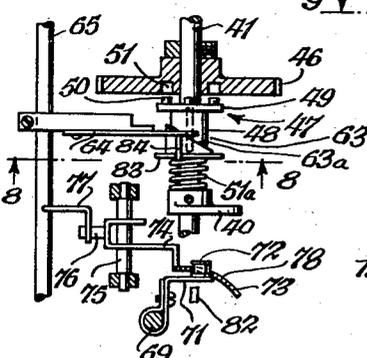
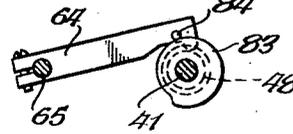


Fig. 8.



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July 7, 1953

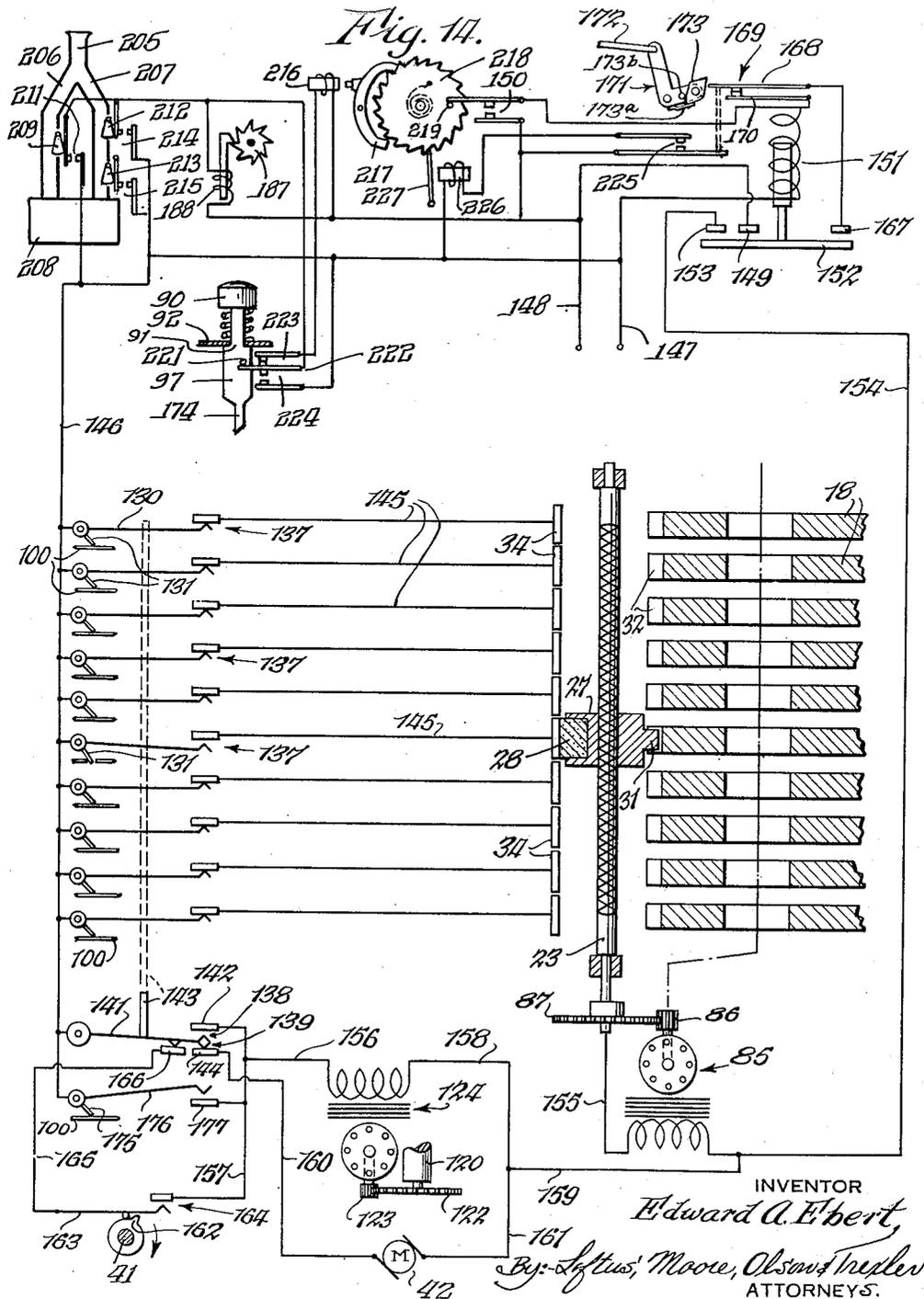
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AUTOMATIC PHONOGRAPH

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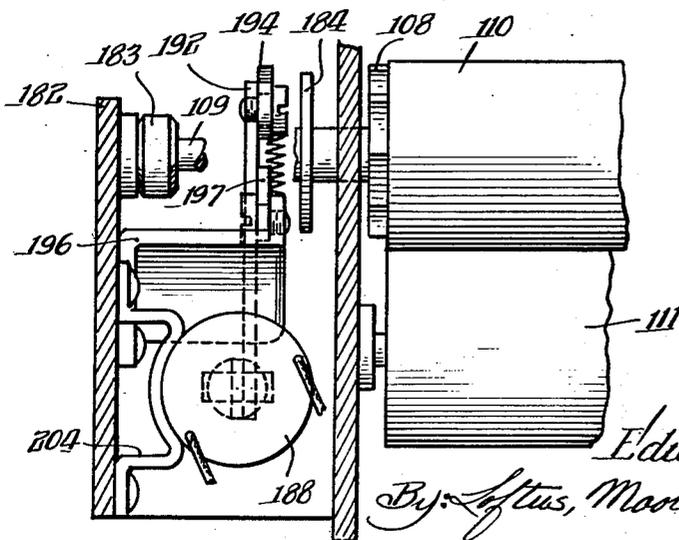
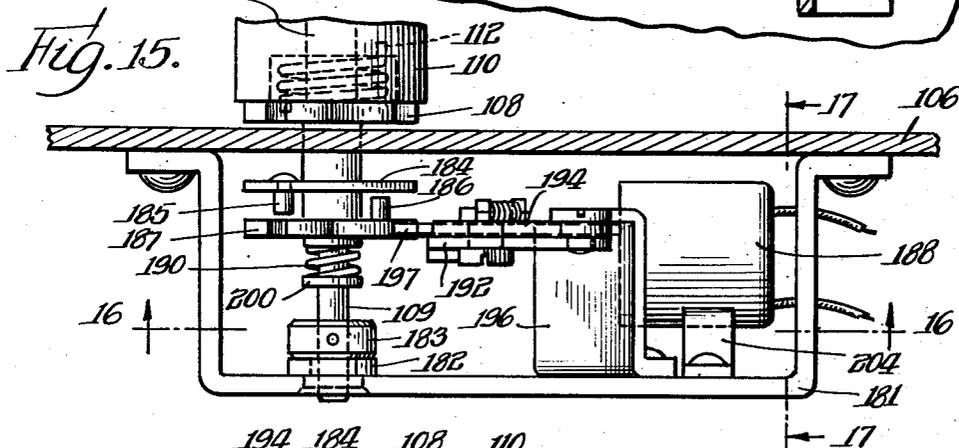
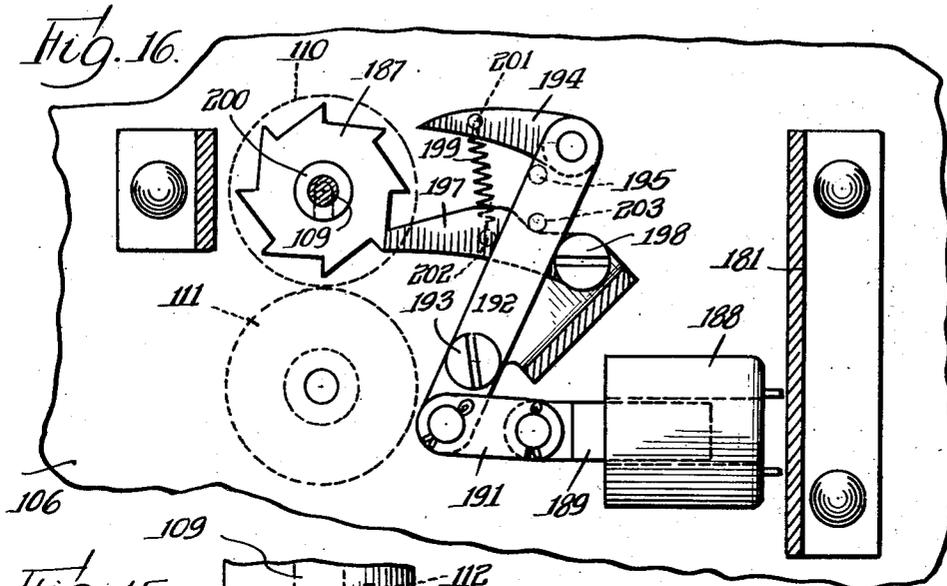
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AUTOMATIC PHONOGRAPH

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5 Sheets-Sheet 5



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# UNITED STATES PATENT OFFICE

2,644,565

## AUTOMATIC PHONOGRAPH

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Application November 29, 1944, Serial No. 565,618

11 Claims. (Cl. 194—15)

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This invention relates to improvements in automatic phonographs and more particularly is concerned with a phonograph of the kind which is operative to play in an uninterrupted sequence a plurality of pre-selected records.

The phonograph, in general, includes a plurality of trays which support the records in a vertical series, each tray being movable horizontally in response to the actuation of selector mechanism to an extended position over a turntable. The latter is located alongside and below the lowermost tray of the series and is operative, when a tray has been moved to an extended position, to lift the record supported thereby and carry it into and hold it in cooperating relation with the needle of the tone arm or reproducer. When the record has been played the turntable restores the record to its tray and returns to its original position. The tray then moves back to its place in the series and the sequence of operation described is repeated until all of the records selected have been played.

In check or coin controlled automatic phonographs, the phonograph generally does not reproduce the records selected in the order of selection except by coincidence. In certain phonographs the selector mechanism which moves the record trays or records from a magazine or stack to a reproducing means may be of the type which comes to rest at a predetermined position or of the type which remains at rest when no more records are to be played at the position corresponding to the last record played. In the type where the selector comes to rest at a predetermined position the movement of the selector usually is to a certain point which brings about the reproduction of the lowest numbered record so that if the records selected are successive records having higher numbers, the phonograph through coincidence will reproduce the records in the order selected. If, however, first a higher numbered record is selected and then a lower numbered record, the phonograph may play the records in the inverse order of selection. Due to this peculiarity of operation the customer may select a plurality of records and prior to the completion of the playing of those records a second customer may select one or more records which records may be played prior to the completion of the playing of the first group of selected records. This produces confusion which if eliminated would bring a great deal of satisfaction to the customers or users of the coin controlled automatic phonographs.

In the operation of check or coin controlled

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automatic phonographs it is necessary to frequently change the records so that the largest possible selection of currently popular records may be provided by the phonograph. Current popularity, however, varies from community to community thus necessitating some manner of obtaining the information upon which to judge the popularity of the records provided by the phonograph. Those records which are least popular may be removed and others substituted and further observations made. In most cases the automatic phonograph is placed in a location on a lease or rental basis and the proprietor of the location cannot keep a record of the number of times each record is played so as to guide the proper selection of records at regular intervals. It, therefore, is desirable to provide some means whereby the popularity of the records played may be obtained. It furthermore would be desirable to have an indication of the total number of times that the phonograph reproduces the records. Such record would of course serve as a check in accounting for the coins removed from the phonograph coin box.

In accordance with the present invention the above mentioned desirable features may be obtained by providing an automatic phonograph having check controlled means which will store up the selections in the order selected so that the phonograph will reproduce the selections in that order. The preselecting means thus provided may also be arranged to simultaneously make a permanent record of each record selected. One manner of accomplishing such purposes is by an arrangement wherein a tape serves to record each selection in the order selected, and the tape controls the operation of the phonograph. The tape also serves as a permanent record for the number of times the phonograph is played and the number of times each record is played.

One object of the invention is to provide a phonograph of the type generally described wherein the selected records may be played in the order selected.

A further object is a phonograph which is so designed that any desired number of selections, including duplicate selections of the same record, may be made and played without regard to, or limitation by, the number of records.

A still further object is to provide a phonograph which is so constructed that additional records may be selected for play, including the one being played, while the machine is in operation.

A still further object is a phonograph in which

provision is made for cancelling a selection which may have been made either unintentionally or inadvertently.

A still further object is to provide a permanent record of such selections as may be made so as to enable the popularity of the various records to be determined.

A still further object is a novel design and arrangement of the parts of the phonograph, whereby simplicity and economy in construction are insured.

The invention is illustrated in the accompanying drawings in which:

Figure 1 is a side elevational view of an automatic phonograph embodying the features of the invention;

Figure 2 is a top plan view;

Figure 3 is a vertical section taken along the line 3—3 of Figure 1;

Figure 4 is a section through one of the record trays;

Figure 5 is an elevational view similar to Figure 1 but is of the opposite side of the machine;

Figure 6 is an enlarged vertical section taken along the line 6—6 of Figure 2;

Figure 7 is a fragmentary section taken along the line 7—7 of Figure 5 with the gears shown in cross-section;

Figure 8 is a detail section taken along the line 8—8 of Figure 7;

Figure 9 is a horizontal section taken along the line 9—9 of Figure 6;

Figure 10 is a horizontal section through the mechanism for selectively controlling the playing of the records;

Figure 11 is a vertical section through the said mechanism and is taken along the line 11—11 of Figure 10;

Figure 11a is a fragmentary view, in plan, illustrating the arrangement of the switches of the control circuit, the view being taken along the line 11a—11a of Figure 11;

Figure 12 is a fragmentary view showing the arrangement of the control elements of the selector mechanism;

Figure 13 is a detail section illustrating the cancelling switch;

Figure 14 is a wiring diagram of the control circuits;

Figure 15 shows a top view of a portion of the apparatus shown in Figure 10;

Figure 16 is a cross sectional view as seen in the direction of the arrows along the line 16—16 of Figure 15;

Figure 17 is an end view as seen in the direction of the arrows along the line 17—17 of Figure 15.

The various mechanisms of the phonograph, as illustrated, are mounted upon a chassis 15 which is adapted to be housed in a suitable cabinet. A plurality of records 16 are supported in individual trays 17 which are pivotally mounted by arms 18 upon a post 19 which rises upwardly above the floor of the chassis. The trays 17 are arranged in a vertical series at one side of a turntable 20, each tray being held against a common stop 21 (Figure 2) by a spring 22. In the drawings ten record trays 17 have been shown to indicate that a plurality of such trays are employed, it being understood that a different number of trays may be provided.

Means is provided whereby any selected one of the trays 17 may be moved to a position in which the record carried by it is supported directly above the turntable 20. The said means includes a double-threaded screw shaft 23 (Figure 6) which

is mounted between the upper and lower arms 24 and 25, respectively, of a bracket 26, the said bracket being pivotally supported by the said arms upon the post 19. The screw shaft 23 carries a holder 27 which in turn carries a contact brush 28, the latter fitting in a socket 29. A toothed element 30, which is located at the inner end of the said socket, engages the threads of the screw shaft so that a rotary movement of the latter will effect a reciprocating movement of the holder 27 between the upper and lower limits of the threaded section. The holder 27 is formed or provided with a tail-piece 31 which is movable through slots 32 formed in the arms 18 of the record trays when the latter occupy their normal positions in the series. The brush 28 which is carried by the said holder is biased toward, and held against, a channel-shaped insulating bar 33 in which a series of contacts 34 are imbedded, each one of said contacts being identified with, and being located opposite, one of the arms 18 of the record trays.

Each of the contacts 34 is connected in series with a switch controlled by a record selecting or preselecting mechanism. One of these latter switches will be in open circuit condition to correspond to the record to be selected by the selector mechanism and hence when the brush 28 makes contact with a contact 34 arranged in an open circuit the power supplied to the means for driving the screw shaft 23 will be interrupted. Further details of the apparatus involved and an explanation of the operation thereof will subsequently be given in connection with the circuit disclosure of Figure 14.

When the tail-piece of the holder 27 is located in the slot 32 in one of the arms, the tray carried by the said arm may be moved to a position in which it supports its record over the turntable 20 by causing the bracket 26 to pivot upon the post 19 in a counterclockwise direction, as seen in Figure 2. To this end the arm 25 of the said bracket carries a second arm 35, one end of which is connected by a link 36 (Figures 2 and 5) to the upper end of a lever 37. The latter is pivoted at its lower end to a horizontal member 37a of the chassis and carries a roller 38 which engages a cam 39, the said cam and a cam 40 being fixed to a cam shaft 41.

The cams 39 and 40 are fixed to the cam shaft 41 which is arranged to make one complete revolution in each cycle of operation in the phonograph. The cam shaft 41 is arranged to be driven for a portion of a revolution to bring about a certain sequence of operations up to the time that a phonograph record is brought into position for reproduction. When a phonograph record has been completely reproduced, means actuated by the reproducing tone arm cause power to be applied to the cam shaft 41 so that it completes its rotation to bring about the subsequent sequence of operation which restores the mechanism to its original condition corresponding to that at the beginning of a cycle of operation.

A motor 42 serves to drive the cam shaft 41, the shaft of the motor being connected through universal joints 43 to a drive shaft 44. The latter carries a worm gear 45 which meshes with a gear 46 loosely mounted on the cam shaft 41. As the cam shaft makes only one complete revolution in each cycle of operation of the phonograph while a record is being selected, played and returned to its normal position and as the shaft 44 is driven continuously a clutch 47 (Figure 7) is

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utilized to connect the gear 46 to the cam shaft 41. The said clutch includes a sleeve 48 which is splined to the cam shaft and which is movable axially thereon. At one end the said sleeve is formed with a head 49 which carries pins 50, the latter being adapted to enter sockets 51 formed in the adjacent face of the gear 46. A spring 51a which is arranged on the shaft 41 between the cam 40 and the sleeve 48 is normally operative to clutch the gear 46 to the said shaft. Hence when the clutch 47 is engaged, the motor 42 is connected to rotate the cam shaft 41 and the cam 39 is operative to move the lever 37 forward, the movement of the said lever being transmitted to the bracket 26. The latter, therefore, is pivoted on the post 19 to swing the tray whose arm is engaged by the tail-piece 31 of the holder 27 to a position in which the record carried by the tray is supported over the turntable 20.

Mechanism is provided for elevating the turntable 20, when a record tray has been moved over it in the manner described, whereby to lift the record out of the tray and carry it into cooperating relation with the needle 52 of the tone arm 53, or reproducer, of the phonograph (see dotted line position of turntable in Figure 1), it being noted in this connection that the record trays, as best shown in Figure 4, comprise an annular flanged ring defining an opening of a larger diameter than the turntable and through which the latter passes as it is elevated in the manner described. Preferably a thin disc 54 of any suitable material is arranged in the ring under the record and is adapted to prevent warping of the latter. The elevating mechanism referred to includes an elongated spindle 55 which carries the turntable 20. The said spindle is slidably mounted in a sleeve 56 which depends from the floor of the chassis. Its lower end rests upon an anti-friction ball 57 (Figure 3) which is carried by a bearing cup 58, whereby to insure free rotary movement of the spindle, and hence of the turntable. The bearing cup 58 is supported upon the outer end of one arm 59 of a bell crank lever 59a by links 60, the other arm 61 (Figure 1) of the said lever carrying a roller 62 which engages the cam 40. It will thus be apparent that after the cam 39 has moved a record tray over the turntable it is operative to hold the tray in such position, while the cam 40 is operative to elevate the turntable to lift the record out of the tray and move it into engagement with the needle of the tone arm.

Referring to Figure 7, it will be noted that the clutch sleeve 48 is formed with a cut-away portion 63 which provides a cam face 63a. The latter is engaged by the free end of an arm 64 which is mounted upon a rock shaft 65. The free end of the arm 64, acting against the cam face 63a, effects the disengagement of the clutch sleeve from the gear 46 as the turntable reaches the upper limit of its range of movement. The turntable, therefore, remains in such position while the record is being played.

The free end of the arm 64 acting on the cam surface 63a moves the cam surface against the action of the spring 51a until the fingers 50 have been withdrawn from the sockets 51 in the driving gear wheel 46. The gear wheel 46 which is loosely mounted on the shaft 41 continues to rotate but the cam shaft 41 stops when the clutch is disengaged. Thus the sequence of operations controlled by the cams on the cam shaft 41 is stopped to permit reproduction of the phonograph record on the turntable. When reproduction of the phonograph record 16 has been com-

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pleted the rock shaft 65 is rotated, as subsequently will become apparent, to move the free end of the lever 64 away from the cam surface 63 to permit the clutch to engage the driving gear wheel 46.

The turntable is rotated by the motor 42. For this purpose a collar 66 is fixed to the lower end of the spindle 55, the said collar being provided with a radially extending pin 66a. As the turntable is moved to the upper limit of its range of movement the collar 66 moves into engagement with a gear 67 and the pin 66a on the collar interlocks with a downwardly extending pin 67a carried by the said gear. The latter is loosely mounted on the sleeve 56 and is driven by a worm gear 68 which is fixed to the drive shaft 44.

The tone arm 53 is pivotally mounted on the upper end of a vertical shaft 69 and normally occupies a position in which it abuts a stop 70 (Figure 1), the said stop holding the tone arm in a position which will insure engagement of the needle with the proper portion of the sound groove when a record is elevated to playing position. In order that the parts may be returned to their original positions when the record has been played, an arm 71 (Figures 5 and 7) is secured to the lower end of the shaft 69. The said arm carries a pawl 72 which engages the outer end of a horizontal arm 73 of a rock member 74, the said member being pivotally mounted upon a shaft 75 and having a depending arm 76 which projects under the outer end of a finger 77 carried by the rock shaft 65. It will be noted that the outer end of the horizontal arm 73 of the rock member 74 is formed with teeth 78. The latter are so formed that the pawl 72 is permitted to slide over them toward the outer end of the arm 73 as the needle of the tone arm moves toward the center of the record. However, as playing of the record is completed and the needle enters the eccentric oval 79 (Figure 2) an oscillating movement is imparted to the shaft 69, and hence to the pawl 72. The particular tooth 78 on the arm 73 which is engaged by the pawl 72 during such movement of the shaft 69 causes the member 74 to rock on the shaft 75. This movement is transmitted to the rock shaft 65 by the arm 76 and the finger 77, thereby lifting the arm 64 so that the free end thereof is moved upwardly out of engagement with the cam face 63a. The clutch sleeve 48 is thus released and the spring 51a is operative to clutch the gear 46 to the cam shaft 41. As the latter rotates the roller 62 gradually rides down the rear side of the cam 40 and the turntable returns to its lower position. Cam 39 has, in the meantime, held the record tray out over the turntable and now allows the roller 38 to ride down the rear side thereof to permit the spring 22 to return the record tray with its record to its normal position. As the cam 39 rotates further, it strikes a roller 80 (Figure 5) which is carried by a pivotally mounted lever 81 and causes an arm 82 carried by the latter to engage the arm 71 and actuate the latter to return the tone arm to its normal position against the stop 70. In order to slide the pawl 72 off the ratchet 73 the rock shaft 65 is maintained in such angular position that the lever 77 and the cooperating arm 76 are in positions to permit the ratchet 73 to drop down and clear the pawl 72 while the shaft 69 is being turned by the lever 81 actuated by the arm 82 due to the engagement of the roller 80 with the cam 39. In order to prevent the arm 64 from engaging

the cam face 63a on the sleeve 48 until the latter has moved to a predetermined angular position, the said sleeve is formed with a second head 83 (Figures 7 and 8) which is in the form of a cam and which cooperates with a pin 84 5 carried by the outer end of the arm. The cam shaft 41 continues to operate to move the cam surface 83 against which the pin 84 is bearing so that at the end of the operation cycle the free end of the arm 64 is in position to engage the cam surface 63a. 10

From the foregoing it will be apparent that during the first portion of the revolution of the cam shaft 41 in each operating cycle of the phonograph, the free end of the lever 64 is in engagement with the cam surface 63a of the clutch 63 so that the clutch is moved against the action of the spring 51a so that the pin 84 on the arm 64 is no longer in position to engage the cam surface 83. As has been explained the rotation of the cam shaft 41 is stopped by the disengagement of the clutch, and subsequently when the phonograph record has been reproduced, the position of the tone arm brings about an actuation of the rock shaft 65 so as to raise 20 the lever 64 to permit the spring 51a to act and to place the cam surface 83 in contact with the pin 84 at the end of the arm 64. The pin 84 is in position on the cam 83 during the latter portion of the revolution of the cam shaft 41. 30

The selection of a particular record involves rotation of the screw shaft 23 to move the tail-piece 31 of the holder 27 into the slot 32 in the arm of the tray in which the said record is supported. Rotation of the screw shaft 23 is effected by a motor 85 which is mounted upon 35 the arm 35, the rotor of the said motor carrying a pinion 86 which meshes with a gear 87 fixed to the lower end of the screw shaft. Since the arm 35 which carries the motor 85 is secured to the bracket 26, the driving relation between the motor 85 and the gear 87 is maintained during pivotal movement of the bracket 26. 40

The mechanism for controlling the screw shaft 23 to enable the selection of the desired records, includes two series of buttons 88 (Figures 11 and 12) which project through suitable openings in a panel 89 of the cabinet of the machine and which are conveniently accessible. One of the said buttons is identified with each 50 of the records of the machine, there being an additional button 90 (Figure 12) for cancelling a selection when this is desired. The buttons 88 and 90 are carried by push bars 91 (Figure 11) which are mounted in suitable guide openings formed in upper and lower cross members 92 and 93, respectively, of a frame 94. The said push bars are formed at their lower ends to provide punch pins 95 and are normally held in upper, or retracted, positions by springs 96 60 which are arranged around the stem portions of the push bars between the cross member 92 and the panel 89. The body portions 97 of the push bars are offset toward one another so that the punch pins 95 are located in a substantially straight line. A die bar 98 is located under, and in spaced relation with respect to, the punch pins 95 and is formed with openings 99 for accommodating the punch pins. A strip of paper or equivalent tape 100 passes over the die bar 98 between the latter and the punch pins 95, the said tape being unwound from a roll 101. 65

As will subsequently become apparent, the push buttons 88 can be actuated only after a coin or coins have been inserted in the coin chute of 75

the phonograph, and the number of times that the buttons 88 may be actuated is controlled in accordance with the value of the coin or coins received. The manner in which the coins placed in the coin chute renders effective the operation of the phonograph and controls the number of selections to be made and played will be fully described when reference is made to Figure 14 showing the electric circuit diagram. The apparatus in Figure 10, however, utilizes a certain electro-mechanical apparatus which serves to control the number of times the push buttons 88 may be actuated. This apparatus includes an auxiliary frame 181 connected to the frame 166 5 in the proximity of the roller 110, best shown in Figures 15 to 17. The shaft 109 which supports the roller 110 is arranged to extend through the frame 166 to a suitable bearing 182 positioned in one side of the auxiliary frame 181. A suitable stop collar 183 is fastened to the shaft 109 to retain the shaft in proper position. Adjacent the main frame 166 there is loosely mounted on the shaft 109 an arm or plate 184 having thereon a stud 185. The arm or collar 184 is connected 20 to a sleeve which is connected to the ratchet wheel 188, so that these parts move together. When all of the records selected at any time have been played the stud 185 is arranged to be adjacent the stud 186 which is supported from a ratchet wheel 187. The ratchet wheel 187 is loosely mounted on shaft 109 and is biased by a spring 190 bearing against a U-collar 200 toward the disk or arm 184. 30

As previously stated the buttons 88 are carried by push bars 91 having shoulders 103 adapted to engage a cross rod 104 to cause the ratchet wheel 108 to be actuated. The ratchet wheel 108 is connected by a spring 112 to the roller 110 to cause the roller to drive the tape forwardly. The ratchet 108, however, cannot be moved when the studs 185 and 186 are adjacent each other and hence the cross bar 104 will not permit the buttons 88 to be depressed sufficiently to engage the tape 100. 35

To permit selection to be made by the buttons 88 a coin or coins inserted in the coin chute will close an electric circuit to supply power to a solenoid 188. The solenoid 188 is energized one or more times in accordance with the value of the coins received by the coin chute. The solenoid 188 has its core 189 connected to a link 191 which in turn is connected to the lower end of a pivoted lever 192. The pivoted lever which is pivoted at 193 carries at its upper end a pivot pawl 194. The pawl is limited in movement in one direction by a pin or stud 195. The auxiliary frame 181 carries a bracket 196 which pivotally supports an escapement lever 197 pivoted at 198. The pawl 194 and the escapement lever 197 are biased toward each other by a spring 199 supported from suitable pins 201 and 202 mounted on the pawl and lever respectively. The escapement lever 197 is limited in its upward movement by a stud 203 mounted at an intermediate point on the lever 192. When the solenoid 188 is energized, the core 189 is drawn into the solenoid so as to actuate the lever 192. The upper end of the lever 192 therefore moves toward the ratchet wheel 187. In so moving the stop pin 203 rides along the upper surface of the escapement lever 197 to cause this lever to be moved downwardly away from the ratchet wheel 187. The pawl 194 then moves forwardly to engage one of the teeth of the ratchet wheel 187 to move it one unit of distance so as to separate the studs 185 and 186. This 75

separation is just sufficient to permit the actuation of one of the push buttons 88. If a plurality of coins are inserted in the coin chute the solenoid 188 is energized a plurality of times so that the ratchet wheel 187 is moved forwardly a plurality of times thereby separating the studs 185 and 186 sufficiently to permit the selection of a number of records. The solenoid 188 is suitably supported by a bracket 204 secured to the auxiliary frame 181.

When one or more records are selected for play those of the buttons 88 which correspond to the said selections are depressed one after the other. As each button is actuated its push bar moves downward and causes the punch pin carried thereby to pass through the tape 100, thereby producing a perforation 102 (Figure 10) in the tape which has a predetermined location with respect to the marginal edges thereof. The body portions of the push bars 91 are formed with shoulders 103 (Figure 11) which overhang a cross rod 104. The latter extends crosswise of the tape and is carried by links 105 which are pivotally connected at their opposite ends to side plates 106 of the frame 94. One of the links 105 carries a pawl 107 which engages a ratchet wheel 108. The latter is loosely mounted on the shaft 109 of an upper drive roll 110, the cooperating lower drive roll being indicated at 111. A coil spring 112 is arranged around the shaft 109 (Figure 10) in a recess 113 in one end of the roll 110, one end of the said spring being secured to the said roll while the other end is secured to the ratchet wheel 108.

It will be apparent that when a push bar 91 is actuated in the manner described, the cross rod 104 is moved downwardly, thereby rotating the ratchet wheel 108 in a counterclockwise direction to place the spring 112 under tension. A second pawl 114 (Figure 11) permits the ratchet wheel to be rotated as described but prevents rotation of the ratchet wheel in the opposite direction when the push bar is released and returns to its normal position under the influence of its spring 96. As the punch pin 95 is withdrawn from the perforation which it has made in the tape the spring 112 causes the feed roll 110 to rotate to advance the tape a step so that when a second button is depressed the perforation which is made will be located behind the initial perforation. The portion of the tape between the roll 101 and the feed rolls 110 and 111 is preferably held under a slight tension by a resilient finger 115 which presses lightly against the roll 101, it being noted that the latter is carried by a roller 116 which is mounted between the side plates of the frame 94.

The tape 100 passes from between the feed rolls 110 and 111 under a take-up roller 117, over a platform 118 and between a second pair of feed rolls 119 and 120, the shaft 121 of the feed roll 120 carrying a gear 122 which meshes with a drive pinion 123 fixed to the armature shaft of a motor 124. It will be apparent from the foregoing, assuming that the feed rolls 119 and 120 are stationary, that as the feed rolls 110 and 111 advance the tape step-by-step during operation of the push bars 91, slack will be produced between the two sets of feed rolls. This slack will, however, be taken up by the roller 117, the latter being carried by a rod 125 which is pivotally connected to the platform 118 by arms 125a and being biased toward the dotted-line position shown in Figure 11 by springs 126 which are connected at one end to extensions 127 of the arms 125a and

at their opposite ends to a depending portion of the platform.

A shaft 128 is mounted between the side plates 106 of the frame 94 above and just beyond the inner end of the platform 118. The said shaft provides a pivotal mounting for a series of loose collars 129, each of which carries a contact arm 130 and finger 131. The latter extends angularly downwardly toward the platform 118 and engages the paper strip over an elongated slot 132 which is formed lengthwise of the said platform. A spring 133 which is located between each contact arm and a cross member 134 urges the contact arm in a clockwise direction, whereby to cause the finger 131 to enter the slot 132 and permit the contact arm to move away from a contact 135 which is carried by an insulating bar 136 and which it normally engages. Entry of the fingers 131 into the slot 132 is normally prevented, however, by the tape 100. The switches 137 provided by the contact arms 130 and the contacts 135 are thus normally closed, these switches corresponding in number to the selector buttons 88.

The fingers 131 are located in line with the punch pins 95. Hence when one of the said pins has been actuated to produce a perforation in the tape 100 and the latter has been advanced far enough so that the said perforation is located over the slot 132 in the platform 118, the finger 131 which is located in line with the punch pin which produced the perforation will pass through the latter into the slot. The downward movement of the finger will permit the associated contact arm 130 to move, under the influence of a spring 133, away from the companion contact 135. The switch 137 which is provided by the said contact arm and contact is thus opened.

The movement of any one of the contact arms 130 in the manner described is utilized to open a switch 138 which is included in the circuit of the motor 124 (the motor which drives the feed rolls 119 and 120 for the tape 100) and close a switch 139 which is included in the circuit of the main motor 42. For this purpose a collar 140 carries an arm 141 which is normally held in engagement with a contact 142 of the switch 138 by a spring 143a. The fingers 131 which overlie a bail 143 are operative, as they move downwardly, however, to pass through the perforations in the tape 100 to rotate the bail about the shaft 128. The bail is loosely mounted on the said shaft and is suitably connected to the collar 140 so that its movement is transmitted to the contact arm 141, thereby moving the latter into engagement with a contact 144 of the switch 139 against the action of the spring 143a.

Referring to Figure 14, it will be noted that the contact 135 of each of the switches 137 is connected by a wire 145 to one of the contacts 34 traversed by the brush 28 while the contact arms 130 are connected by a common wire 146 to one power line 147. The other power line 148 is connected to a contact 149. When the main switch 150, which may be, and preferably is, a conventional coin switch, is closed a solenoid 151 is energized to move a switch bar 152 to connect the contact 149 and a contact 153. The latter is connected by a wire 154 to one side of the motor 85, the other side of the said motor being connected by a wire 155, the screw shaft 23 and the holder 27 to the brush 28.

In order to initiate operation of the phonograph one or more coins are inserted in a coin chute 205 which is provided with a plurality of selective branches 206 and 207 to accommodate

coins of different values. The various branches 206 and 207, of which there may be a greater number than shown, eventually dispose the coins in a coin box 208. To illustrate the general operation, the coin chute 206 has a value of one unit of play and is provided with a cam 209 which is actuated to momentarily close a normally open circuit switch 211. The other branch 207 of the coin chute 205 illustrates a branch which accommodates a coin having a greater value so as to actuate a plurality of switches, and hence is provided with a plurality of cams 212 and 213 arranged to momentarily close normally open circuit switches 214 and 215. The switches 211, 214, and 215 are connected in a circuit, one side of which is directly connected to the power line conductor 147. The other side of these switches is connected to one side of the solenoid 188 which in turn is connected to the other power conductor 148. Therefore each time that any of the switches 211, 214, and 215 are actuated, the solenoid 188 is energized to advance the ratchet wheel 187. This separates the studs 185 and 186 shown in Figure 15 a distance sufficient to permit the required number of operations of the selected push buttons 88 shown in Figure 11. The switches associated with the coin chute 205 are also connected to a play accumulator of the type commonly known in the art having for example an energizing relay or solenoid 216 arranged to actuate an escapement 217 associated with a spring biased ratchet wheel 218. Each time that the solenoid 216 is actuated, the escapement member 217 permits the ratchet wheel 218 to advance the distance of one tooth. The play accumulator ratchet wheel 218 is provided with a pin 219 arranged to hold open a normally closed switch 159. As soon as the relay 216 is energized to advance the escapement wheel 218, the switch 159 is closed for a purpose which subsequently will become apparent.

An arrangement has been provided for cancelling a selection by the actuation of a push button 90. The push bar 91 supporting the push button 90 is provided with a pin 221 arranged to actuate a switch 222 having normally closed contacts 223 and normally open contacts 224. The normally closed contacts 223 are in circuit between the switches of the coin chute 205 and the play accumulator solenoid or relay 216. The normally open contacts 224 are connected between the one power conductor 147 and one side of the solenoid 188 so that upon cancellation the ratchet wheel 187 is advanced one unit to permit a succeeding selection to be made. The play accumulator is not actuated at this time since the play accumulator is reset only at the end of each phonograph record.

The selector buttons 88 which are identified with the records which it is desired to play are depressed one after the other. As each selector button is actuated it produces a perforation in the tape 100, the latter being advanced one step as the selector button is released and returns to its normal position and the spring 112 rotates the feed rolls 110 and 111. When the switch 150 is closed the solenoid 151 moves the switch bar 152 to connect the contacts 149 and 153 and current is supplied to the motor 85, thereby rotating the screw shaft 23 to cause the holder 27 to move up and down upon it. It will be noted that as the holder 27 moves from one end of the screw shaft to the other, each of the contacts 34 (and the wire 145 and switch 137 by which the contact is connected to the wire 146) is included in the

motor circuit and the motor will continue to operate so long as all of the switches 137 remain closed. The motor 124 which drives feed rolls 119 and 120 for the tape 100 is, however, connected in parallel with the motor 85 as the switch 138 is normally closed, one side of the motor 124 being connected to the contact 142 by wires 156 and 157 while the contact arm 141 is connected to the wire 146. The other side of the motor 124 is connected by wires 158 and 159 to the wire 154. The motors 85 and 124 are, therefore, connected to power simultaneously. The motor 124 drives the feed rolls 119 and 120 until the first perforation 102 which has been punched in the tape 100 moves over the slot 132 in the platform 118. When this occurs the finger 131 which is aligned with the said perforation passes through the latter into the slot 132, thereby permitting the contact arm which is associated with the finger to move away from the cooperating contact to open the switch 137 of which the contact arm is a part.

In Figure 14 one of the switches 137 is shown open. As this occurs the switch 138 is also opened, thereby breaking the circuit of the motor 124 which drives the feed rolls 119 and 120. The motor 85, however, continues to drive the screw shaft and the brush 28 moves over the contacts 34 as described until it moves, as illustrated, into full alignment with the contact which is connected by a wire 145 to the switch 137 which is open. When this occurs the circuit through the motor 85 is broken and the holder 27 is arrested in a position in which the tail-piece 31 is located in the notch 32 of the arm 18 of the tray 17 which carries the record selected to be played.

When the contact arm 141 is moved to break the circuit of the motor 124 it engages the contact 144 to connect the main motor 42 of the phonograph in parallel with the motor 85, one side of the motor 42 being connected to the contact 144 by a wire 160 while the other side of the motor is connected by a wire 161 to the wire 159. The motors 42 and 85, therefore, operate together momentarily. The leading end of the cam 39 (Figure 5), however, is spaced from the roller 38 so that before it moves into engagement with the said roller the circuit of the motor 85 will have been broken in the manner described. After movement of the tail-piece 31 of the holder 27 into the notch 32 of the arm of the proper record tray the motor 42 is operative, through the agency of the cam 39, to move the lever 37 forward and thereby rotate the bracket 26 upon the post 19 to swing the tray carrying the selected record to a predetermined position over the turntable. While the tray is held in this position the cam 40 comes into play, actuating the bell crank lever 59a to elevate the turntable to lift the record out of the tray and carry it to a position in which the needle of the tone arm enters the sound groove. As the record is moved upwardly to a playing position the clutch collar 66 engages the gear 67 and the turntable is rotated, the clutch 47 being actuated at this time to disconnect the cam shaft 41 from the gear 46.

Upon entry of the needle of the tone arm into the eccentric oval position of the sound groove, playing of the record having been completed, the clutch 47 is actuated to again connect the gear 46 to the cam shaft 41. As rotation of the latter is resumed the turntable is lowered to its normal position and the record is returned to its tray, the latter then being moved back to its place in the stack. Thereafter the cam 39 engages the

roller 80 and the tone arm is returned to its original position. As the cam shaft 41 approaches its original position a cam 162 (Figure 14) which is carried by it engages a contact arm 163 of a normally open switch 164 and momentarily closes the latter. The contact arm 163 being connected by a wire 165 to a contact 166 which is engaged by the contact arm 141, current is supplied to the motor 124 and the latter is operative to advance the paper strip 100. As this occurs the particular finger 131 which to this time has been located in one of the perforations, is forced out of the perforation and again rides upon the paper strip. The pivotal movement of the finger as it moves out of the perforation is transmitted to its contact arm 130 and the latter is moved to close the switch 137 of which it is a part. At the same time, the bail 143 is released and the spring 143a moves the contact arm 141 to open the switch 139 of the main motor 42 and close the switch 138 of the motor 124. If at this time the switch 150 is still closed, the motor 124 is operative to drive the feed rolls 119 and 120 and the tape 100 is advanced until the next perforation 102 moves over the slot 132 in the platform 118 and the finger which is in alignment with it passes through it to again open the circuit of the motor which drives the paper strip and close the circuit of the main motor 42, the sequence of operations described being repeated until all of the records selected have been played.

It will be noted that when the solenoid 151 (Figure 14) is energized by the closing of the switch 150 and the contact bar 152 is moved to connect contacts 149 and 153 it is also moved into engagement with a contact 167 which is connected to a resilient member 168 of a normally closed switch 169, the other member 170 of the switch being connected to one side of the solenoid 151. The solenoid 151, therefore, is operative to maintain the connection of the lines 146 and 154 to power after they have been once connected by closing of the switch 150. In order to provide for breaking of the power circuit after all of the selected records have been played a bell crank 171 is mounted in the vicinity of the switch 169. One arm of the bell crank is connected by a link 172 to the lower end of the lever 37 of Figures 1 and 2 while the other arm carries a dog 173. The latter is pivotally mounted so that as the bell crank is rocked in a clockwise direction during forward movement of the lever 37 to swing a record tray over the turntable it will pivot against the resistance of a spring 173a and swing aside as it passes the end of the resilient switch member 168. However, when playing of the record has been completed and the lever 37 is retracted to cause the bell crank 171 to rotate in a counter-clockwise direction, the dog 173 is operative, after the switch 164 has been momentarily closed for the purpose and in the manner described and the various parts restored to their original positions, to momentarily open the switch 169, a pin 173b preventing pivotal movement of the dog during such movement of the lever.

Each time that the dog 173 actuates the switch 169, a cooperating pair of contacts 225 is closed to supply power to a reset solenoid 226 which moves its armature 227 so as to step the ratchet wheel 218 one unit toward its original position. The switch 150 remains open until the total number of records played equals the total number of units accumulated by the successive operation of the solenoid 216. While the switch 169 is actuated at the end of the reproduction of each

record by the dog 173, the switch 150 remains closed as long as any selections still remain to be played. If at this time the switch 150 is open the solenoid circuit will be broken and the contact bar 152 will move away from the contacts 149, 153 and 167. It will thus be apparent, assuming that the switch 150 is a conventional coin switch and that a plurality of records have been selected, that the switch 150 will remain closed until the playing of the final record has begun. The opening of the switch 169 after the playing of each record will, therefore, have no effect upon the power circuit. The switch 150 will, however, be opened after playing of the final record. Hence when the switch 169 is opened after this record is played the power circuit will be broken.

In accordance with the invention means is provided for cancelling a record which has been selected. The said means includes a punch 174 (Figure 10) which is carried by a push bar similar to those which carry the punches 95 and which may be actuated by the button 90 (Figure 12). Referring to Figure 10, it will be noted that the punch 174 is so located with respect to the punches 95 that it will be in alignment (crosswise of the sheet) with respect to the initial position to which any perforation made by the latter is advanced. A perforation made by the punch 174 thus advances with the one made by the punch 95 and they both move to a position over the slot 132 in the platform 118 at the same instant. When this occurs a finger 175 (Figure 13) passes through the perforation produced by the punch 174 and permits a contact arm 176 to engage a contact 177 which is connected to the wire 157 (Figure 14). An auxiliary circuit, independent of that controlled by the switch 138, is thus momentarily established and the motor 124 continues to operate to advance the tape 100 until the next perforation in the strip effects the playing of a selected record.

The use of a tape to control the playing of the records of the phonograph has the advantage that the records are played in the order in which the selections are made. Such selections may be made without regard to the number of records in the collection and may include any of the records, including the one which is playing at the time, any desired number of times. If during playing of a record additional selections are desired to be made this may be done without interfering with the operation of the machine.

It is to be noted that the perforation produced by each of the punches 95 has a characteristic location with respect to the marginal edges of the tape, such location being different from that produced by each of the remaining punches. In other words, each time the same record is played a perforation is made in the tape which has the same lateral position. This has the advantage that the tape provides a permanent record which will not only indicate the number of times the phonograph has been played but will also indicate the number of times the individual records have been played.

While for the purpose of illustrating and describing the present invention, there has been shown in the drawings a certain embodiment, it is to be understood that the invention is not to be limited thereby since such variations in the instrumentalities employed and in their arrangement and that of the associated circuits are contemplated as may be commensurate with the spirit and scope of the invention defined in the following claims.

This invention is hereby claimed as follows:

1. An automatic coin controlled phonograph comprising a reproducer means, a record magazine having a plurality of records, a mechanism for selectively presenting a record from said magazine into operative engagement with said reproducer means, a coin chute for receiving coins, and coin controlled means operable upon reception of coins in said coin chute for selecting a plurality of said records and for automatically effecting the operation of said mechanism to play selected records in sequence, said means including a tape, two sets of feed rollers for actuating said tape, a plurality of selector elements each identified with one of said records and disposed in operative relation to said tape to produce a perforation therein at each projection stroke in a location corresponding to a particular record, means operatively connecting said selector elements with one set of feed rollers for advancing said tape, a unit of distance as an incident of the operation of each of said elements, separable means interconnected with and for operation in response to operation of said coin controlled mechanism under influence of the value of the coins received in said chute for correspondingly limiting the number of actuations of said selector elements, means for advancing the other set of feed rollers, and means rendered operative by the predetermined positioning of the perforations as the tape moves and operatively connected to the record selective mechanism for controlling the playing of records, said last named means including an operative connection to the advancing means of said second named set of feed rollers for stopping the action thereof while playing of a record is in progress.

2. In a coin controlled automatic phonograph, a movable tape adapted to be perforated, a plurality of normally retracted but projectable preselector punches disposed crosswise of said tape between the marginal edges thereof to produce perforation in said tape at different locations corresponding to the records selected, a coin chute, means including relatively abutting elements interconnected with said preselector punches for limiting the number of actuations of said punches, means responsive to the coins received in said coin chute for separating said elements in accordance with the value of the received coins to permit corresponding actuations of the punches, feed rollers in operative contact with the tape, and means interconnecting said feed rollers and said punches for advancing said tape a given distance whenever one of said punches is actuated within the allowed number of actuations.

3. An automatic phonograph comprising means for reproducing phonograph records, a magazine containing a collection of records, a selector mechanism for presenting a record from said magazine to said reproducing means, and coin controlled means including selective coin responsive control devices for preselecting any of said records and for subsequently automatically effecting operation of said selector mechanism to reproduce selected records in the order selected, said means including a movable tape, two sets of feed rollers for actuating said tape, a plurality of projectable preselector elements each identified with one of said records and disposed adjacent the path of movement of said tape to produce a perforation therein at each projected stroke and in a location which is identified with a particular record, means operatively intercon-

necting said preselector elements with one set of said feed rollers for advancing said tape a certain distance as a result of the operation of each said element, means controlled by said coin responsive control devices for limiting the number of times said selector elements may be projected, other means for advancing the other set of feed rollers, and means including a plurality of switch arms adapted to selectively penetrate a tape perforation for controlling the operation of said selector mechanism, said latter means including an operative connection to the advancing means of said second named set of feed rollers for governing the actuation thereof at a predetermined time in each cycle of operation of said selector mechanism.

4. In an automatic phonograph, a selector mechanism comprising a plurality of record carriers each carrying a different phonograph record and pivoted on a common pivot post, a selectively operable record carrier actuating mechanism including a bracket pivoted to said post, a reciprocable member, driving means therefor and carried by said bracket, a plurality of electrical contacts each corresponding to one of said carriers and adapted to be engaged successively by said reciprocable member, means including a switch for deenergizing said driving means when said reciprocable member engages a predetermined selected electrical contact, and means interconnecting said reciprocable member with a record carrier corresponding to the selected electrical contact whereby the carrier may be rotated about the pivot post with the bracket.

5. In an automatic phonograph, the combination comprising a selective record predetermining mechanism, a plurality of record carriers for phonograph records adapted to be moved into reproducing position, and a phonograph record selector mechanism comprising a reciprocable member, screw driving means for said reciprocable member to position the same adjacent a selected record carrier, a control circuit for the selector mechanism and including a plurality of electrical contacts arranged in a straight line path and each corresponding to a different one of said carriers, means carried by said reciprocable member for traversing the path of said contacts and engaging successively said electrical contacts, means controlled by said predetermining mechanism for stopping said screw driving means when the reciprocable member engages the electrical contact corresponding to the selected record carrier, and means interconnecting said reciprocable member with the selected record carrier for moving the carrier to reproducing position.

6. In an automatic phonograph, the combination comprising a magazine having record trays for a collection of phonograph records each supported in a separate record tray, mechanism for selectively predetermining which of said records are to be reproduced, a reciprocable member adapted to be aligned with a selected predetermined record tray, said reciprocable member carrying an electrical contact element, a plurality of electrical contacts each corresponding to a different one of said trays and being arranged in the path of movement of said reciprocable contact element for successive engagement therewith, means interconnecting said plurality of contacts with said selective record predetermining mechanism, means responsive to the engagement of said reciprocable contact element with a preselected one of said plurality of contacts for ar-

resting the motion of said reciprocable member, said record trays having registering slots in normal position thereof and said reciprocable member having a projection traversing said slots during movement thereof and engaging the slot of the preselected record tray, and mechanism actuated by said record predetermining mechanism and including the interengaged projection of the reciprocable member and slot of the selected record tray for moving the selected record tray to a position where the record thereon may be reproduced.

7. An automatic coin controlled phonograph comprising a reproducing means, a record magazine for a plurality of records disposed adjacent said reproducing means, a mechanism for selectively presenting a record from said magazine into operative engagement with said reproducing means, a coin chute for receiving coins, coin controlled means operable in response to coins received in said coin chute for selecting a plurality of records and for automatically effecting the operation of said mechanism, to play selected records in sequence, and including a selectively operable record preselector and a record medium, said preselector having a plurality of selectively operable members, each corresponding to a record in said record magazine, and disposed with respect to said record medium when actuated to place indicia on said record medium for indicating thereon the number of times each record is played, wherefrom its popularity may be determined, and means including plural elements each selectively responsive to the previously placed indicia on said medium and operatively associated with said mechanism for controlling the said operation of the mechanism.

8. A check controlled multirecord phonograph comprising a turntable, reproducing means associated therewith, a magazine for a plurality of phonograph records disposed adjacent said reproducing means, record shifting means including record selector means for selectively presenting a record from said magazine into operative engagement with said reproducing means, preselector mechanism including a plurality of selectively operable selector members, each corresponding to a record in said magazine, and a movable record tape to receive a characteristic alteration from each actuated selector member, coin controlled means including an electric circuit and switches controlling the number of actuations of said selector members and said record shifting means, and plural sensing devices each responsive to a corresponding characteristic alteration in said tape and including switch means for effecting operation of said record selector means to present

a record to the reproducing means in accordance with the selection of records by said preselector mechanism.

9. A check controlled multirecord phonograph as claimed in claim 8, wherein the magazine includes movable record carriers each having connector means adapted for selective engagement with the record selector means and movable thereby for presenting a preselected record to said reproducing means.

10. A check controlled multirecord phonograph as claimed in claim 9, wherein the record selector means includes a movable member adapted to traverse the record carriers in the magazine and to interengage with the connector means of a selected record carrier.

11. A check controlled multirecord phonograph as claimed in claim 8, wherein the selector members of said preselector mechanism are in the form of punches for selectively perforating the record tape and wherein the switch means of the sensing devices includes shiftable members engageable with a corresponding perforation in the record tape.

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