Aug. 23, 1932. R. R. ERBE 1,872,707

PHONOGRAPH

Filed April 5, 1929 5 Sheets-Sheet 1

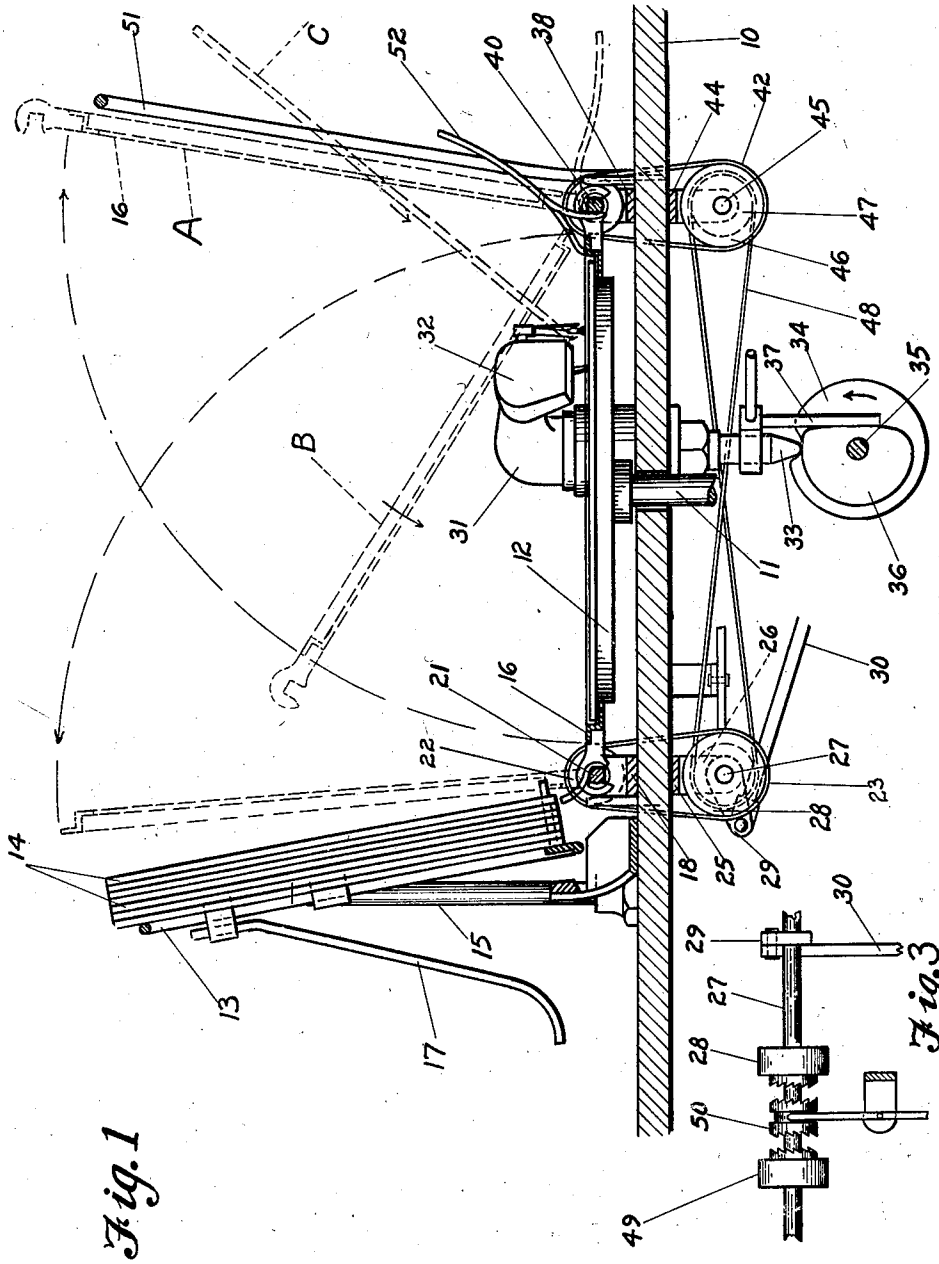


Fig. 1

Fig. 3

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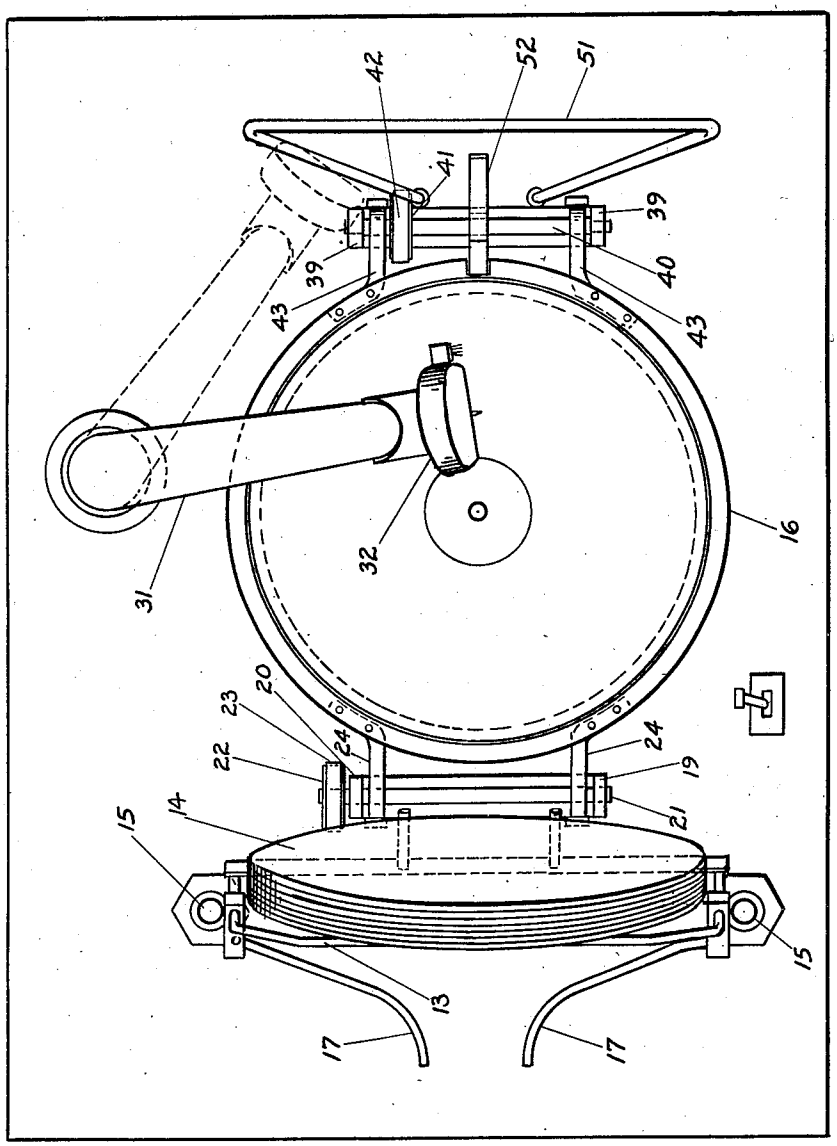


Fig. 2

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Fig. 4

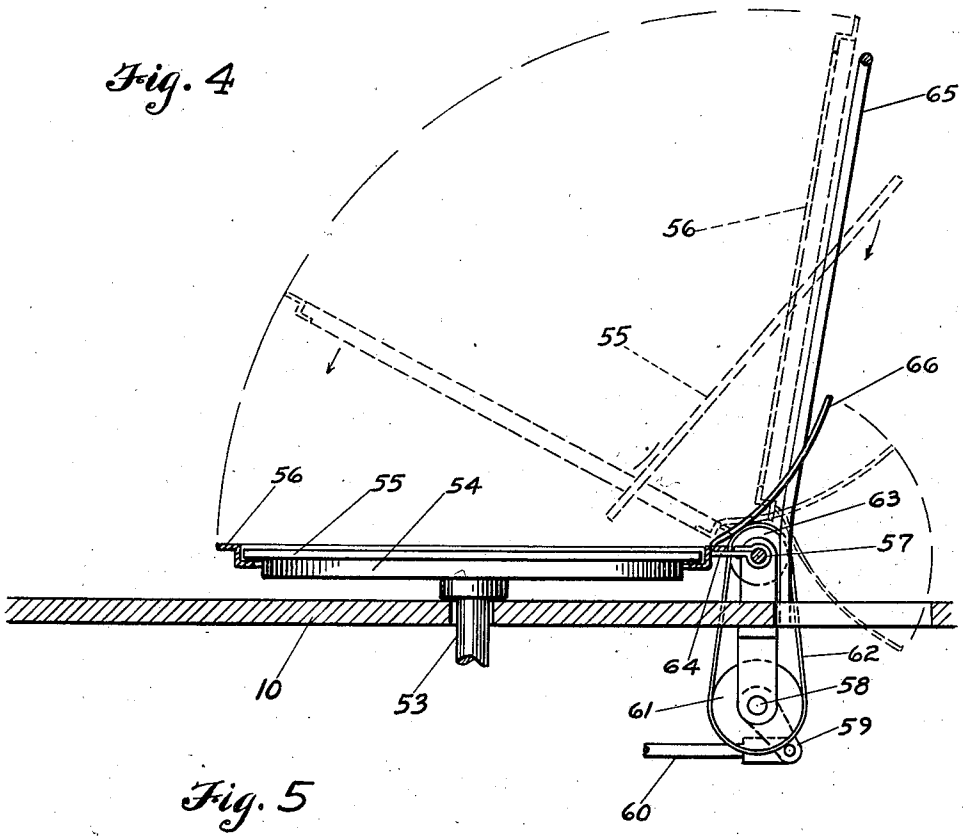


Fig. 5

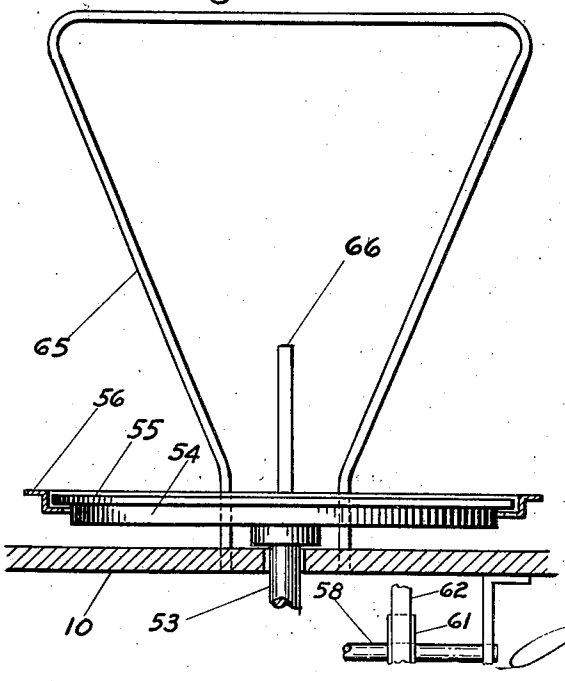
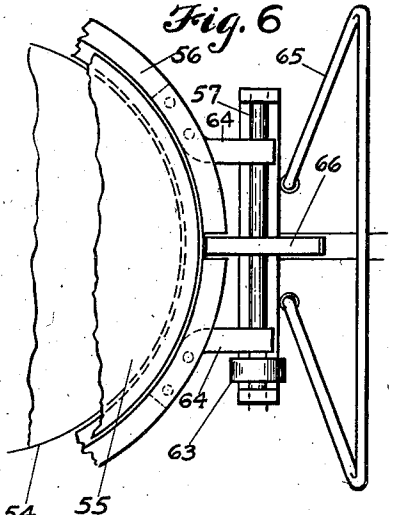


Fig. 6



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Fig. 7

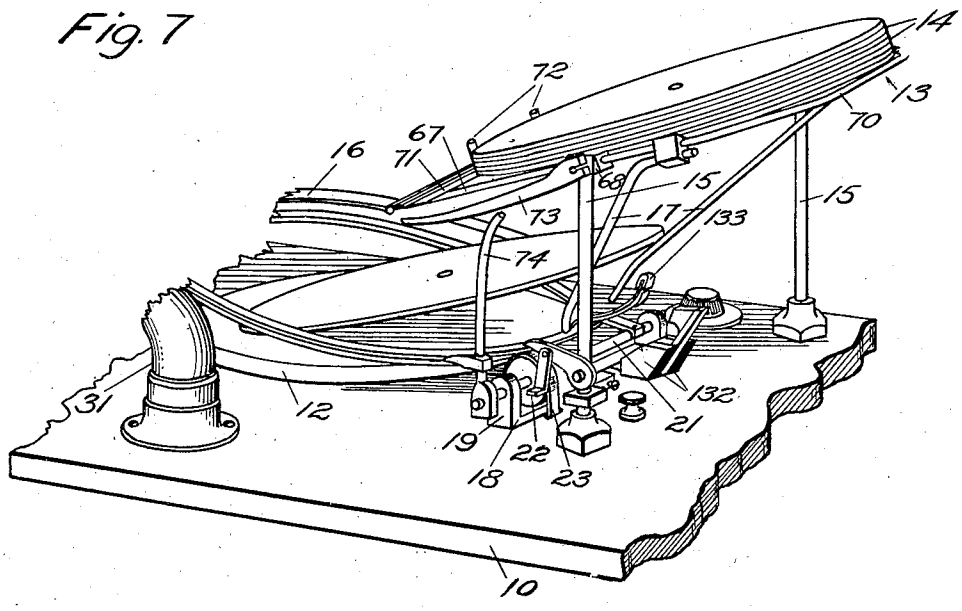


Fig. 8

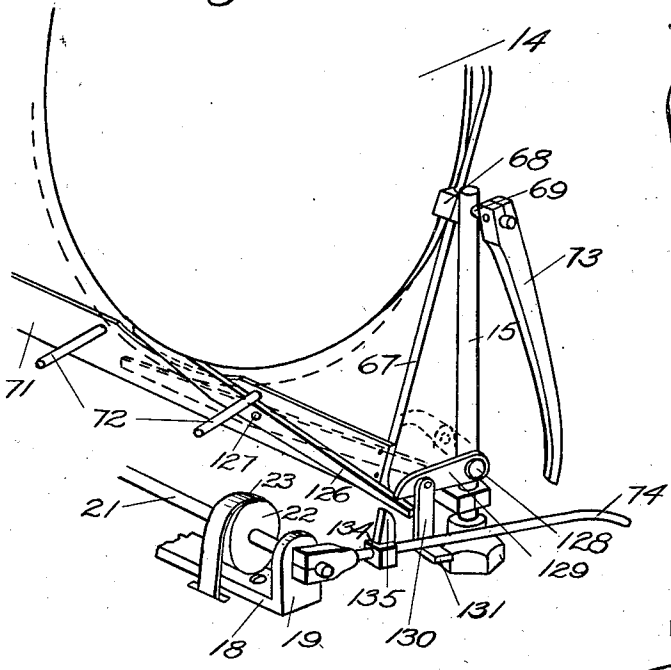
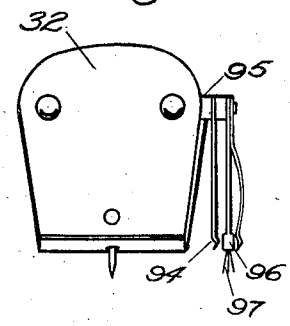


Fig. 9



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Fig. 10

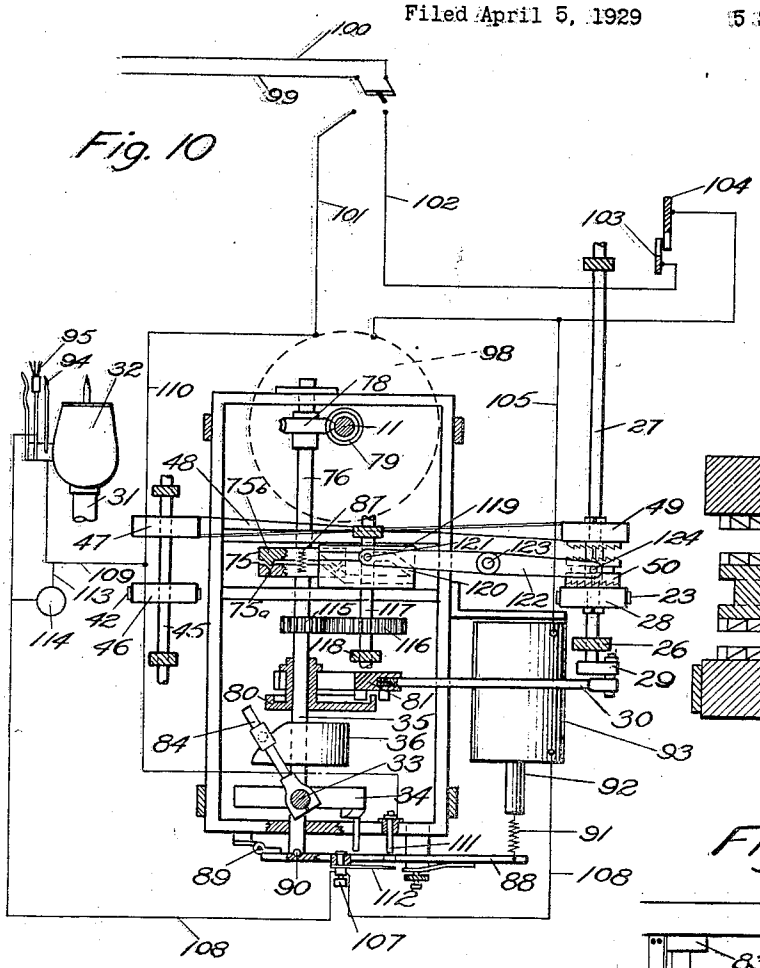


Fig. 11

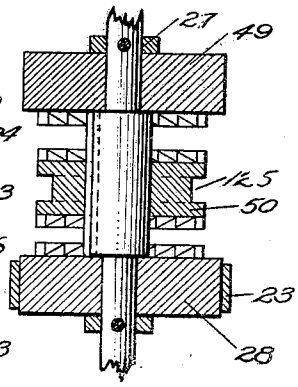


Fig. 12

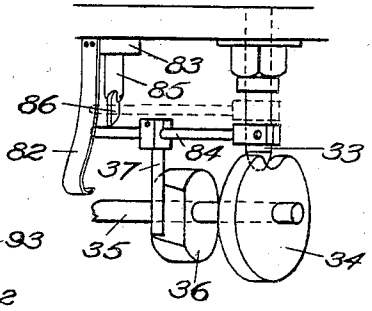
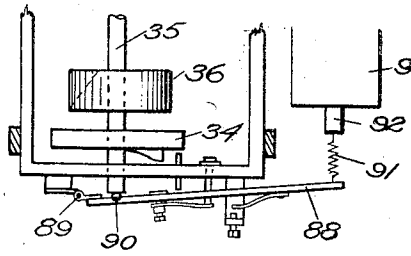


Fig. 13



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Patented Aug. 23, 1932 1,872,707

UNITED STATES PATENT OFFICE

RALPH R. ERBE, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE CAPEHART CORPORATION, OF FORT WAYNE, INDIANA, A CORPORATION OF INDIANA

PHONOGRAPH

Application filed April 5, 1929. Serial No. 352,768.

This invention relates to new and useful improvements in phonographs and to some extent seeks to improve on the phonograph shown in my application Serial No. 270,363 filed April 16, 1928.

The present invention has particular relation to a means for reversing the position of a record on a phonograph turntable whereby the reverse side of the record will automatically be presented for playing.

A further object is to provide a means for the purpose stated, which means will be of simple construction, not likely to get out of order and reliable in operation.

An additional object of the invention is to provide a record reversing mechanism which may be used either on a phonograph where the records are manually supplied to the turntable or on a multiplaying or automatic phonograph.

Another object is to provide an automatic phonograph including means whereby both sides of a record are played, and the played record returned to a rack.

A further object is to provide an automatic phonograph including means for removing a record from the bottom of the group, playing one side and then the other of the record and returning the played record to the top of the group with the sides in their original relative location.

Additional objects and advantages will become more apparent from a consideration of the following detailed description taken in connection with the accompanying drawings, wherein is shown a satisfactory embodiment of the invention. However, it is to be understood that the following description and the accompanying drawings are for the purpose of illustration only, and that reference must be made to the appended claims for a definit on of the limitations of the invention, since changes in construction, arrangement and combination of parts may be made without departing from the spirit of the invent on or the scope of the claims.

In the drawings:—

Fig. 1 is a side view partly in elevation and partly in section showing my improved reversing mechanism in combination with an automatic phonograph;

Fig. 2 is a plan view thereof;

Fig. 3 is a plan view of a detail;

Fig. 4 is an elevational view, parts being shown in section and illustrating the application of the record reversing means to a phonograph, wherein the records are adapted to be manually supplied to the turntable;

Fig. 5 is a front view of the device shown in Fig. 4; and

Fig. 6 is a plan view thereof, part of the turn-table record and record carrier being broken away.

Fig. 7 is a perspective view of the record changing mechanism during a record changing operation.

Fig. 8 is a retail, perspective view, showing the trip mechanism whereby the records are released from the bottom of the stack onto the carrier for delivery to the turntable.

Fig. 9 is a front view of the reproducing implement, showing the switch used in connection therewith for closing the circuit to the clutch actuating solenoid.

Fig. 10 is a plan view of the various control and driving mechanisms and a diagrammatic view of the circuit connections.

Fig. 11 is an enlarged sectional view on the line 11—11 of Fig. 10.

Fig. 12 is a perspective view of the tone arm raising, swinging and setting devices; and

Fig. 13 is a detail view illustrating action of the clutch setting lever under the influence of the energized solenoid.

Referring in detail to the drawings, at 10 is shown a motor board or other suitable support through which projects a spindle 11 carrying a turntable 12, the spindle being rotated by any suitable means (not shown). The automatic mechanism shown in Figs. 1, 2 and 3 is substantially the same as that shown in my application Serial No. 270,363 of April 16, 1928 and will be but briefly referred to here.

This mechanism comprising a tiltable rack 13 carrying a group of records 14 is pivotally mounted between the upright posts 15. Records are fed from this rack 13 as in the

case of my earlier filed application, and these records are placed into a pan or carrier 16, the records being guided into place on the turntable by the carrier and by the bars 17, also movable with the rack. The operation of transferring the record from the magazine or rack to the turntable will later be described in detail.

Disposed on the motor board 10 between the rack 13 and turntable is a bar 18 having its ends bent upwardly to form bearings 19 and 20 in which is rotatably mounted a shaft 21. A pulley 22 is fixed to the shaft 21 and is adapted to be driven at the proper time by a belt 23 for the purpose of raising and lowering the carrier or pan 16. As best shown in Fig. 2, the shaft 21 has a squared portion embraced by a similar portion of arms 24 which as clearly shown, are secured to the carrier or pan 16.

Disposed below the motor board 10 substantially in alignment with the member 18 is a similar member 25 having down-turned ends 26 mounting a shaft 27 on which is secured a pulley 28 about which is disposed the belt 23. Obviously, as movement is imparted to pulley 28, it will be transmitted to pulley 22 by belt 23.

Shaft 27 carries a crank 29 rocked by a link 30. Also, movement is imparted to the tone arm or support 31 and pick-up 32 at the proper times by means of the downwardly extending post 33 carrying the arm or support 31. This post, at its lower end rides on the periphery of a cam 34 fixed to a shaft 35. For the purpose of imparting a swinging movement to the arm 31, cam 36 is provided on the shaft 35 and operates a pin 37, all as fully disclosed in my earlier application.

Mounted on the motor board 10 at the side of the turntable opposite the side at which the record rack 13 is disposed, is a member 38 having its ends upturned to provide bearings 39 whereby a shaft 40 is mounted. This shaft is similar to the shaft 21 and carries a pulley 41 about which is disposed a belt 42. The pan or record carrier 16 carries arms 43 identical with the arms 24 and which embrace the shaft 40 in the same manner as the arms 24 embrace the shaft 21. Disposed at the underside of the motor board below the member 38 is a similar member 44 carrying a shaft 45 on which is disposed a pulley 46. The belt 42 is trained over pulley 46 whereby any movement imparted to pulley 46 will also be imparted to pulley 41.

A second pulley 47 is secured to the shaft 45 and is driven by a belt 48 at the proper time. This belt 48 is also trained over a pulley 49 loosely mounted on the shaft 27 as in the case of pulley 28. Pulleys 28 and 49 are provided with teeth whereby they may be driven from shaft 27, through the medium of clutch element 50. This element (see Fig. 3) has clutch teeth at each end and is keyed to and slidable on shaft. Alternately, clutch element 50 is moved to drive pulleys 28 and 49. For example, when the machine is starting, element 50 will be coupled with pulley 28 whereby to raise the pan upwardly, chop a record from the bottom of the stack and return the pan to a position about the turntable, the pan and the rack co-operating to feed a record to the turntable.

After the record has been played, the element 50 is shifted to couple with the pulley 49 whereby belt 48, pulley 47, pulley 46 and pulley 41 are driven. In this way, movement is imparted to shaft 40 and not to shaft 21, and the carrier or pan 16 is moved upwardly into the dotted line position A of Fig. 1 to drop the record against the somewhat triangular shaped guide means 51. As the pan or carrier 16 descends into the dotted line position B of Fig. 1, the record slides on the pan and guide 51 passing through the dotted line position C of Fig. 1, moving downwardly until it is given its final push by means of the kicker or finger 52 carried by the shaft 40. This, it will be seen, places the record on the turntable in a reverse position to that it formerly occupied. The pick-up or sound box 32 is returned to playing position, the record played, after which element 50 clutches with pulley 28 to return the played record to the top of the stack with its sides in the relative position formerly occupied by it and to have fed another record from the bottom of the stack.

In Figs. 4, 5 and 6, the reversing mechanism is shown associated with a phonograph turntable onto which records are to be manually fed. Here we have a turntable shaft 53 driven by any suitable means (not shown) and carrying a turntable 54 on which is disposed a record 55 and about which is disposed a pan or carrier 56. In this form of the invention, shafts 57 and 58 are mounted respectively above and below the motor board 10, the shaft 58 having a crank 59 to be moved by a link 60. Further, shaft 58 carries a pulley 61 which, through the medium of a belt 62, drives a pulley 63 secured to shaft 57. When the shaft 57 is rocked upwardly it carries the pan or carrier 56 with it, since the pan is secured to the shaft by arms 64. The record carried upwardly by the pan is disposed against the somewhat triangular shaped guide member 65 as in the form previously described and gravitates downwardly on the guide member and carrier 56 which has started to descend and is finally kicked or pushed into position by the kicker or finger 66, movable with the pan or carrier 56.

The rack 13 is as before stated pivotally mounted on the uprights 15, being pivotally connected at the upper ends of said uprights; the said rack comprising parallel opposite side bars 67 which extend through blocks 68

pivotally connected as at 69 to the uprights or posts 15, with the upper ends of the bars 67 connected by a cross member 70 and their lower ends connected by a flat bar or plate 71. In this present construction as in the case of my pending application previously referred to, the cross-bar 70 and the plate 71 serve as supports for the record stack which barely overlaps these parts, to spaced studs or pins 72 being fixed in the plate 71 and against which the lower edges of the stack of records abut whereby to hold the record discs in alignment and also to support the stacks when the frame or rack is tilted vertically during a record changing operation, as will presently be described.

Except during the record changing operation, the record stack is supported by the rack or frame substantially in a vertical position, the rack being moved to a substantially horizontal position during a record changing operation by means of an arm 73 which is fixed to the rack pivot 69 at one side of one of the uprights 15 and which extends alongside the adjacent frame or rack bar 67. This arm when in its upper position is supported by engagement with the upper end of a lever 74 that is fixed to one end of the cross shaft 21. The center of the rack or record stack is set slightly forward of the line of the pivots 69 so that the stack will of its own weight cause the rack to tilt forwardly when the arm 73 is released.

Downward tilting of the record supporting rack, which is necessary for each transfer operation, is effected by swinging the arm or lever 74 rearwardly and the return of the rack to horizontal position is effeced by the return of the lever to initial position. Movement is, of course, imparted to the lever by the shaft 21 which is operated by the lever or link 30 and crank 29 through the medium of pulleys and a belt as has been described.

It will, of course, be understood that the shaft 27 is stationary during the playing of a record, but is set in motion for the record changing operation by the setting of a friction clutch mechanism 75 which provides a driving connection between a shaft 76 and a shaft 35 aligned therewith.

Shaft 76 is continuously rotated being driven from the turntable spindle 11 through a worm and worm gear 78 and 79 respectively. When the clutch is set, the shaft 35 will be revolved and a cam 80 on the shaft, through its connection with a slide 81 and the link 30 effects an oscillating motion of the lever arm or crank 29 and this is transferred to the shaft 27 which through the connection of the belt 23 with the pulley 22 effects the rearward and forward swinging movement of the lever or arm 74 controlling the movement of the rack.

When the shaft 35 is rotated cam 34, of course, rotates with it and the lower end of the post 33 riding on the periphery of the cam moves out of the notch in the cam and is elevated raising the tone arm 31 with it. During the playing of a record, the post is disposed in the notch in the cam as shown in Fig. 12. As the post is elevated, the arm 31 carried thereby is swung to one side of the turntable by the action of the cam 36 on the pin 37. A yieldable spring 82 fixed to a block 83 on the under side of the base or motor board 10, engages an arm 84 carrying the pin 37 and thus limits the outward swing of the tone arm. This spring also serves as a means for returning the tone arm back over the turntable as the cam 36 recedes. As the tone arm is brought back over the turntable, its inward swing is stopped at a certain point so that when it is lowered, the stylus of the pick-up or reproducer 32 will be positioned within the starting groove adjacent the outer edge of the record. This stopping of the arm is effected by engagement of the outer end of the arm 84 with a downwardly projecting stop 85 fixed to the block 83 and of such length that after the tone arm has been lowered arm 84 may pass beneath the stop as it swings inwardly in accordance with the travel of the needle on the record.

When the tone arm is lifted on the completion of a record, the laterally extending arm 84 is disposed within the stop post 85 and it is essential that the stop be so constructed as to permit the arm 84 to pass by it when the tone arm is swung outwardly. To permit this I have provided the lower end of the stop post with a hingedly attached extension member 86. This extension is so hinged that it will swing outwardly to permit the arm 84 to pass outwardly but will not swing inwardly beyond the straight line of the post.

The clutch 75 as shown in Fig. 10 comprises two co-operating friction discs 75*a* and 75*b* that are fixed, respectively, to the shafts 35 and 76 and which are normally held disengaged by the pressure of a small coil spring 87 that is placed between them but which will be engaged to effect a driving connection between the shafts by the inward swinging of a lever 88 that is hingedly attached as at 89 to the machine frame and has a bearing as at 90 against the outer end of shaft 35. The inward swinging of this lever from the position shown in Fig. 10 to that shown in Fig. 13 causes the shaft 35 to be shifted inwardly to press the clutch discs together and thus cause the shaft 35 to be driven.

This movement of the clutch lever is effected through a spring connection 91 with the core bar 92 of a solenoid 93. When the solenoid is energized, through connection with the main circuit as presently described, the core is drawn inwardly and this places the spring 91 under tension and pulls the lever 88 inwardly. This action of the solenoid, whereby the clutch is set and the transfer

mechanism placed in motion, is occasioned at the completion of playing a record by the closing of a circuit through the solenoid by the automatic, momentary closing of a switch carried on the reproducer unit at the end of the tone arm. This switch as best shown in Fig. 9 comprises a stationary contact 94 mounted on a block of insulation 95 on the casing of the reproducer unit 32, with a flexible contact 96 also mounted on the block at one end, having a brush 97 or other device adapted to engage the face of the record disc and to follow in its grooves.

The contacts 94 and 96 are normally disengaged so that the circuit to the solenoid is open but are brought together incident to the inward travel of the brush toward the center of the record after the reproducing needle has reached the continuous groove formed in the disc at the end of the record; it being apparent that the needle reaches the continuous groove in advance of the brush and that, since the brush is following in the spiral grooves of the record, it will carry the contact 96 over against the contact 94.

The wiring diagram of Fig. 10, whereby the circuit connection between the motor and the various switches are closed, shows the motor 98 to be connected with the main circuit wires 99 and 100 by means of circuit connections 101 and 102; the latter having a switch interposed therein which comprises a fixed contact plate 103 and a yieldably mounted contact plate 104, these being associated with an automatic stop mechanism which forms no particular part of the present invention and which is fully disclosed in my co-pending application above referred to, and will not be further described herein. A circuit wire 105 connects one side of the solenoid 93 with the circuit wire 102, between the motor and the cutout switch. A wire 106 connects the other side of the solenoid with a binding post 107 that is mounted on but insulated from the lever arm 88. A wire 108 connects the binding post 82 with the movable contact 96 of the switch carried on the tone arm and a wire 109 connects the stationary contact 94 with a wire 110 which connects with wire 101 and a binding post 111 mounted on the frame of the machine within the lever 88. This latter post 111 is adapted when the lever 88 is drawn inwardly by the action of the solenoid to engage with a contact 112 carried by the lever 88. With the circuit connections so established, it is apparent that the bringing together of the contact 94 and 96 on the completion of a record will close a circuit through the solenoid which causes the core thereof to be drawn inwardly and the lever 88 to be moved accordingly to set the clutch 75 and thus cause the shafts 35 to be driven in accordance with the continuously driven shaft 76.

I have also provided a shunt circuit connection around the switch on the tone arm, such shunt circuit connection consisting of a wire 113 connecting wires 108 and 109 with the normally open push button switch 114 interposed in the connection. Since the circuit through the solenoid as controlled by the switch carried on the tone arm is only temporary, it is necessary to provide other means for keeping the circuit closed after the contact 94 and 96 are separated. This is accomplished by the circuit connecting wire 110 which carries the circuit to the post 111 from which it passes through the contact 112 to wire 106 to the solenoid after the circuit through the wire 108 is opened.

Through a two to one gearing, comprising small and large gears 115 and 116 respectively, the shaft 35 drives a short shaft 117 parallel with the shaft 35 and mounted in bearings 118. Shaft 117 carries a cam 119 having a cam groove 120 in which is disposed a pin 121 carried in one end of a lever 122 pivoted as at 123 and including a yoke portion having a pin 124 operating in the groove 125 of the shiftable clutch element 50. Due to the gear ratio between the shafts 35 and 117 cam 119 will be given a complete turn each time shaft 35 makes two complete revolutions. The cam groove 120 is such that the element 50 on one rotation of shaft 35 engages to drive the pulley 28 and on the next rotation is shifted whereby to drive the pulley 49. As best shown in Fig. 11 these pulleys are free to turn on the shaft 27.

Since the element 50 alternately connects pulleys 28 and 49 to be driven by the shaft 27 it will be understood that shaft 21 and 40 are alternately driven and thus records are elevated and reversed due to movement of the shaft 40 and after their reverse side has been played are returned to the rack due to movement of the shaft 21.

Records are removed from the rack while it is in the position shown in Figs. 1 and 2. The means for releasing the record as best shown in Figs. 7 and 8 comprises a trip lever 126 which lies against the outer face of the plate 71 and is pivotally connected thereto as by a pin 127. The inner end of this lever is disposed against the lower edge of the innermost record of the stack while the outer end of the lever projects beyond the end of plate 17. Pivotally attached to one of the posts 15 at that end of the rack, by means of a pivot 128 is a short forwardly directed lever 129 and pivotally connected with the outer end of this lever is a downwardly depending link 130 having a laterally turned foot 131 at its lower end. The construction and arrangement of these parts is such that while the record supporting rack is disposed substantially vertically the lower end of the lever 126 is in a position beneath the outer end of the lever 129 and when lever arm 74 swings downwardly it is brought into en-

gagement with the foot 131 of the link 130, and through this link, draws the lever 129 downwardly so that its end engages with the end portion of the lever 126 and rocks the inner end of the latter upwardly, thereby unseating the innermost record of the stack from the cross plate 71 and allowing the record to drop against two spaced cushioning members 132 that are fixed to the base or board 10 centrally between the uprights or posts 15 and in the rear of the shaft 21.

The released record is supported by the cushion members and by the two inwardly and downwardly directed arms or antenna member 17 against which the record leans. As soon as the record is released the rack starts to tilt upwardly and the carrier 16 starts to tilt downwardly and as the carrier swings downwardly the record slides forwardly on the same (see Fig. 7). As the carrier swings downwardly, a rearwardly and upwardly directed prong 133 that is fixed to the rear edge of the carrier comes into contact with the lower edge of the released record and lifts it from the cushion blocks 132 and causes it to slide into the carrier; then as the rack swings upwardly the record slides down along the inwardly converging arms 17 and onto the turntable. Finally, as the carrier assumes a horizontal position the record drops from the arms 17 and is centered in the ringlike carrier and on the turntable in position for playing.

For the purpose of resetting the lever 126, after it has unseated a record from the bottom of the stack, I provide a block 134 mounted on the arm 74 at a position at which the outer end of the lever 126 will be engaged therewith when the records supporting frame swings upwardly and by this engagement will be moved back to initial position. The arrangement is best shown in Fig. 8, which shows the relation of parts just after the record has been tripped. In resetting, the lever 74 swings upwardly and forwardly as the rack swings upwardly, and during this upward swinging movement, the outer end of the lever 126 rides over the rounded edge 135 of the block 134 to effect the resetting of the lever.

From the foregoing, it is believed that the construction and operation of the invention will be clear. However, it is desired to point out that the reversing mechanism is equally applicable to phonographs wherein the records are automatically supplied to the turntable and phonographs wherein the records are manually supplied to the turntable. Further, the device may be used with records of various diameters, and the reversing mechanism is of exceedingly simple construction.

Having thus described the invention what is claimed is:—

1. In a phonograph, in combination, with a turntable, means at one side of the turntable automatically supplying records thereon, and means at the diametrically opposite side of the turntable for reversing the record and causing its return directly to the turn table in reverse position.

2. In a phonograph including a turntable, a record carrier associated with the turntable, means at one side of the turntable for supporting a group of records and feeding them one at a time to said carrier for disposition on the turntable, and means at the other side of the turntable for raising the record off the turn table and returning it to the turntable in reverse position from that formerly occupied by it.

3. In a phonograph, in combination with a turntable, means on one side of the turntable for holding a group of records, means for feeding the records from one side of the group to the turntable one at a time, means on the other side of the turntable for reversing the record and causing its return directly to the turntable in reverse position, and a part of the first means adapted to return the record to the group with its sides in the relative positions occupied by them before the record was removed therefrom.

4. In a phonograph including a turntable, means at one side of the turntable for holding a group of records, means for feeding the records from the group to the turntable, said means including a ring movable over the turntable, and adapted to be swung between the turntable and group, a guide at the other side of the turntable, and means for swinging said ring to deposit a record against said guide.

5. In a phonograph including a turntable, means at one side of the turntable for holding a group of records, means for feeding the records from the group to the turntable, said means including a pan movable over the turntable, and adapted to be swung between the turntable and group, a guide at the other side of the turntable, and means to swing said pan alternately toward the group and toward the guide, said pan when swung toward the guide serving to dispose a record against the guide and to assist in guiding the record as it gravitates downwardly against the guide.

Signed at Bridgeport, in the county of Fairfield, and State of Connecticut, this 2nd day of April, A. D. 1929.

RALPH R. ERBE.