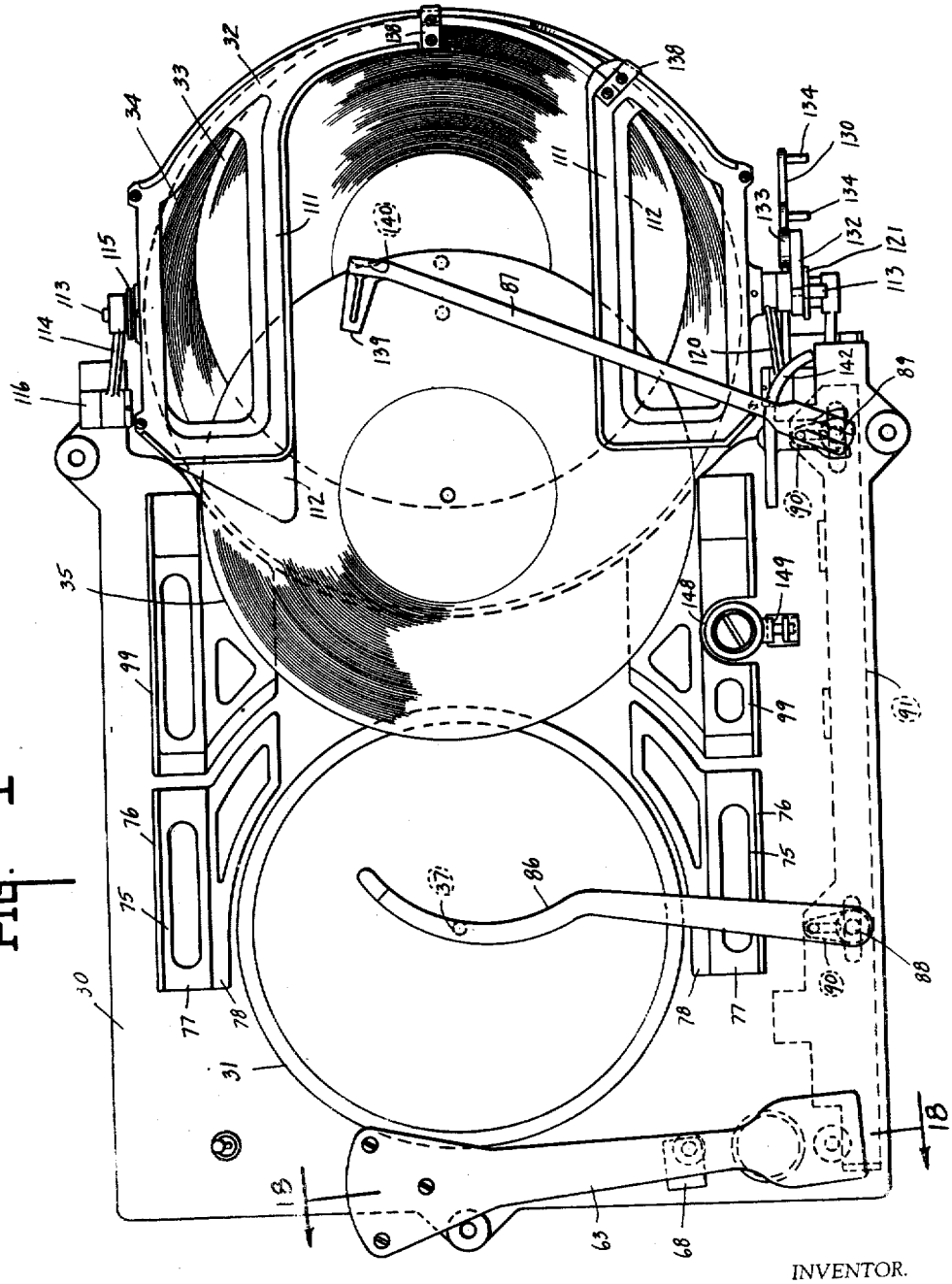
Feb. 22, 1938. T. W. SMALL 2,109,322

AUTOMATIC RECORD CHANGING PHONOGRAPH

Filed March 13, 1936 6 Sheets-Sheet 1

FIG. 1



INVENTOR.
THOMAS W. SMALL.

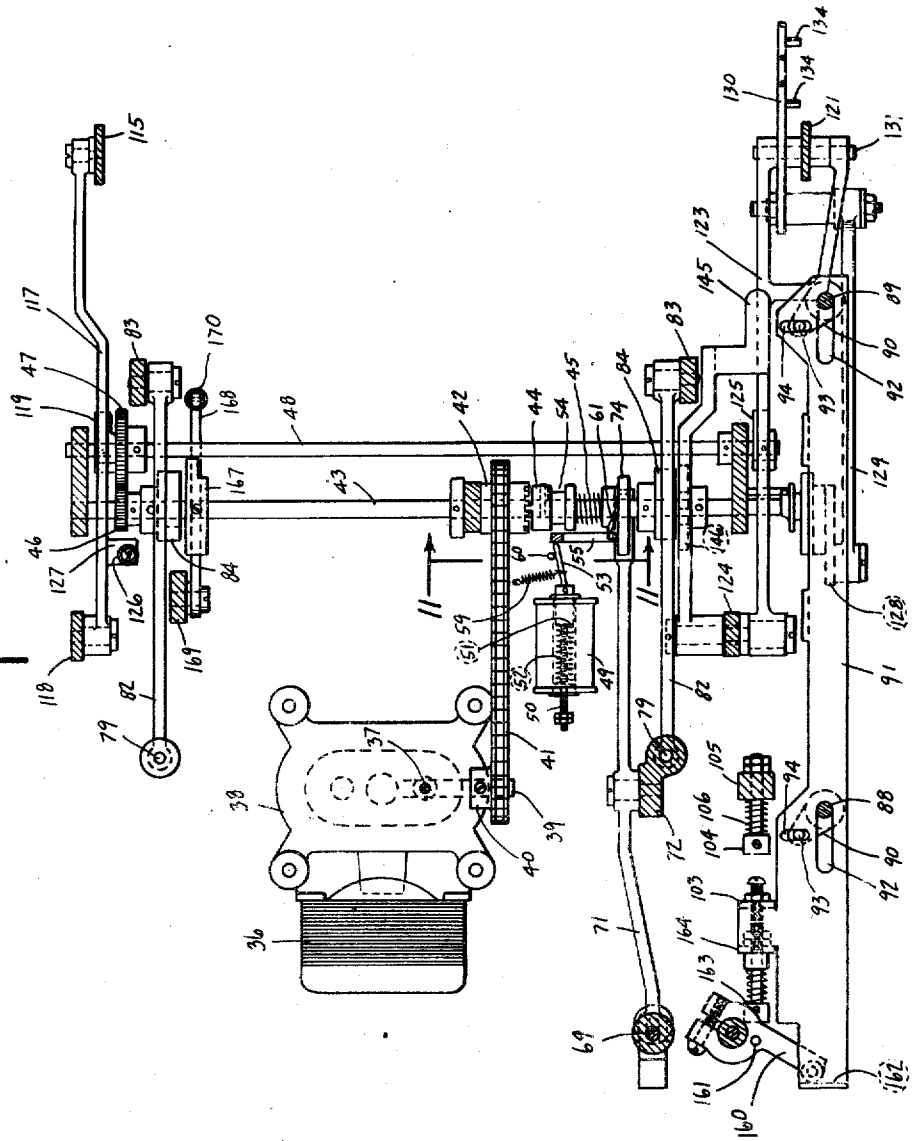
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Lockwood Goldsmith & Galt
ATTORNEYS.

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AUTOMATIC RECORD CHANGING PHONOGRAPH

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FIG. 2



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AUTOMATIC RECORD CHANGING PHONOGRAPH

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FIG. 3

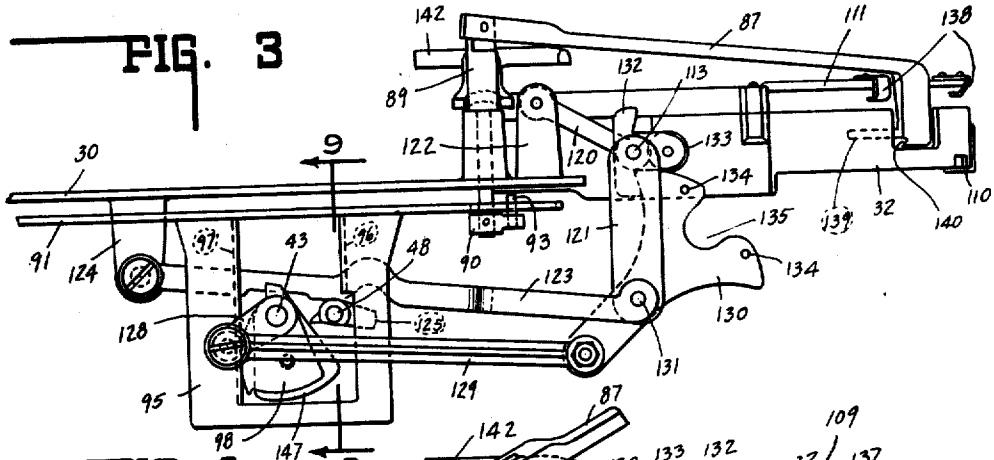


FIG. 4

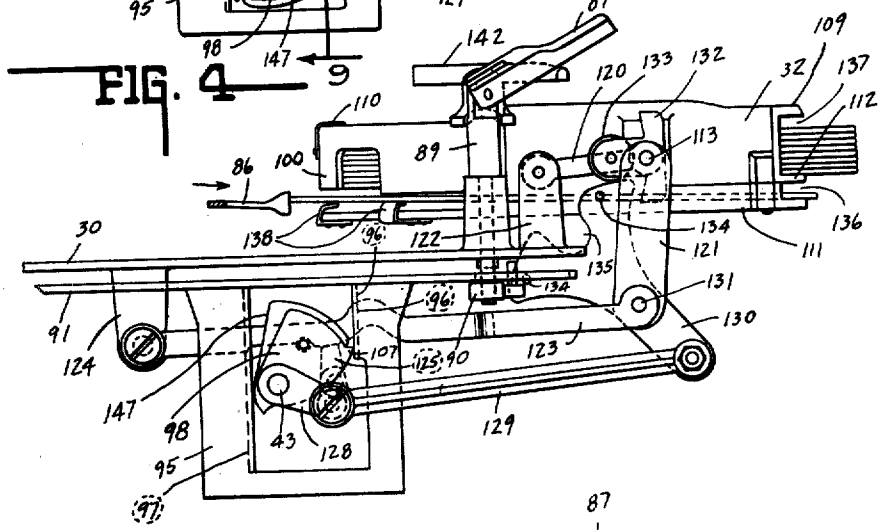
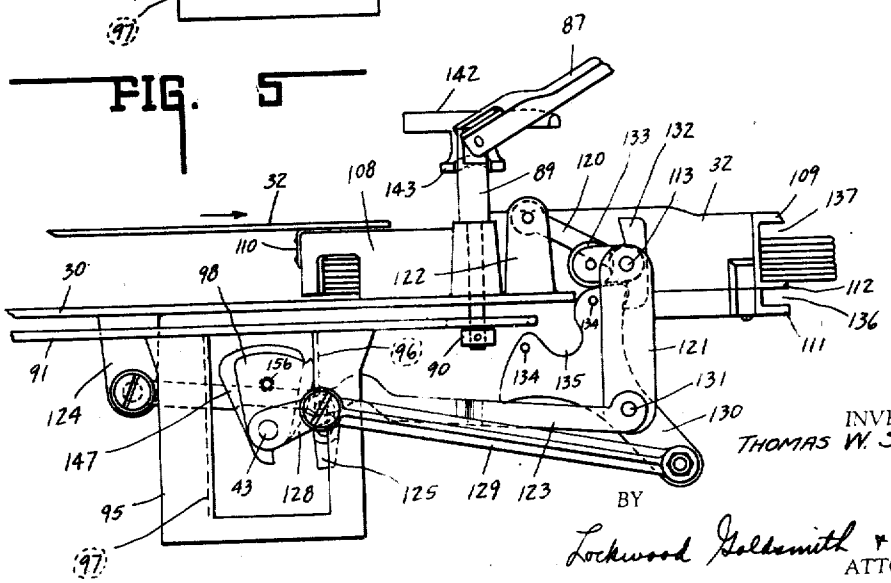


FIG. 5



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FIG. 6

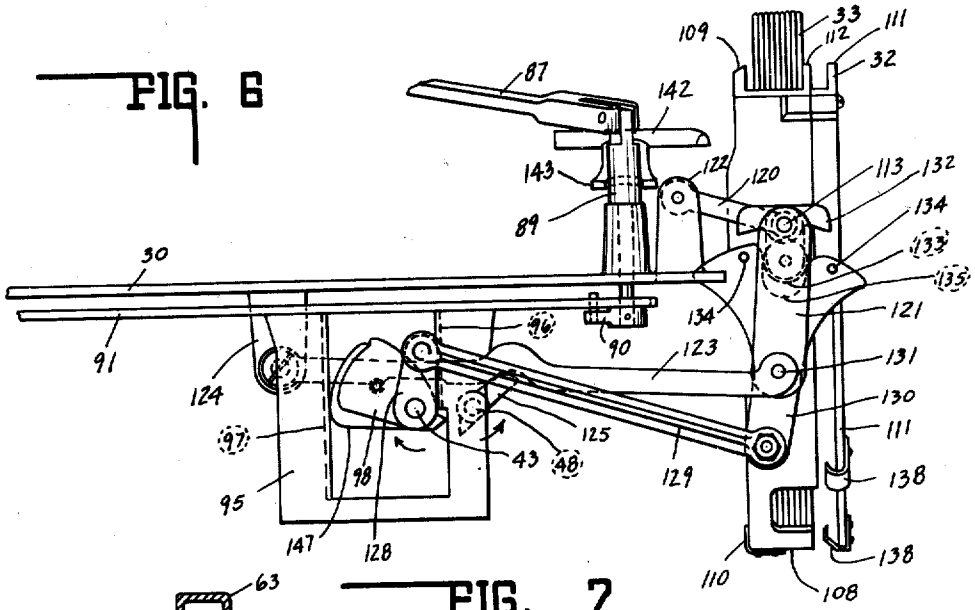


FIG. 7

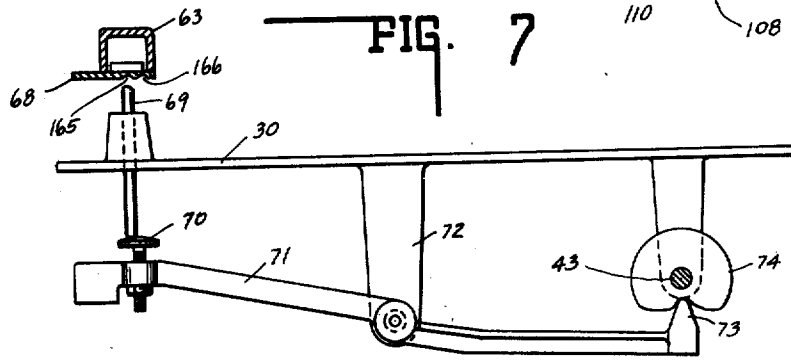


FIG. 8

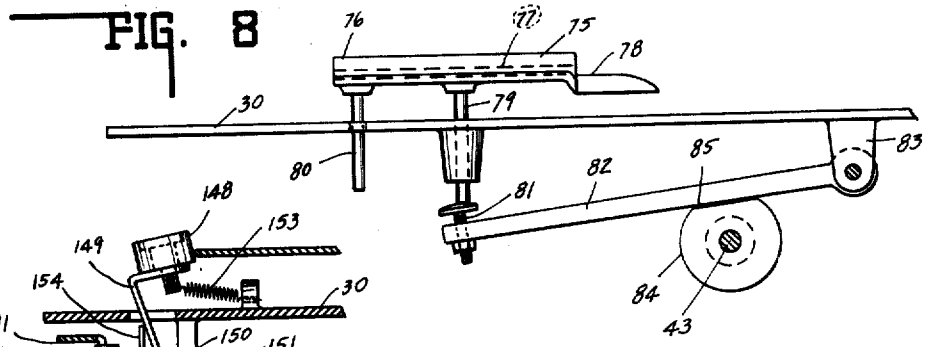
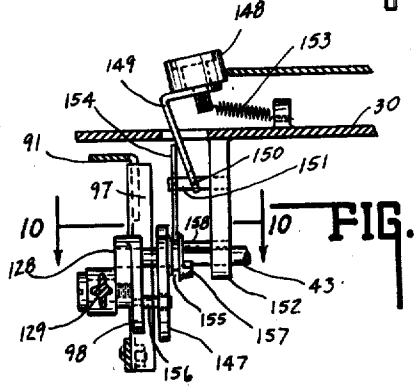


FIG. 9



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FIG. 10

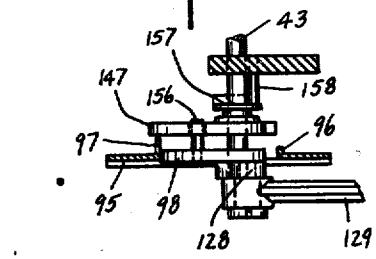


FIG. 11

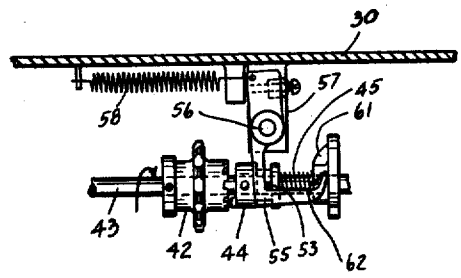
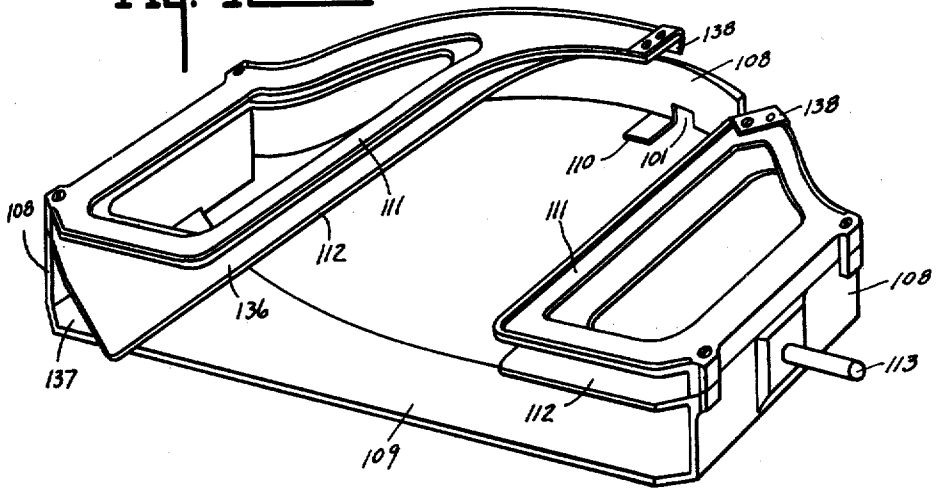


FIG. 12



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AUTOMATIC RECORD CHANGING PHONOGRAPH

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FIG. 13

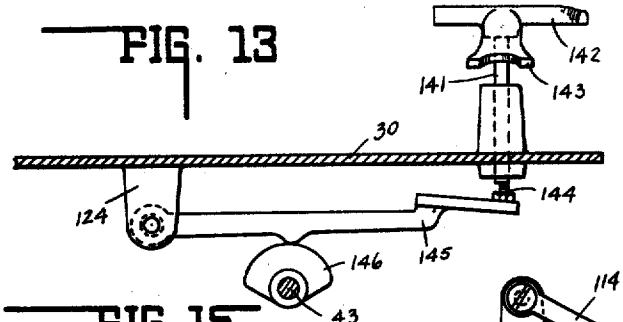


FIG. 14

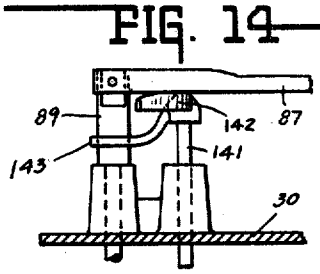


FIG. 15

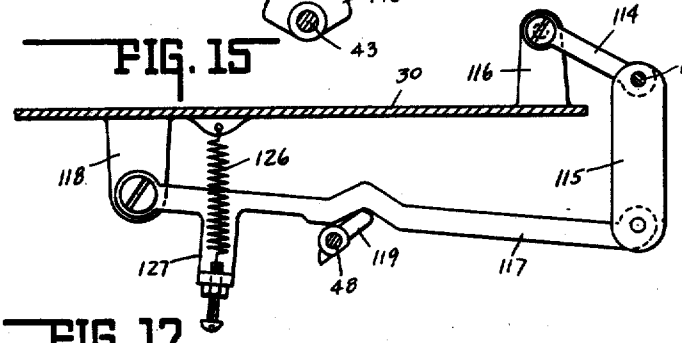


FIG. 16

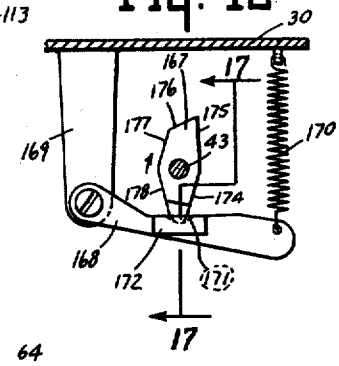


FIG. 17

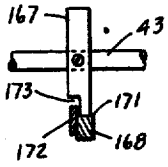


FIG. 18

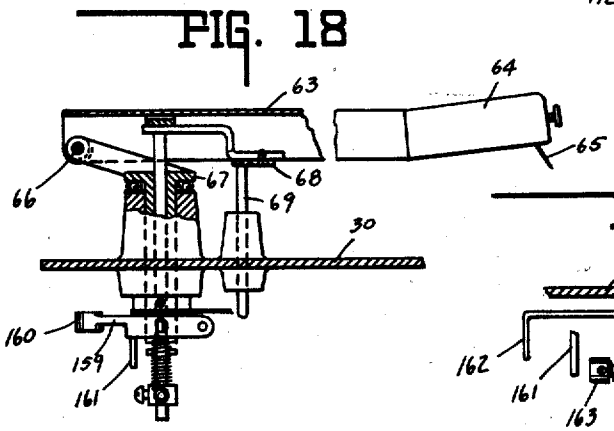


FIG. 19

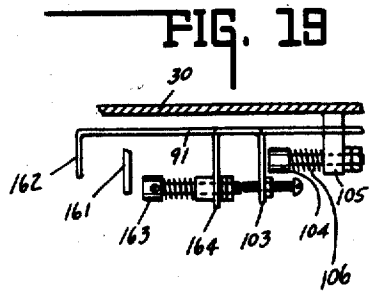
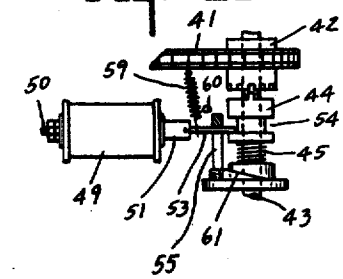


FIG. 20



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Patented Feb. 22, 1938 2,109,322

UNITED STATES PATENT OFFICE

2,109,322

AUTOMATIC RECORD CHANGING PHONOGRAPH

Thomas W. Small, Fort Wayne, Ind., assignor, by mesne assignments, to Reconstruction Finance Corporation, Chicago, Ill., a corporation

Application March 13, 1936, Serial No. 68,673

22 Claims. (Cl. 274—10)

This invention relates to an automatic record-changing phonograph.

One object of the invention is generally to improve upon the simplicity and flexibility of operation of phonographs of this type.

Another object is to provide a phonograph in which a plurality of records may be played successively and automatically, both sides of each record being played before the playing of the succeeding record.

Another object of the invention is to provide simplified mechanism whereby an assortment of records of different sizes may be successively and automatically played irrespective of their sizes.

Other objects and features of the invention will be understood from the accompanying drawings and the following description and claims:

Fig. 1 is a plan view of the phonograph mechanism or chassis assembly removed from the usual cabinet. Fig. 2 is a plan view of the operating mechanism beneath the deck plate of the chassis with parts shown in section. Fig. 3 is an elevational view of a part of the machine showing the record storage magazine and operating mechanism therefor in one of the positions assumed during the cycle of operations. Figs. 4, 5 and 6 are similar views showing the same mechanism in other positions. Fig. 7 is an elevational view of the mechanism for lifting the pickup arm from the record and returning the same thereto with parts shown in section. Fig. 8 is an elevational view showing the mechanism for raising the records from the playing turntable and lowering the same thereon. Fig. 9 is an elevational view with parts in section showing mechanism used to control the movement of the record and movement of the pickup arm for different sizes of records. Fig. 10 is a horizontal sectional view taken substantially on the line 10—10 of Fig. 9. Fig. 11 is an elevational view taken on the line 11—11 of Fig. 2 and illustrating mechanism used for the initiation and stopping of the record-changing cycle. Fig. 12 is a perspective view of the record storage magazine in its preferred form. Fig. 13 is an elevational view of a portion of the apparatus used for removing records from the magazine. Fig. 14 is an elevational view of other portions of the same apparatus. Fig. 15 is an elevational view of a portion of the magazine manipulating mechanism. Fig. 16 is an elevational view of another portion of the magazine manipulating mechanism. Fig. 17 is a sectional view taken substantially on the line 17—17 of Fig. 16. Fig. 18 is a sectional view taken on the line 18—18 of Fig. 1 illustrating the pickup arm manipulating mechanism. Fig. 19 is an elevational view of a portion of the same mechanism. Fig. 20 is a plan view of a portion of the clutch controlling mechanism shown in Fig. 2 in a position assumed in its operation different from the position shown in Fig. 2.

In the drawings there is shown, by way of illustration, a preferred form of the invention. In this form the entire operating mechanism for rotating the turntable and manipulating the records and pickup arm is mounted upon a deck plate 30 which may be secured in a cabinet, not shown, in any well known manner. In Fig. 1 there is shown the playing turntable 31, the storage magazine 32 containing therein a stack of records including small records 33 and larger records 34. A record 35 of the small size is shown during transfer from the magazine to the turntable for playing.

Power drive

An electric motor 36 (see Fig. 2) is supported upon the undersurface of the deck plate 30 and continuously drives a spindle 37 by means of gears, not shown, contained in a housing 38. The spindle 37 supports the turntable 31 in the usual manner. The motor 36 also drives a stub shaft 39 by means of other gears contained in the case 38. The shaft 39 has secured thereto a sprocket 40 which carries a sprocket chain 41 for driving a sprocket 42 which runs freely on a cam shaft 43. The cam shaft 43 has splined thereto a clutch 44 carrying teeth engaging with similar teeth upon the hub of the sprocket 42. A compression spring 45 normally presses the clutch 44 into engagement with the mating teeth and when the clutch is so engaged, the motor 36 drives the shaft 43. The cam shaft 43 is fitted with a pinion 46 driving a gear 47 mounted upon a second cam shaft 48. The pinion 46 and gear 47 are proportioned to provide one revolution of shaft 48 for each two revolutions of the shaft 43. The shaft 43 carries a plurality of cams, to be hereinafter described, which control the various movements which take place in a single record-changing cycle including the moving of a record from the turntable to the magazine and the moving of the same or another record from the magazine to the turntable. The shaft 43 makes one revolution for each such cycle of operation and may, therefore, be known as the "one-cycle" cam shaft. The shaft 48 makes one revolution for each two cycles and operates mechanism which determines whether the same or a different rec-

ord is to be returned to the turntable for playing. This shaft, therefore, may be known as the "two-cycle" shaft.

Clutch operating mechanism

The clutch 44 is placed into operative position by the momentary actuation of a solenoid 49. This actuation takes place automatically upon completion of the playing of a record and may be accomplished by any of several well known forms of apparatus,—as for example, that shown in copending application of Ralph R. Erbe, Serial No. 10,441, filed March 11, 1935. The solenoid 49 is provided with a plunger 50 having thereon a shoulder 51 against which there abuts a compression spring 52 normally urging the plunger to the right in Fig. 2. During playing of a record, the plunger is in the position shown in Fig. 20 and in that position a pin 53 pivotally mounted upon the plunger engages a groove 54 in the clutch member 44. Said pin rests against a hook-shaped lever 55 (see Fig. 11) which serves to hold the pin and the clutch member 44 in the disengaged position. The lever 55 is pivotally mounted at 56 upon a bracket 57 formed upon the undersurface of the deck plate 30 and is retained in position by a tension spring 58.

Upon actuation of the solenoid 49, the plunger is drawn to the left as shown in Fig. 2. The pin 53 is thereby withdrawn from its engagement with clutch 44 and lever 55 and is drawn by a tension spring 59 against a stop 60, the end of said pin resting against the upright portion of lever 55. The removal of the pin permits clutch 44 to move under the influence of spring 45 into operative engagement with the mating teeth and initiates the movement of the two cam shafts 43 and 48. During this movement, a cam 61 mounted upon the one-cycle cam shaft 43 engages the tip of lever 55 and moves the same to the left in Fig. 11 sufficiently far to permit the pin 53 to slip into its engagement with the groove 54, this movement being caused by the action of spring 52. At the completion of one revolution of shaft 43, the tip of lever 55 reaches a shoulder 62 on the cam 61 and slips into the position shown in Fig. 11 under the influence of spring 58. In this movement, the pin 53 is operated to withdraw the clutch element 44 from its operative position and thereby to stop the movement of the cam shafts 43 and 48.

Pickup arm elevating and lowering mechanism

The first operation performed by the movement of the one-cycle cam shaft 43 is the elevation of the stylus from the record. In Figs. 1 and 18 the pickup arm 63 is shown. The arm carries the usual pickup mechanism 64 and stylus 65 for engaging the record for reproduction. The arm 63 is pivotally mounted at 66 upon a bushing 67 which is mounted for pivotal horizontal movement on the deck plate 30. On the undersurface of the arm 63 there is provided a plate 68 beneath which there is located a vertical pin 69 slidably mounted in the deck plate 30 (Figs. 7 and 18). The lower end of the pin 69 rests upon an adjustable stud 70 carried on one end of a lever 71, said lever being pivotally mounted upon a bracket 72 secured to the undersurface of the deck plate 30. The opposite end of lever 71 is provided with a pointed cam follower 73 following a cam 74 carried upon the one-cycle cam shaft 43.

The shape of the cam 74 is such that the follower 73 is pressed downwardly as soon as the rotation of shaft 43 commences. The pin 69 is thus pressed upwardly to elevate the stylus from the record. For this purpose, the plate 68 is sufficiently elongated so that it may rest upon the pin 69 in either the innermost or outermost positions of the stylus. Due to the shape of cam 74, the stylus remains elevated throughout the remainder of the record-changing cycle and is lowered into position upon the record at the completion of said cycle. It will be noticed from Fig. 7 that in the lowering of the stylus, the pin 69 drops out of engagement with the plate 68 so that there is no frictional engagement therewith during the playing of a record.

Record elevating mechanism

After the stylus has been raised, the next operation performed by the rotation of the one-cycle cam shaft 43 is the elevation of the record just played from the turntable to clear the centering pin formed by the upper end of the spindle 37. This is accomplished by means of a pair of elevators 75 positioned upon opposite sides of the turntable 31 (see Figs. 1 and 8). Said elevators are provided with side guides 76, properly spaced to include a record of the larger size, and with an upper surface 77 adapted to support records of this size. They are also provided with a lower surface 78 for supporting the smaller size records, the boundary between the surfaces 77 and 78 being properly spaced to provide guides for the latter size of record.

The elevators 75 are mounted upon spindles 79 vertically slidable in the deck plate 30 and are also provided with guide pins 80 sliding through other openings in said deck plate. The lower ends of the spindles 79 rest upon adjustable studs 81 carried upon levers 82 which are pivotally mounted upon brackets 83 formed upon the lower surface of the deck plate 30. The levers 82 rest upon cams 84 carried by the one-cycle cam shaft 43. Said cams are provided with flat spaces 85 upon which the levers 82 rest during the playing of a record. In this position, the elevators are lowered out of contact with the record on the turntable. As soon as the rotation of shaft 43 is started, the cams 84 operate to raise the levers 82, thus raising the elevators 75 and lifting the record just played from the turntable. The shapes of the cams 84 are such that said elevators remain in their upper position while the record is removed therefrom to the magazine and the same or another record is returned to the elevators, whereupon the elevators are again lowered by the cams to place the record upon the turntable for playing. The elevators reach their lowermost position simultaneously with the completion of a single revolution of the one-cycle cam shaft 43.

Mechanism for moving records from the elevators to the magazine

The movement of the records from the elevators to the magazine is accomplished by an arm 86 (see Fig. 1.) The return movement of the records from the magazine to the elevators, a detailed description of which is given under a later subhead, is accomplished by an arm 87. The arm 86 is mounted upon the upper end of a pin 88 pivotally mounted in the deck plate 30 while the arm 87 is pivotally mounted for vertical movement upon a pin 89 similarly mounted upon said deck plate. Each of said pins 88 and 89 has secured thereto at its lower end an arm 90, said arms supporting a slide 91 having slotted openings 92 embracing the pins 88 and 89 which, therefore, serve as guides permitting horizontal sliding movement of the slide 91. The arms 90

are provided with pins 93 sliding in slotted openings 94 in the slide 91. By this construction it will be apparent that movement of the slide 91 to the right will move the levers 86 and 87 in unison in the same direction while a movement of the slide 91 to the left will move said arms to the left.

The slide 91 is provided with a yoke-shaped depending member 95, best seen in elevation in Figs. 3 to 6, inclusive, and in section in Fig. 10. Said member 95 is provided with inturned flanges 96 and 97 adapted to engage a cam 98 carried by the one-cycle cam shaft 43. This cam is so shaped that it engages the flange 96 and moves the slide to the right at the proper time to bring the end of arm 86 into engagement with a record which has just been elevated from the turntable and to move the record to the magazine. In this movement the record is guided, if it is a large size record, by the guides 76, and, if a small size record, by the guides formed by the boundaries between the surfaces 77 and 78. Upon leaving the elevators 75, the records are guided by members 99 which are formed in substantially the same manner as the elevators and, similarly, provide guides for both sizes of records.

At the time of delivery of a record to the magazine, the latter may be either in the position shown in Fig. 4 or in that shown in Fig. 5. In the position shown in Fig. 4, the end of arm 86 enters the confines of the magazine beneath the portion 100 thereof so that the record is placed well within the magazine. Similarly, with the magazine in the Fig. 5 position, the arm 86 enters the confines thereof through a notch 101 shown only in Fig. 12. During the latter part of this movement, a downwardly extending portion 103 of the slide 91 (see Figs. 2 and 19) engages the end of a spring-pressed stud 104 slidably mounted on a boss 105 on the bottom of the deck plate 30 and in so doing, compresses a spring 106. At the completion of said movement, a shoulder 107 on the cam 98 reaches the end of the flange 96 (see Fig. 4) whereupon the slide 91 is permitted to move slightly to the left under the influence of spring 106, and thus promptly removes the end of lever 86 out of the confines of the magazine to permit manipulation of the magazine hereinafter described.

Magazine manipulating mechanism

The record storage magazine is shown in perspective in Fig. 12 and consists of a frame having side walls 108 about three of its sides, a cross plate 109 forming with a lug 110 a support for a group of records when the magazine is in the horizontal position shown in Fig. 12, a pair of end plates 111 and a pair of partition plates 112. The magazine is fitted with a pair of trunnions 113, one of which is pivotally connected to links 114 and 115 (see Figs. 1, 2 and 15). The link 114 is pivotally mounted on an upstanding bracket 116 carried by the deck plate 30 and the link 115 is pivotally connected to one end of a lever 117 which in turn is pivotally connected to a bracket 118 secured to the undersurface of the deck plate 30. The lever 117 rests upon a cam 119 carried by the two-cycle cam shaft 48.

The second of the trunnions 113 is similarly pivotally mounted on links 120 and 121. The link 120 is pivotally attached at its other end to a bracket 122 carried upon the upper surface of the deck plate and the link 121 is pivotally connected to a lever 123 pivotally mounted on a bracket 124 secured to the undersurface of said deck plate. The lever 123 rests upon a cam 125 carried upon the two-cycle cam shaft 48, said cam being similar to cam 119. This construction supports the record magazine upon the cams 119 and 125 and it is obvious that the rotation of the two-cycle cam shaft 48 may raise and lower the magazine. To counterbalance a portion of the weight of the magazine, there is provided a tension spring 126 secured at one end to the deck plate 30 and at the other end to a downwardly extending portion 127 of the lever 117. A similar spring may be attached to the lever 123 if necessary.

During the playing of a record, the magazine stands in the position shown in Fig. 6 with the group of records 33 in a vertical position resting upon the side walls 108 of the magazine. During the receipt of a record from the turntable, the magazine is moved to a horizontal position as shown in Figs. 4 and 5 with the closed side of the side walls toward the turntable. During the removal of the record from the magazine for playing, the magazine assumes the position shown in Fig. 3 with the open side toward the turntable. The mechanism for tilting the magazine to the several positions includes a crank arm 128 mounted upon the one-cycle cam shaft 43 and having its outer end pivotally connected to a link 129. The opposite end of the link 129 is pivotally connected to a cam plate 130 which is in turn pivotally mounted upon a pivot pin 131, which also serves to connect the links 121 and 123. A T-shaped member 132 is secured upon one of the trunnions 113 and carries a roller 133 engaging the edge of the cam plate 130. The cam plate also carries pins 134 adapted to engage the head portions of the T-shaped member 132.

In the normal or playing position of the magazine, the roller 133 is in position in a recess 135 in the cam plate 130 as shown in Fig. 6. The rotation of the one-cycle cam shaft 43 at the completion of playing of a record, moves the cam plate 130 to the position shown in Figs. 4 and 5, in which position the roller 133 is raised by the cam plate to move the magazine to the horizontal record-receiving position. After the receipt of the record, further rotation of cam shaft 43 moves cam plate 130 toward the position shown in Fig. 3. In this movement one of the pins 134 strikes the head of the T-shaped member 132 as the roller 133 reaches the recess 135. It thereby tilts the T-shaped member and insures that the roller enters the recess to return the magazine to the vertical position. This movement continues beyond this position, however, to the position shown in Fig. 3 in which the roller 133 has ridden onto the lefthand portion of the plate 130, bringing the magazine to the horizontal position for removal of a record therefrom. The completion of the rotation of cam shaft 43 returns the magazine to the Fig. 6 position where it comes to rest during the playing of a record, the second of the pins 134 striking the T-shaped member 131 and insuring the return to this position.

It will be seen that the tilting of the magazine during the receipt and removal of a record is controlled by the one-cycle cam shaft 43 while the raising and lowering of the magazine between the positions shown in Figs. 4 and 5 is controlled by the two-cycle cam shaft by means of cams 119 and 125. When a record is first removed from the magazine and returned thereto, the magazine is raised to the Fig. 4 position by cams 119 and 125, in which position the compartment

136 between the plates 111 and 112 is at the level of the guide members 99 and thus the returning record is placed in that compartment. The remainder of the records stored in the magazine are in the larger compartment 137 between plates 109 and 112. In the reversal of the magazine to the Fig. 3 position, the record in compartment 136 is supported by lugs 138 and is brought into the uppermost position in the magazine. Since the arm 87 which removes records from the magazine always takes the uppermost record, as will be hereinafter described, the same record is returned to the turntable for playing in the reversed position.

When the second side of the record has been played and the record is again returned to the magazine, cams 119 and 125 on the two-cycle cam shaft have made a half revolution and are now in the position shown in Fig. 5, permitting the magazine to drop sufficiently low for the record to pass over the side wall 108 thereof and to be deposited upon the group of records in the magazine compartment 137. In the next reversal of the magazine to the Fig. 3 position, the record just played becomes the lowermost one in the group and a new record is removed from the top of the group for playing.

Mechanism for removing records from the magazine

The removal of records from the magazine is accomplished by means of arm 87. This arm is provided with a side extension 139 adapted to rest upon the top of the uppermost record in the magazine and with a downward extension 140 adapted to engage the edge of said record. During the movement of the slide 91 to the right, the arm 87 is raised about its pivotal mounting upon the pin 89 to clear the magazine. This is accomplished by means of a member 141 mounted for vertical movement in the deck plate 30 and having an arcuate portion 142 upon which the arm 87 may rest. The member 141 is provided with arms 143 embracing the pin 89 to prevent the member from rotating. The lower end of the member 141 is supported upon an adjustable stud 144 (Fig. 13) carried on the end of a lever 145 which is pivotally mounted on the bracket 124 and which rests on a cam 146 carried by the one-cycle cam shaft 43. When a record has been returned to the magazine with the arm 87 upraised to clear the magazine and the magazine has been reversed to the Fig. 3 position, the cam 146 acts to lower the arm 87 to permit the same to rest upon the uppermost record in the magazine, whether said record is in the small compartment 136 or in the larger compartment 137. At this time the cam 98 is in the position shown in Fig. 3 and further rotation thereof brings the same into engagement with the flange 97 to commence movement of the slide 91 to the left. This movement moves the arm 87 to the left carrying the topmost record from the magazine.

Mechanism for centering records of different sizes on the turntable

It is obvious that for records of different sizes the travel of the arm 87 toward the turntable must be variable in order to provide accurate centering of the record over the pin 37. This is accomplished by providing on the cam shaft 43 a cam 147 which may be moved along said shaft into and out of position to engage the flange 97. This cam has the operating portion thereof of greater radius than the corresponding portion of cam 98. When cam 147 is in the operative position engaging flange 97, it controls the movement of the slide 91 to cause the arm 87 to travel the proper distance to center the smaller size of record. When the cam 147 is withdrawn to the position shown in Figs. 9 and 10, it does not engage the flange 97 and the movement of arm 87 is then controlled by cam 98 to center the larger size of record.

For controlling the movement of cam 147 on the shaft 43 there is provided a roller 148 mounted upon a lever arm 149 pivotally mounted by means of a small pin 150 upon a larger pin 151 carried upon a bracket 152 supported on the undersurface of the deck plate 30. The roller 148 is so positioned that it may be engaged and pressed backward to the position shown in Fig. 9 by the larger size of record but will not be engaged by the smaller records. The said roller is held in proper position by a tension spring 153. When the roller is pressed outwardly to the Fig. 9 position, the lever 149 engages the upper end of a lever 154 which is also pivotally mounted on the pin 151. The lower end of said lever engages a groove 155 in the hub of the cam 147. The cam 147 is slidably mounted upon the shaft 43 and is prevented from rotating thereon by a pin 156 mounted upon the cam 98 and passing through a suitable opening in the cam 147. Said cam may, therefore, be considered as splined to shaft 43.

In the operation of this portion of the device, the passage of a large size record toward the turntable presses the roller 148 outwardly and, through the lever 154, moves the cam 147 out of its operating position, thus permitting the travel to be controlled by the smaller cam 98. After the return of the record to the magazine and before the removal of the next record, a cam surface 157 on the hub of cam 147 engages a pin 158 carried by the bracket 152 and returns the cam 147 to its operative position. If the next record moved to the magazine is the smaller size record, the cam remains in that position and controls the movement of the arm 87. If the next record is the larger size of record, the cam is again moved out of operative position. It will be observed in Fig. 10 that the flange 96 is sufficiently narrower than the flange 97 so that it cannot be engaged by cam 147. Thus the return of records of either size to the magazine is controlled by cam 98.

Mechanism for horizontal movement of pickup arm

The return of the pickup arm to the starting point for the two sizes of records is accomplished by the left-hand movement of the slide 91 and is, therefore, under the control of cam 98 when the large size record is moved to the turntable and under control of cam 147 when the smaller size record is moved to the turntable. For this purpose, there is mounted on the lower end of the bushing 67 a clamp 159 having a lever arm 160 and a pin 161 carried thereby. The lever arm 160 projects into the path of a downwardly turned portion 162 of the slide 91 and is engaged thereby in the right-hand movement of said slide at the beginning of the record-changing cycle. This movement swings the pickup arm to the left in Fig. 1 to a point beyond the starting point of either the large or small record.

At the return of the slide 91 toward the end of the record-changing cycle, the pin 161 is struck by a spring-pressed stud 163 mounted upon a downwardly turned portion 164 of the slide 91.

If the record being transferred is a large size record, the cam 98 limits the travel of the slide to bring a pit or hollow 165 in the plate 68 into engagement with the upper end of the stem 69. This pit is so placed that the stylus, when lowered, will accurately engage the large size record at its starting point. If the record being transferred is a small size record, the slide moves further to the left under control of cam 147 and moves the pickup arm sufficiently to bring a second pit 166 into engagement with the end of the stem 69. In this position, the pickup arm is accurately lowered to the starting point of the smaller size record.

Power equalizing device

It will be noticed that the trunnions 113 on the magazine are not located at the center of gravity of the magazine and the records therein. For this reason, the movement of the magazine from its vertical position to a horizontal position requires a relatively large force, whereas the movement from the horizontal to the vertical might be accomplished by gravity. To equalize the forces involved and to assist the motor in raising the magazine there is provided mechanism shown in Figs. 16 and 17 and also appearing in Fig. 2. This mechanism includes a cam 167 mounted upon the one-cycle cam shaft 43 and engaging a lever 168 pivotally mounted upon a bracket 169 secured to the undersurface of the deck plate 30. The opposite end of the lever is connected to a heavy tension spring 170 secured to the undersurface of the deck plate 30. The upper surface of the lever 168 is provided with a notch 171 and said lever has secured to one side thereof a plate 172 forming a continuation of the upper surface in the region of said notch. The cam 167 has one end thereof formed with a recess 173 which permits the end of the cam to enter the notch 171, the remainder of the cam being of sufficient width to engage the plate 172.

In the playing position of the mechanism, the recessed end of the cam engages notch 171 as shown in Figs. 16 and 17 and thus holds the record-changing mechanism against undesired movement while the clutch 44 is disengaged. Upon the commencement of rotation, the end of the cam leaves the notch and the lever 168 is pressed against the portion 174 of the cam by spring 170. This portion of the cam is so shaped that the spring pressure tends to rotate the shaft 43 in the direction in which it is already moving and thus assists the motor in raising the magazine from the vertical to the horizontal position. When this position has been reached and the magazine again moves toward the vertical position, the portion 175 of the cam is riding on the lever 168 and the plate 172, forcing the same downwardly, extending the spring 170 and impeding the rotation of shaft 43. The opposite point 176 of the cam reaches the lever 168 as the magazine again reaches the vertical position but since this point is the full width of the cam, it does not enter the notch 171. During the succeeding movement of the magazine to the horizontal record-removing position, portion 177 of the cam acts to assist the raising of the magazine and during the next downward movement thereof, portion 178 retards said movement. Thus, at each movement of the magazine from horizontal to vertical, a certain amount of energy is stored in the spring 170 and is later returned to the system to assist in the subsequent movement from vertical to horizontal.

While the foregoing specification described a preferred form of the invention, the details thereof may be varied between wide limits without departing from the scope of the invention as defined by the appended claims.

The invention claimed is:

1. In an automatic phonograph, the combination of a playing turntable, a record storage magazine adapted to hold a plurality of records of at least two sizes, record transfer mechanism for moving records from the magazine to the turntable, said mechanism including a pair of members, one of which controls the limit of travel of said mechanism to center the larger records on the turntable and the other of which controls said limit of travel to center the smaller records on the turntable, and record operated means for selectively placing said members into operation in accordance with the size of record being transferred.

2. In an automatic phonograph, the combination of a playing turntable, a record storage magazine adapted to hold a plurality of records of at least two sizes, record transfer mechanism for moving records from the magazine to the turntable, said mechanism including a pair of cams, one of which controls the limit of travel of said mechanism to center the larger records on the turntable and the other of which controls said limit of travel to center the smaller records on the turntable, and record operated means for selectively placing said cams into operation in accordance with the size of record being transferred.

3. In an automatic phonograph, the combination of a playing turntable, a record storage magazine adapted to hold a plurality of records of at least two sizes, an oscillating arm adapted to move records from the magazine to the turntable, mechanism for moving said arm, said mechanism including a pair of members alternatively placed in operation, one of which controls the movement of said arm to center the larger records on the turntable and the other of which controls said movement to center the smaller records on the turntable, and record operated means selectively placing said members in operation in accordance with the size of record being transferred.

4. In an automatic phonograph, the combination of a playing turntable, a record storage magazine adapted to hold a plurality of records of at least two sizes, a record moving member adapted to move a record from the magazine to the turntable, a power driven cam shaft, a cam splined thereon, a second cam fixed thereon, a cam driven member operatively connected to the record moving member for moving the same, and means for sliding said splined cam upon the cam shaft in accordance with the size of record being moved, whereby one of said cams controls the movement of the record moving member to center the larger records and the other of said cams controls the same to center the smaller records.

5. In an automatic phonograph, the combination of a playing turntable, a record storage magazine adapted to hold a plurality of records of at least two sizes, a record moving member adapted to move a record from the magazine to the turntable, a power driven cam shaft, a cam splined thereon, a second cam fixed thereon, a cam driven member operatively connected to the record moving member for moving the same, said

member engaging the fixed cam when the splined cam is slid into one position on the cam shaft and engaging the splined cam when the latter is moved to a second position on the shaft, and means for sliding said splined cam upon the cam shaft in accordance with the size of record being moved, whereby one of said cams controls the movement of the record moving member to center the larger records and the other of said cams controls the same to center the smaller records.

6. In an automatic phonograph, the combination of a playing turntable, a record storage magazine adapted to hold a plurality of records of at least two sizes, a record moving member adapted to move a record from the magazine to the turntable, a cam driven member operatively connected to the record moving member for moving the same, a power driven cam shaft, a cam splined thereon, said cam engaging said cam driven member when in one position upon the cam shaft and controlling the movement thereof to center one size of records on the turntable, a second cam on said shaft engaging said cam driven member when the first mentioned cam has been moved out of engagement therewith and controlling said movement to center the other size of records on the turntable, and means for sliding said splined cam upon the cam shaft in accordance with the size of record being moved.

7. In an automatic phonograph, the combination of a playing turntable, a record storage magazine adapted to hold a plurality of records of at least two sizes, a record moving member adapted to move a record from the magazine to the turntable, a cam driven member operatively connected to the record moving member for moving the same, a power driven cam shaft, a cam splined thereon, said cam engaging said cam driven member when in one position on the cam shaft and controlling the movement thereof to center the smaller records on the turntable, a second cam on said cam shaft engaging said cam driven member when the first mentioned cam has been moved out of engagement therewith and controlling said movement to center the larger records on the turntable, means operable by contact with a large record in its movement to the turntable for moving the splined cam to non-engaging position, and other means operable after said record has been placed on the turntable for returning said splined cam to engaging position.

8. In an automatic phonograph, the combination of a playing turntable, a record storage magazine adapted to hold a plurality of records of at least two sizes, record transfer mechanism adapted to move records from the magazine to the turntable, a pickup arm having a stylus engageable with the records for playing, a cam driven member operatively connected to the pickup arm for moving the same, a power driven cam shaft, a cam splined thereon, said cam engaging said cam driven member when in one position upon the cam shaft and controlling the movement thereof to place the stylus at the start of one size of record, a second cam on said cam shaft engaging said cam driven member when the first mentioned cam has been moved out of engagement therewith and controlling said movement to place the stylus at the start of the other size of record, and means for sliding said splined cam upon the cam shaft in accordance with the size being moved.

9. In an automatic phonograph, the combination of a playing turntable, a record storage magazine adapted to hold a plurality of records of at least two sizes, record transfer mechanism adapted to move records from the magazine to the turntable, a pickup arm having a stylus engageable with the records for playing, a cam driven member operatively connected to the pickup arm for moving the same, a power driven cam shaft, a cam splined thereon, said cam engaging said cam driven member when in one position upon the cam shaft and controlling the movement thereof to place the stylus at the start of the smaller records, a second cam on said cam shaft engaging said cam driven member when the first mentioned cam has been moved out of engagement therewith and controlling said movement to place the stylus at the start of the larger records, means operable by contact with a large record in its movement to the turntable for moving the splined cams to non-engaging position, and other means operable after said record has been placed on the turntable for returning said splined cam to engaging position.

10. In an automatic phonograph, the combination of a record storage magazine, a member adapted to move records into said magazine and to follow said records within the confines of said magazine, driving mechanism for said member including a cooperating cam and follower, and a spring compressed during movement of said member into said magazine to force said member out of said magazine at the end of said movement.

11. In an automatic phonograph, a rotatable turntable, a magazine movably mounted to one side thereof for containing a group of records to be reproduced on said turntable, means for transferring records laterally from the magazine to the turntable and from the turntable to the magazine, and means for shifting the position of the magazine relative to the turntable and transfer means to alternately receive a record below the group and above the group of records in the magazine.

12. In an automatic phonograph, a rotatable turntable, a magazine having a main compartment for containing a group of records to be reproduced on said turntable, and an auxiliary compartment, means for movably supporting said magazine to one side of the turntable, means for transferring records laterally from the magazine to the turntable and from the turntable to the magazine, and means for periodically shifting the position of the magazine relative to the turntable and transfer means after each record is reproduced to alternately receive a record in the main compartment and the auxiliary compartment.

13. In an automatic phonograph, a rotatable turntable, a magazine having a main compartment for containing a group of records to be reproduced on said turntable, and an auxiliary compartment, means for movably supporting said magazine to one side of the turntable, means for transferring records laterally from the magazine to the turntable and from the turntable to the magazine, and means for periodically shifting the position of the magazine relative to the turntable and transfer means after each record is reproduced to alternately position a record for transfer from the main compartment and the auxiliary compartment to the turntable.

14. In an automatic phonograph, a horizontal turntable, a record magazine for containing a group of records to be reproduced on said turntable, means for pivotally supporting said magazine to one side of the turntable so as to permit it to swing from one horizontal position to another

with the sides thereof alternately uppermost, means for transferring records laterally from the magazine to the turntable and from the turntable to the magazine when said magazine is horizontally disposed, means for swinging said magazine from one horizontal position to the other after each record is reproduced, and means for displacing said magazine vertically relative to the turntable and transfer means during every alternate swinging movement so as to receive a record below the group when in uppermost position and above the group when in lowermost position.

15. In an automatic phonograph, a horizontally disposed rotatable turntable, a magazine having a main compartment for containing a group of records to be reproduced on said turntable, and an auxiliary compartment adjacent thereto, means for pivotally mounting said magazine to one side of the turntable, actuating mechanism for swinging said magazine after each record is reproduced so as to present first one side and then the other to the turntable, means for transferring records from the uppermost side of the magazine to the turntable and from the turntable to the magazine, and means for periodically raising and lowering the magazine relative to the turntable and transfer means to alternately receive a record in the main compartment and the auxiliary compartment.

16. In an automatic phonograph, a horizontally rotatable turntable, a magazine pivotally supported to one side of the turntable having a main compartment for containing a group of records to be reproduced on said turntable and an auxiliary compartment for receiving a single record from the turntable to be reversed, means for transferring a record from the turntable after reproduction of one side thereof to said auxiliary compartment, and means for immediately reversing the position of the magazine about its pivotal mounting so as to reverse the record in said auxiliary compartment for transfer by said means back to the turntable for reproduction of the reverse side thereof before transfer of any other record of the group.

17. In an automatic phonograph, a horizontally rotatable turntable, a magazine pivotally mounted to one side of the turntable having a main compartment for containing a group of records to be reproduced on said turntable and an auxiliary compartment for receiving a record from the turntable to be reversed, means for transferring a record from the turntable after reproduction of one side thereof to said auxiliary compartment, means for reversing the position of the magazine about its pivotal mounting so as to reverse the record in said auxiliary compartment for transfer by said means back to the turntable for reproduction of the reverse side thereof, and means for shifting the position of the magazine relative to the turntable and transfer means so that said reversed record is thereupon returned from the turntable to said main compartment in its original position.

18. In an automatic phonograph, a rotatable turntable, a magazine pivotally mounted to one side thereof, said magazine having a main compartment for containing a stack of records to be reproduced on said turntable and an auxiliary compartment for a single record to be immediately reversed after reproduction, record changing mechanism including means for engaging a record and transferring it laterally from above the stack of records for positioning on the turntable, and means actuated by said record changing mechanism to reverse the position of said magazine and elevate it with respect to said turntable for receiving the reproduced record in said auxiliary compartment below the stack of records upon being returned by said transfer means, and thereafter again reverse and lower the magazine relative to said turntable for overturning said reproduced record and repositioning it as the uppermost record in the magazine for immediate return to the turntable in reverse position for reproduction of the opposite side thereof.

19. In an automatic phonograph, a rotatable turntable, a magazine for receiving a group of records to be reproduced on said turntable, means for pivotally mounting said magazine to one side of said turntable, means for movably supporting said pivotal mounting, and record transfer mechanism including means for swinging said magazine about its pivotal mounting and means for raising or lowering said supporting means and magazine with respect to said turntable in predetermined relation to the transfer of records between the magazine and turntable.

20. In an automatic phonograph, a rotatable turntable, a magazine for receiving a group of records for transfer to said turntable and return to said magazine after reproduction, means for pivotally mounting said magazine to one side of said turntable, record transfer mechanism, and means actuated thereby for periodically raising or lowering the pivotal mounting of said magazine relative to said turntable and swinging said magazine about its pivotal mounting.

21. In an automatic phonograph, a rotatable turntable, a magazine for containing a plurality of records to be reproduced upon said turntable, a record changing mechanism, means for pivotally mounting said magazine to one side of said turntable, and means actuated by said record changing mechanism for raising or lowering said pivotal mounting and simultaneously reversing said magazine thereabout relative to said turntable.

22. In an automatic phonograph, a rotatable turntable, a magazine having a main compartment for containing a group of records to be reproduced and an auxiliary compartment for receiving a reproduced record to be immediately reversed for reproduction on the opposite side thereof, record changing mechanism including means for transferring records between said magazine and the turntable, means for pivotally mounting said magazine to one side of said turntable for permitting reversal thereof so that first one and then the other of said compartments is uppermost, means for reversing said magazine about its pivotal mounting, means for raising and lowering said pivotal mounting with respect to said turntable and record transfer means, and means actuated by said record changing mechanism for operating said magazine reversing, raising and lowering means in timed relation upon completion of the reproduction of a record.

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